Department of Defense
Fiscal Year (FY) 2018 Budget Estimates

May 2017

Office of the Secretary Of Defense

Defense-Wide Justification Book Volume 3 of 5

Research, Development, Test & Evaluation, Defense-Wide

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OSD RDT&E Overview

The OSD RDT&E budget provides ongoing support and oversight of research, development, and testing for the Office of the Secretary of Defense (OSD) Principal Staff Assistants, Military Services and other DoD agencies while eliminating duplication of efforts. It represents requirements from the Services that has been coordinated with appropriate Office of the Secretary of Defense (OSD) organizations.

The OSD RDT&E budget is divided into seven budget activities (BA 1-7) ranging from basic research to full scale operational system development consisting of programs such as research grants, STEM education, laboratory research, innovation & technology, manufacturing institutes, combatting terrorism, countering weapons of mass destruction, physical security, cyber security, systems engineer among many more.

The OSD RDT&E Program is committed to and has achieved numerous milestones and individual accomplishments which are presented in the FY 2018 President's Budget justification book.

FY 2018 OSD RDT&E President's Budget Request is approximately $4 billion.

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Department of Defense
FY 2018 President's Budget Request
Exhibit R-1 FY 2018 President's Budget Request
Total Obligational Authority
(Dollars in Thousands)

23 May 2017

Appropriation	FY 2016 Base + OCO	FY 2017 PB Request with CR Adj Base	FY 2017 Total PB Requests* with CR Adj Base	FY 2017 PB Request with CR Adj OCO	FY 2017 Total PB Requests* with CR Adj OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj OCO
Research, Development, Test & Eval, DW	3,381,638	3,430,277	3,770,685				
Total Research, Development, Test & Evaluation	3,381,638	3,430,277	3,770,685				

Department of Defense
FY 2018 President's Budget Request
Exhibit R-1 FY 2018 President's Budget Request
Total Obligational Authority
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23 May 2017

Appropriation	FY 2017 Total PB Requests** with CR Adj Base+OCO+SAA	FY 2017 Total PB Requests* with CR Adj Base + OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj Base + OCO	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Research, Development, Test & Eval, DW	3,430,277	3,770,685		3,770,685	4,041,233	25,000	4,066,233
Total Research, Development, Test & Evaluation	3,430,277	3,770,685		3,770,685	4,041,233	25,000	4,066,233

Department of Defense
FY 2018 President's Budget Request
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Total Obligational Authority
(Dollars in Thousands)

23 May 2017

Summary Recap of Budget Activities	FY 2016 Base + OCO	FY 2017 PB Request with CR Adj Base	FY 2017 Total PB Requests* with CR Adj Base	FY 2017 PB Request with CR Adj OCO	FY 2017 Total PB Requests* with CR Adj OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj OCO
Basic Research	158,091	129,571	129,571				
Applied Research	142,583	158,823	158,823				
Advanced Technology Development	1,133,128	1,161,401	1,221,785				
Advanced Component Development And Prototypes	1,005,790	1,096,620	1,247,220				
System Development And Demonstration	149,113	292,419	308,943				
Management Support	736,881	522,166	635,066				
Operational System Development	56,052	69,277	69,277				
Total Research, Development, Test & Evaluation	3,381,638	3,430,277	3,770,685				
Summary Recap of FYDP Programs							
General Purpose Forces	1,888	2,072	2,072				
Intelligence and Communications	87,820	118,502	118,502				
Research and Development	3,250,195	3,275,319	3,615,727				
Training Medical and Other	41,735	34,384	34,384				
Total Research, Development, Test & Evaluation	3,381,638	3,430,277	3,770,685				

Department of Defense
FY 2018 President's Budget Request
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23 May 2017

Summary Recap of Budget Activities	FY 2017 Total PB Requests** with CR Adj Base+OCO+SAA	FY 2017 Total PB Requests* with CR Adj Base + OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj Base + OCO	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Basic Research	129,571	129,571		129,571	140,775		140,775
Applied Research	158,823	158,823		158,823	141,815		141,815
Advanced Technology Development	1,161,401	1,221,785		1,221,785	1,128,893	25,000	1,153,893
Advanced Component Development And Prototypes	1,096,620	1,247,220		1,247,220	1,685,375		1,685,375
System Development And Demonstration	292,419	308,943		308,943	341,821		341,821
Management Support	522,166	635,066		635,066	534,872		534,872
Operational System Development	69,277	69,277		69,277	67,682		67,682
Total Research, Development, Test & Evaluation	3,430,277	3,770,685		3,770,685	4,041,233	25,000	4,066,233
Summary Recap of FYDP Programs							
General Purpose Forces	2,072	2,072		2,072	2,551		2,551
Intelligence and Communications	118,502	118,502		118,502	118,990		118,990
Research and Development	3,275,319	3,615,727		3,615,727	3,919,692	25,000	3,944,692
Training Medical and Other	34,384	34,384		34,384			
Total Research, Development, Test & Evaluation	3,430,277	3,770,685		3,770,685	4,041,233	25,000	4,066,233

Defense-Wide
FY 2018 President's Budget Request
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Summary Recap of Budget Activities	FY 2016 Base + OCO	FY 2017 PB Request with CR Adj Base	FY 2017 Total PB Requests* with CR Adj Base	FY 2017 PB Request with CR Adj OCO	FY 2017 Total PB Requests* with CR Adj OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj OCO
Basic Research	158,091	129,571	129,571				
Applied Research	142,583	158,823	158,823				
Advanced Technology Development	1,133,128	1,161,401	1,221,785				
Advanced Component Development And Prototypes	1,005,790	1,096,620	1,247,220				
System Development And Demonstration	149,113	292,419	308,943				
Management Support	736,881	522,166	635,066				
Operational System Development	56,052	69,277	69,277				
Total Research, Development, Test & Evaluation	3,381,638	3,430,277	3,770,685				
Summary Recap of FYDP Programs							
General Purpose Forces	1,888	2,072	2,072				
Intelligence and Communications	87,820	118,502	118,502				
Research and Development	3,250,195	3,275,319	3,615,727				
Training Medical and Other	41,735	34,384	34,384				
Total Research, Development, Test & Evaluation	3,381,638	3,430,277	3,770,685				

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Summary Recap of Budget Activities	FY 2017 Total PB Requests** with CR Adj Base+OCO+SAA	FY 2017 Total PB Requests* with CR Adj Base + OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj Base + OCO	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Basic Research	129,571	129,571		129,571	140,775		140,775
Applied Research	158,823	158,823		158,823	141,815		141,815
Advanced Technology Development	1,161,401	1,221,785		1,221,785	1,128,893	25,000	1,153,893
Advanced Component Development And Prototypes	1,096,620	1,247,220		1,247,220	1,685,375		1,685,375
System Development And Demonstration	292,419	308,943		308,943	341,821		341,821
Management Support	522,166	635,066		635,066	534,872		534,872
Operational System Development	69,277	69,277		69,277	67,682		67,682
Total Research, Development, Test & Evaluation	3,430,277	3,770,685		3,770,685	4,041,233	25,000	4,066,233
Summary Recap of FYDP Programs							
General Purpose Forces	2,072	2,072		2,072	2,551		2,551
Intelligence and Communications	118,502	118,502		118,502	118,990		118,990
Research and Development	3,275,319	3,615,727		3,615,727	3,919,692	25,000	3,944,692
Training Medical and Other	34,384	34,384		34,384			
Total Research, Development, Test & Evaluation	3,430,277	3,770,685		3,770,685	4,041,233	25,000	4,066,233

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Office of Secretary of Defense	3,381,638	3,430,277	3,770,685				
Total Research, Development, Test & Evaluation	3,381,638	3,430,277	3,770,685				

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Office of Secretary of Defense	3,430,277	3,770,685		3,770,685	4,041,233	25,000	4,066,233
Total Research, Development, Test & Evaluation	3,430,277	3,770,685		3,770,685	4,041,233	25,000	4,066,233

Defense-Wide
FY 2018 President's Budget Request
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Total Obligational Authority
(Dollars in Thousands)

23 May 2017

Appropriation: 0400D Research, Development, Test & Eval, DW

Line No	Program Element Number	Item	Act	FY 2016 Base + OCO	FY 2017 PB Request with CR Adj Base	FY 2017 Total PB Requests* with CR Adj Base	FY 2017 PB Request with CR Adj OCO	FY 2017 Total PB Requests* with CR Adj OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj OCO	Sec
3	0601110D8Z	Basic Research Initiatives	01	70,311	36,654	36,654					U
5	0601120D8Z	National Defense Education Program	01	52,837	69,345	69,345					U
6	0601228D8Z	Historically Black Colleges and Universities/Minority Institutions	01	34,943	23,572	23,572					U
		Basic Research		158,091	129,571	129,571					
8	0602000D8Z	Joint Munitions Technology	02	18,993	17,745	17,745					U
10	0602230D8Z	Defense Technology Innovation	02		30,000	30,000					U
11	0602234D8Z	Lincoln Laboratory Research Program	02	53,517	48,269	48,269					U
12	0602251D8Z	Applied Research for the Advancement of S&T Priorities	02	46,750	42,206	42,206					U
16	0602668D8Z	Cyber Security Research	02	15,378	12,183	12,183					U
21	0602751D8Z	Software Engineering Institute (SEI) Applied Research	02	7,945	8,420	8,420					U
		Applied Research		142,583	158,823	158,823					
23	0603000D8Z	Joint Munitions Advanced Technology	03	25,452	23,902	23,902					U
24	0603122D8Z	Combating Terrorism Technology Support	03	146,115	73,002	73,002					U
25	0603133D8Z	Foreign Comparative Testing	03	24,406	19,343	19,343					U
32	0603225D8Z	Joint DoD-DoE Munitions Technology Development	03	18,129	17,256	17,256					U
37	0603288D8Z	Analytic Assessments	03	14,145	12,048	12,048					U
38	0603289D8Z	Advanced Innovative Analysis and Concepts	03	48,873	57,020	57,020					U

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Line No	Program Element Number	Item	Act	FY 2017 Total PB Requests** with CR Adj Base+OCO+SAA	FY 2017 Total PB Requests* with CR Adj Base + OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj Base + OCO	FY 2018 Base	FY 2018 OCO	FY 2018 Total	Sec
3	0601110D8Z	Basic Research Initiatives	01	36,654	36,654		36,654	40,612		40,612	U
5	0601120D8Z	National Defense Education Program	01	69,345	69,345		69,345	74,298		74,298	U
6	0601228D8Z	Historically Black Colleges and Universities/Minority Institutions	01	23,572	23,572		23,572	25,865		25,865	U
		Basic Research		129,571	129,571		129,571	140,775		140,775	
8	0602000D8Z	Joint Munitions Technology	02	17,745	17,745		17,745	19,111		19,111	U
10	0602230D8Z	Defense Technology Innovation	02	30,000	30,000		30,000				U
11	0602234D8Z	Lincoln Laboratory Research Program	02	48,269	48,269		48,269	49,748		49,748	U
12	0602251D8Z	Applied Research for the Advancement of S&T Priorities	02	42,206	42,206		42,206	49,226		49,226	U
16	0602668D8Z	Cyber Security Research	02	12,183	12,183		12,183	14,775		14,775	U
21	0602751D8Z	Software Engineering Institute (SEI) Applied Research	02	8,420	8,420		8,420	8,955		8,955	U
		Applied Research		158,823	158,823		158,823	141,815		141,815	
23	0603000D8Z	Joint Munitions Advanced Technology	03	23,902	23,902		23,902	25,627		25,627	U
24	0603122D8Z	Combating Terrorism Technology Support	03	73,002	73,002		73,002	76,230	25,000	101,230	U
25	0603133D8Z	Foreign Comparative Testing	03	19,343	19,343		19,343	24,199		24,199	U
32	0603225D8Z	Joint DoD-DoE Munitions Technology Development	03	17,256	17,256		17,256	18,662		18,662	U
37	0603288D8Z	Analytic Assessments	03	12,048	12,048		12,048	13,154		13,154	U
38	0603289D8Z	Advanced Innovative Analysis and Concepts	03	57,020	57,020		57,020	37,674		37,674	U

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39	0603291D8Z	Advanced Innovative Analysis and Concepts - MHA	03								U
42	0603375D8Z	Technology Innovation	03	25,000	39,923	89,923					U
44	0603527D8Z	RETRACT LARCH	03	105,243	181,977	181,977					U
45	0603618D8Z	Joint Electronic Advanced Technology	03	28,667	22,030	22,030					U
46	0603648D8Z	Joint Capability Technology Demonstrations	03	130,829	148,184	148,184					U
47	0603662D8Z	Networked Communications Capabilities	03	5,452	9,331	9,331					U
48	0603680D8Z	Defense-Wide Manufacturing Science and Technology Program	03	151,999	158,398	158,398					U
50	0603699D8Z	Emerging Capabilities Technology Development	03	77,966	49,895	49,895					U
53	0603716D8Z	Strategic Environmental Research Program	03	54,261	65,078	65,078					U
55	0603727D8Z	Joint Warfighting Program	03	4,852	7,848	7,848					U
60	0603769D8Z	Distributed Learning Advanced Technology Development	03			10,384					U
62	0603781D8Z	Software Engineering Institute	03	13,687	14,264	14,264					U
63	0603826D8Z	Quick Reaction Special Projects	03	69,506	74,943	74,943					U
64	0603833D8Z	Engineering Science & Technology	03	17,904	17,659	17,659					U
65	0603941D8Z	Test & Evaluation Science & Technology	03	89,317	87,135	87,135					U
66	0604055D8Z	Operational Energy Capability Improvement	03	40,387	37,329	37,329					U

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39	0603291D8Z	Advanced Innovative Analysis and Concepts - MHA	03					15,000		15,000	U
42	0603375D8Z	Technology Innovation	03	39,923	89,923		89,923	59,863		59,863	U
44	0603527D8Z	RETRACT LARCH	03	181,977	181,977		181,977	171,120		171,120	U
45	0603618D8Z	Joint Electronic Advanced Technology	03	22,030	22,030		22,030	14,389		14,389	U
46	0603648D8Z	Joint Capability Technology Demonstrations	03	148,184	148,184		148,184	105,871		105,871	U
47	0603662D8Z	Networked Communications Capabilities	03	9,331	9,331		9,331	12,661		12,661	U
48	0603680D8Z	Defense-Wide Manufacturing Science and Technology Program	03	158,398	158,398		158,398	136,159		136,159	U
50	0603699D8Z	Emerging Capabilities Technology Development	03	49,895	49,895		49,895	57,876		57,876	U
53	0603716D8Z	Strategic Environmental Research Program	03	65,078	65,078		65,078	71,832		71,832	U
55	0603727D8Z	Joint Warfighting Program	03	7,848	7,848		7,848	6,349		6,349	U
60	0603769D8Z	Distributed Learning Advanced Technology Development	03		10,384		10,384	11,211		11,211	U
62	0603781D8Z	Software Engineering Institute	03	14,264	14,264		14,264	15,047		15,047	U
63	0603826D8Z	Quick Reaction Special Projects	03	74,943	74,943		74,943	69,203		69,203	U
64	0603833D8Z	Engineering Science & Technology	03	17,659	17,659		17,659	25,395		25,395	U
65	0603941D8Z	Test & Evaluation Science & Technology	03	87,135	87,135		87,135	89,586		89,586	U
66	0604055D8Z	Operational Energy Capability Improvement	03	37,329	37,329		37,329	38,403		38,403	U

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67	0303310D8Z	CWMD Systems	03	40,938	44,836	44,836					U
		Advanced Technology Development		1,133,128	1,161,401	1,221,785					
69	0603161D8Z	Nuclear and Conventional Physical Security Equipment RDT&E ADC&P	04	31,149	28,498	28,498					U
70	0603600D8Z	WALKOFF	04	88,031	89,643	98,143					U
71	0603714D8Z	Advanced Sensors Application Program	04	15,869							U
72	0603821D8Z	Acquisition Enterprise Data & Information Services	04		2,136	2,136					U
73	0603851D8Z	Environmental Security Technical Certification Program	04	51,380	52,491	52,491					U
91	0603920D8Z	Humanitarian Demining	04	9,858	10,007	10,007					U
92	0603923D8Z	Coalition Warfare	04	10,179	10,126	10,126					U
93	0604016D8Z	Department of Defense Corrosion Program	04	7,471	3,893	3,893					U
95	0604132D8Z	Missile Defeat Project	04		45,000	185,500					U
97	0604250D8Z	Advanced Innovative Technologies	04	459,966	844,870	846,470					U
98	0604294D8Z	Trusted & Assured Microelectronics	04								U
99	0604331D8Z	Rapid Prototyping Program	04								U
100	0604342D8Z	Defense Technology Offset	04	71,500							U
101	0604400D8Z	Department of Defense (DoD) Unmanned System Common Development	04	7,731	3,320	3,320					U
102	0604682D8Z	Wargaming and Support for Strategic Analysis (SSA)	04		4,000	4,000					U

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67	0303310D8Z	CWMD Systems	03	44,836	44,836		44,836	33,382		33,382	U
		Advanced Technology Development		1,161,401	1,221,785		1,221,785	1,128,893	25,000	1,153,893	
69	0603161D8Z	Nuclear and Conventional Physical Security Equipment RDT&E ADC&P	04	28,498	28,498		28,498	32,937		32,937	U
70	0603600D8Z	WALKOFF	04	89,643	98,143		98,143	101,714		101,714	U
71	0603714D8Z	Advanced Sensors Application Program	04								U
72	0603821D8Z	Acquisition Enterprise Data & Information Services	04	2,136	2,136		2,136	2,198		2,198	U
73	0603851D8Z	Environmental Security Technical Certification Program	04	52,491	52,491		52,491	54,583		54,583	U
91	0603920D8Z	Humanitarian Demining	04	10,007	10,007		10,007	10,837		10,837	U
92	0603923D8Z	Coalition Warfare	04	10,126	10,126		10,126	10,740		10,740	U
93	0604016D8Z	Department of Defense Corrosion Program	04	3,893	3,893		3,893	3,837		3,837	U
95	0604132D8Z	Missile Defeat Project	04	45,000	185,500		185,500	98,369		98,369	U
97	0604250D8Z	Advanced Innovative Technologies	04	844,870	846,470		846,470	1,175,832		1,175,832	U
98	0604294D8Z	Trusted & Assured Microelectronics	04					83,626		83,626	U
99	0604331D8Z	Rapid Prototyping Program	04					100,000		100,000	U
100	0604342D8Z	Defense Technology Offset	04								U
101	0604400D8Z	Department of Defense (DoD) Unmanned System Common Development	04	3,320	3,320		3,320	3,967		3,967	U
102	0604682D8Z	Wargaming and Support for Strategic Analysis (SSA)	04	4,000	4,000		4,000	3,833		3,833	U

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Line No	Program Element Number	Item	Act	FY 2016 Base + OCO	FY 2017 PB Request with CR Adj Base	FY 2017 Total PB Requests* with CR Adj Base	FY 2017 PB Request with CR Adj OCO	FY 2017 Total PB Requests* with CR Adj OCO	FY 2017 Less Enacted Div B P.L.114-254** OCO	FY 2017 Remaining Req with CR Adj OCO	Sec
103	0604775D8Z	Defense Rapid Innovation Program	04	250,000							U
114	0303191D8Z	Joint Electromagnetic Technology (JET) Program	04	2,656	2,636	2,636					U
		Advanced Component Development And Prototypes		1,005,790	1,096,620	1,247,220					
118	0604161D8Z	Nuclear and Conventional Physical Security Equipment RDT&E SDD	05	8,590	10,324	10,324					U
119	0604165D8Z	Prompt Global Strike Capability Development	05	88,660	181,303	181,303					U
122	0604771D8Z	Joint Tactical Information Distribution System (JTIDS)	05	13,774	16,288	16,288					U
126	0605022D8Z	Defense Exportability Program	05	3,165	2,920	2,920					U
127	0605027D8Z	OUSD(C) IT Development Initiatives	05	13,457		16,524					U
129	0605075D8Z	DCMO Policy and Integration	05	2,217							U
132	0605140D8Z	Trusted Foundry	05	7,000	69,000	69,000					U
133	0605210D8Z	Defense-Wide Electronic Procurement Capabilities	05	7,961	9,881	9,881					U
134	0605294D8Z	Trusted & Assured Microelectronics	05								U
136	0305304D8Z	DoD Enterprise Energy Information Management (EEIM)	05	4,289	2,703	2,703					U
137	0305310D8Z	CWMD Systems: System Development and Demonstration	05								U
		System Development And Demonstration		149,113	292,419	308,943					
138	0604774D8Z	Defense Readiness Reporting System (DRRS)	06	5,571	4,678	4,678					U

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103	0604775D8Z	Defense Rapid Innovation Program	04								U
114	0303191D8Z	Joint Electromagnetic Technology (JET) Program	04	2,636	2,636		2,636	2,902		2,902	U
		Advanced Component Development And Prototypes		1,096,620	1,247,220		1,247,220	1,685,375		1,685,375	
118	0604161D8Z	Nuclear and Conventional Physical Security Equipment RDT&E SDD	05	10,324	10,324		10,324	12,536		12,536	U
119	0604165D8Z	Prompt Global Strike Capability Development	05	181,303	181,303		181,303	201,749		201,749	U
122	0604771D8Z	Joint Tactical Information Distribution System (JTIDS)	05	16,288	16,288		16,288	15,358		15,358	U
126	0605022D8Z	Defense Exportability Program	05	2,920	2,920		2,920	3,162		3,162	U
127	0605027D8Z	OUSD(C) IT Development Initiatives	05		16,524		16,524	21,353		21,353	U
129	0605075D8Z	DCMO Policy and Integration	05					2,810		2,810	U
132	0605140D8Z	Trusted Foundry	05	69,000	69,000		69,000				U
133	0605210D8Z	Defense-Wide Electronic Procurement Capabilities	05	9,881	9,881		9,881	11,870		11,870	U
134	0605294D8Z	Trusted & Assured Microelectronics	05					61,084		61,084	U
136	0305304D8Z	DoD Enterprise Energy Information Management (EEIM)	05	2,703	2,703		2,703	3,669		3,669	U
137	0305310D8Z	CWMD Systems: System Development and Demonstration	05					8,230		8,230	U
		System Development And Demonstration		292,419	308,943		308,943	341,821		341,821	
138	0604774D8Z	Defense Readiness Reporting System (DRRS)	06	4,678	4,678		4,678	6,941		6,941	U

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139	0604875D8Z	Joint Systems Architecture Development	06	3,007	4,499	4,499					U
140	0604940D8Z	Central Test and Evaluation Investment Development (CTEIP)	06	209,014	219,199	219,199					U
141	0604942D8Z	Assessments and Evaluations	06	127,827	28,706	132,106					U
143	0605100D8Z	Joint Mission Environment Test Capability (JMETC)	06	39,549	87,080	87,080					U
144	0605104D8Z	Technical Studies, Support and Analysis	06	24,121	23,069	23,069					U
146	0605128D8Z	Classified Program USD(P)	06	115,000							U
147	0605142D8Z	Systems Engineering	06	38,321	32,429	32,429					U
148	0605151D8Z	Studies and Analysis Support - OSD	06	2,696	3,797	3,797					U
149	0605161D8Z	Nuclear Matters-Physical Security	06	5,094	5,302	5,302					U
150	0605170D8Z	Support to Networks and Information Integration	06	5,113	7,246	7,246					U
151	0605200D8Z	General Support to USD (Intelligence)	06	1,686	1,874	10,374					U
156	0605502D8Z	Small Business Innovative Research	06	62,824							U
161	0605790D8Z	Small Business Innovation Research (SBIR)/ Small Business Technology Transfer	06	2,166	2,187	2,187					U
162	0605798D8Z	Defense Technology Analysis	06	15,538	22,650	22,650					U
165	0605804D8Z	Development Test and Evaluation	06	20,749	19,541	19,541					U
168	0606100D8Z	Budget and Program Assessments	06	3,973	4,014	4,014					U

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139	0604875D8Z	Joint Systems Architecture Development	06	4,499	4,499		4,499	4,851		4,851	U
140	0604940D8Z	Central Test and Evaluation Investment Development (CTEIP)	06	219,199	219,199		219,199	211,325		211,325	U
141	0604942D8Z	Assessments and Evaluations	06	28,706	132,106		132,106	30,144		30,144	U
143	0605100D8Z	Joint Mission Environment Test Capability (JMETC)	06	87,080	87,080		87,080	91,057		91,057	U
144	0605104D8Z	Technical Studies, Support and Analysis	06	23,069	23,069		23,069	22,386		22,386	U
146	0605128D8Z	Classified Program USD(P)	06								U
147	0605142D8Z	Systems Engineering	06	32,429	32,429		32,429	37,622		37,622	U
148	0605151D8Z	Studies and Analysis Support - OSD	06	3,797	3,797		3,797	5,200		5,200	U
149	0605161D8Z	Nuclear Matters-Physical Security	06	5,302	5,302		5,302	5,232		5,232	U
150	0605170D8Z	Support to Networks and Information Integration	06	7,246	7,246		7,246	12,583		12,583	U
151	0605200D8Z	General Support to USD (Intelligence)	06	1,874	10,374		10,374	31,451		31,451	U
156	0605502D8Z	Small Business Innovative Research	06								U
161	0605790D8Z	Small Business Innovation Research (SBIR)/ Small Business Technology Transfer	06	2,187	2,187		2,187	2,372		2,372	U
162	0605798D8Z	Defense Technology Analysis	06	22,650	22,650		22,650	24,365		24,365	U
165	0605804D8Z	Development Test and Evaluation	06	19,541	19,541		19,541	20,571		20,571	U
168	0606100D8Z	Budget and Program Assessments	06	4,014	4,014		4,014	3,992		3,992	U

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169	0606225D8Z	ODNA Technology and Resource Analysis	06	3,500		1,000					U
170	0203345D8Z	Defense Operations Security Initiative (DOSI)	06	1,888	2,072	2,072					U
175	0303260D8Z	Defense Military Deception Program Office (DMDPO)	06	942	916	916					U
178	0305193D8Z	Cyber Intelligence	06	6,567	18,523	18,523					U
180	0305245D8Z	Intelligence Capabilities and Innovation Investments	06								U
181	0306310D8Z	CWMD Systems: RDT&E Management Support	06								U
182	0804767D8Z	COCOM Exercise Engagement and Training Transformation (CE2T2) - MHA	06	41,735	34,384	34,384					U
		Management Support		736,881	522,166	635,066					
191	0607210D8Z	Industrial Base Analysis and Sustainment Support	07	21,792	16,195	16,195					U
192	0607310D8Z	CWMD Systems: Operational Systems Development	07	1,832	4,194	4,194					U
208	0303140D8Z	Information Systems Security Program	07	8,649	8,876	8,876					U
227	0305186D8Z	Policy R&D Programs	07	4,131	6,204	6,204					U
228	0305199D8Z	Net Centricity	07	17,532	17,971	17,971					U
237	0305387D8Z	Homeland Defense Technology Transfer Program	07	2,116	2,037	2,037					U

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169	0606225D8Z	ODNA Technology and Resource Analysis	06		1,000		1,000	1,000		1,000	U
170	0203345D8Z	Defense Operations Security Initiative (DOSI)	06	2,072	2,072		2,072	2,551		2,551	U
175	0303260D8Z	Defense Military Deception Program Office (DMDPO)	06	916	916		916	1,006		1,006	U
178	0305193D8Z	Cyber Intelligence	06	18,523	18,523		18,523				U
180	0305245D8Z	Intelligence Capabilities and Innovation Investments	06					18,992		18,992	U
181	0306310D8Z	CWMD Systems: RDT&E Management Support	06					1,231		1,231	U
182	0804767D8Z	COCOM Exercise Engagement and Training Transformation (CE2T2) - MHA	06	34,384	34,384		34,384				U
		Management Support		522,166	635,066		635,066	534,872		534,872	
191	0607210D8Z	Industrial Base Analysis and Sustainment Support	07	16,195	16,195		16,195	10,882		10,882	U
192	0607310D8Z	CWMD Systems: Operational Systems Development	07	4,194	4,194		4,194	7,222		7,222	U
208	0303140D8Z	Information Systems Security Program	07	8,876	8,876		8,876	9,415		9,415	U
227	0305186D8Z	Policy R&D Programs	07	6,204	6,204		6,204	6,526		6,526	U
228	0305199D8Z	Net Centricity	07	17,971	17,971		17,971	18,455		18,455	U
237	0305387D8Z	Homeland Defense Technology Transfer Program	07	2,037	2,037		2,037	2,071		2,071	U

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243	0307577D8Z	Intelligence Mission Data (IMD)	07		13,800	13,800					U
		Operational System Development		56,052	69,277	69,277					
Total Research, Development, Test & Eval, DW				3,381,638	3,430,277	3,770,685					

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243	0307577D8Z	Intelligence Mission Data (IMD)	07	13,800	13,800		13,800	13,111		13,111	U
		Operational System Development		69,277	69,277		69,277	67,682		67,682	
Total Research, Development, Test & Eval, DW				3,430,277	3,770,685		3,770,685	4,041,233	25,000	4,066,233	

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3	0601110D8Z	Basic Research Initiatives	01	70,311	36,654	36,654					U
5	0601120D8Z	National Defense Education Program	01	52,837	69,345	69,345					U
6	0601228D8Z	Historically Black Colleges and Universities/Minority Institutions	01	34,943	23,572	23,572					U
Basic Research				158,091	129,571	129,571					
8	0602000D8Z	Joint Munitions Technology	02	18,993	17,745	17,745					U
10	0602230D8Z	Defense Technology Innovation	02		30,000	30,000					U
11	0602234D8Z	Lincoln Laboratory Research Program	02	53,517	48,269	48,269					U
12	0602251D8Z	Applied Research for the Advancement of S&T Priorities	02	46,750	42,206	42,206					U
16	0602668D8Z	Cyber Security Research	02	15,378	12,183	12,183					U
21	0602751D8Z	Software Engineering Institute (SEI) Applied Research	02	7,945	8,420	8,420					U
Applied Research				142,583	158,823	158,823					
23	0603000D8Z	Joint Munitions Advanced Technology	03	25,452	23,902	23,902					U
24	0603122D8Z	Combating Terrorism Technology Support	03	146,115	73,002	73,002					U
25	0603133D8Z	Foreign Comparative Testing	03	24,406	19,343	19,343					U
32	0603225D8Z	Joint DoD-DoE Munitions Technology Development	03	18,129	17,256	17,256					U
37	0603288D8Z	Analytic Assessments	03	14,145	12,048	12,048					U
38	0603289D8Z	Advanced Innovative Analysis and Concepts	03	48,873	57,020	57,020					U

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3	0601110D8Z	Basic Research Initiatives	01	36,654	36,654		36,654	40,612		40,612	U
5	0601120D8Z	National Defense Education Program	01	69,345	69,345		69,345	74,298		74,298	U
6	0601228D8Z	Historically Black Colleges and Universities/Minority Institutions	01	23,572	23,572		23,572	25,865		25,865	U
Basic Research				129,571	129,571		129,571	140,775		140,775	
8	0602000D8Z	Joint Munitions Technology	02	17,745	17,745		17,745	19,111		19,111	U
10	0602230D8Z	Defense Technology Innovation	02	30,000	30,000		30,000				U
11	0602234D8Z	Lincoln Laboratory Research Program	02	48,269	48,269		48,269	49,748		49,748	U
12	0602251D8Z	Applied Research for the Advancement of S&T Priorities	02	42,206	42,206		42,206	49,226		49,226	U
16	0602668D8Z	Cyber Security Research	02	12,183	12,183		12,183	14,775		14,775	U
21	0602751D8Z	Software Engineering Institute (SEI) Applied Research	02	8,420	8,420		8,420	8,955		8,955	U
Applied Research				158,823	158,823		158,823	141,815		141,815	
23	0603000D8Z	Joint Munitions Advanced Technology	03	23,902	23,902		23,902	25,627		25,627	U
24	0603122D8Z	Combating Terrorism Technology Support	03	73,002	73,002		73,002	76,230	25,000	101,230	U
25	0603133D8Z	Foreign Comparative Testing	03	19,343	19,343		19,343	24,199		24,199	U
32	0603225D8Z	Joint DoD-DoE Munitions Technology Development	03	17,256	17,256		17,256	18,662		18,662	U
37	0603288D8Z	Analytic Assessments	03	12,048	12,048		12,048	13,154		13,154	U
38	0603289D8Z	Advanced Innovative Analysis and Concepts	03	57,020	57,020		57,020	37,674		37,674	U

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39	0603291D8Z	Advanced Innovative Analysis and Concepts - MHA	03								U
42	0603375D8Z	Technology Innovation	03	25,000	39,923	89,923					U
44	0603527D8Z	RETRACT LARCH	03	105,243	181,977	181,977					U
45	0603618D8Z	Joint Electronic Advanced Technology	03	28,667	22,030	22,030					U
46	0603648D8Z	Joint Capability Technology Demonstrations	03	130,829	148,184	148,184					U
47	0603662D8Z	Networked Communications Capabilities	03	5,452	9,331	9,331					U
48	0603680D8Z	Defense-Wide Manufacturing Science and Technology Program	03	151,999	158,398	158,398					U
50	0603699D8Z	Emerging Capabilities Technology Development	03	77,966	49,895	49,895					U
53	0603716D8Z	Strategic Environmental Research Program	03	54,261	65,078	65,078					U
55	0603727D8Z	Joint Warfighting Program	03	4,852	7,848	7,848					U
60	0603769D8Z	Distributed Learning Advanced Technology Development	03			10,384					U
62	0603781D8Z	Software Engineering Institute	03	13,687	14,264	14,264					U
63	0603826D8Z	Quick Reaction Special Projects	03	69,506	74,943	74,943					U
64	0603833D8Z	Engineering Science & Technology	03	17,904	17,659	17,659					U
65	0603941D8Z	Test & Evaluation Science & Technology	03	89,317	87,135	87,135					U
66	0604055D8Z	Operational Energy Capability Improvement	03	40,387	37,329	37,329					U

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39	0603291D8Z	Advanced Innovative Analysis and Concepts - MHA	03					15,000		15,000	U
42	0603375D8Z	Technology Innovation	03	39,923	89,923		89,923	59,863		59,863	U
44	0603527D8Z	RETRACT LARCH	03	181,977	181,977		181,977	171,120		171,120	U
45	0603618D8Z	Joint Electronic Advanced Technology	03	22,030	22,030		22,030	14,389		14,389	U
46	0603648D8Z	Joint Capability Technology Demonstrations	03	148,184	148,184		148,184	105,871		105,871	U
47	0603662D8Z	Networked Communications Capabilities	03	9,331	9,331		9,331	12,661		12,661	U
48	0603680D8Z	Defense-Wide Manufacturing Science and Technology Program	03	158,398	158,398		158,398	136,159		136,159	U
50	0603699D8Z	Emerging Capabilities Technology Development	03	49,895	49,895		49,895	57,876		57,876	U
53	0603716D8Z	Strategic Environmental Research Program	03	65,078	65,078		65,078	71,832		71,832	U
55	0603727D8Z	Joint Warfighting Program	03	7,848	7,848		7,848	6,349		6,349	U
60	0603769D8Z	Distributed Learning Advanced Technology Development	03		10,384		10,384	11,211		11,211	U
62	0603781D8Z	Software Engineering Institute	03	14,264	14,264		14,264	15,047		15,047	U
63	0603826D8Z	Quick Reaction Special Projects	03	74,943	74,943		74,943	69,203		69,203	U
64	0603833D8Z	Engineering Science & Technology	03	17,659	17,659		17,659	25,395		25,395	U
65	0603941D8Z	Test & Evaluation Science & Technology	03	87,135	87,135		87,135	89,586		89,586	U
66	0604055D8Z	Operational Energy Capability Improvement	03	37,329	37,329		37,329	38,403		38,403	U

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67	0303310D8Z	CWMD Systems	03	40,938	44,836	44,836					U
		Advanced Technology Development		1,133,128	1,161,401	1,221,785					
69	0603161D8Z	Nuclear and Conventional Physical Security Equipment RDT&E ADC&P	04	31,149	28,498	28,498					U
70	0603600D8Z	WALKOFF	04	88,031	89,643	98,143					U
71	0603714D8Z	Advanced Sensors Application Program	04	15,869							U
72	0603821D8Z	Acquisition Enterprise Data & Information Services	04		2,136	2,136					U
73	0603851D8Z	Environmental Security Technical Certification Program	04	51,380	52,491	52,491					U
91	0603920D8Z	Humanitarian Demining	04	9,858	10,007	10,007					U
92	0603923D8Z	Coalition Warfare	04	10,179	10,126	10,126					U
93	0604016D8Z	Department of Defense Corrosion Program	04	7,471	3,893	3,893					U
95	0604132D8Z	Missile Defeat Project	04		45,000	185,500					U
97	0604250D8Z	Advanced Innovative Technologies	04	459,966	844,870	846,470					U
98	0604294D8Z	Trusted & Assured Microelectronics	04								U
99	0604331D8Z	Rapid Prototyping Program	04								U
100	0604342D8Z	Defense Technology Offset	04	71,500							U
101	0604400D8Z	Department of Defense (DoD) Unmanned System Common Development	04	7,731	3,320	3,320					U
102	0604682D8Z	Wargaming and Support for Strategic Analysis (SSA)	04		4,000	4,000					U

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67	0303310D8Z	CWMD Systems	03	44,836	44,836		44,836	33,382		33,382	U
	Advanced Technology Development			1,161,401	1,221,785		1,221,785	1,128,893	25,000	1,153,893	
69	0603161D8Z	Nuclear and Conventional Physical Security Equipment RDT&E ADC&P	04	28,498	28,498		28,498	32,937		32,937	U
70	0603600D8Z	WALKOFF	04	89,643	98,143		98,143	101,714		101,714	U
71	0603714D8Z	Advanced Sensors Application Program	04								U
72	0603821D8Z	Acquisition Enterprise Data & Information Services	04	2,136	2,136		2,136	2,198		2,198	U
73	0603851D8Z	Environmental Security Technical Certification Program	04	52,491	52,491		52,491	54,583		54,583	U
91	0603920D8Z	Humanitarian Demining	04	10,007	10,007		10,007	10,837		10,837	U
92	0603923D8Z	Coalition Warfare	04	10,126	10,126		10,126	10,740		10,740	U
93	0604016D8Z	Department of Defense Corrosion Program	04	3,893	3,893		3,893	3,837		3,837	U
95	0604132D8Z	Missile Defeat Project	04	45,000	185,500		185,500	98,369		98,369	U
97	0604250D8Z	Advanced Innovative Technologies	04	844,870	846,470		846,470	1,175,832		1,175,832	U
98	0604294D8Z	Trusted & Assured Microelectronics	04					83,626		83,626	U
99	0604331D8Z	Rapid Prototyping Program	04					100,000		100,000	U
100	0604342D8Z	Defense Technology Offset	04								U
101	0604400D8Z	Department of Defense (DoD) Unmanned System Common Development	04	3,320	3,320		3,320	3,967		3,967	U
102	0604682D8Z	Wargaming and Support for Strategic Analysis (SSA)	04	4,000	4,000		4,000	3,833		3,833	U

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103	0604775D8Z	Defense Rapid Innovation Program	04	250,000							U
114	0303191D8Z	Joint Electromagnetic Technology (JET) Program	04	2,656	2,636	2,636					U
		Advanced Component Development And Prototypes		1,005,790	1,096,620	1,247,220					
118	0604161D8Z	Nuclear and Conventional Physical Security Equipment RDT&E SDD	05	8,590	10,324	10,324					U
119	0604165D8Z	Prompt Global Strike Capability Development	05	88,660	181,303	181,303					U
122	0604771D8Z	Joint Tactical Information Distribution System (JTIDS)	05	13,774	16,288	16,288					U
126	0605022D8Z	Defense Exportability Program	05	3,165	2,920	2,920					U
127	0605027D8Z	OUSD(C) IT Development Initiatives	05	13,457		16,524					U
129	0605075D8Z	DCMO Policy and Integration	05	2,217							U
132	0605140D8Z	Trusted Foundry	05	7,000	69,000	69,000					U
133	0605210D8Z	Defense-Wide Electronic Procurement Capabilities	05	7,961	9,881	9,881					U
134	0605294D8Z	Trusted & Assured Microelectronics	05								U
136	0305304D8Z	DoD Enterprise Energy Information Management (EEIM)	05	4,289	2,703	2,703					U
137	0305310D8Z	CWMD Systems: System Development and Demonstration	05								U
		System Development And Demonstration		149,113	292,419	308,943					
138	0604774D8Z	Defense Readiness Reporting System (DRRS)	06	5,571	4,678	4,678					U

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103	0604775D8Z	Defense Rapid Innovation Program	04								U
114	0303191D8Z	Joint Electromagnetic Technology (JET) Program	04	2,636	2,636		2,636	2,902		2,902	U
		Advanced Component Development And Prototypes		1,096,620	1,247,220		1,247,220	1,685,375		1,685,375	
118	0604161D8Z	Nuclear and Conventional Physical Security Equipment RDT&E SDD	05	10,324	10,324		10,324	12,536		12,536	U
119	0604165D8Z	Prompt Global Strike Capability Development	05	181,303	181,303		181,303	201,749		201,749	U
122	0604771D8Z	Joint Tactical Information Distribution System (JTIDS)	05	16,288	16,288		16,288	15,358		15,358	U
126	0605022D8Z	Defense Exportability Program	05	2,920	2,920		2,920	3,162		3,162	U
127	0605027D8Z	OUSD(C) IT Development Initiatives	05		16,524		16,524	21,353		21,353	U
129	0605075D8Z	DCMO Policy and Integration	05					2,810		2,810	U
132	0605140D8Z	Trusted Foundry	05	69,000	69,000		69,000				U
133	0605210D8Z	Defense-Wide Electronic Procurement Capabilities	05	9,881	9,881		9,881	11,870		11,870	U
134	0605294D8Z	Trusted & Assured Microelectronics	05					61,084		61,084	U
136	0305304D8Z	DoD Enterprise Energy Information Management (EEIM)	05	2,703	2,703		2,703	3,669		3,669	U
137	0305310D8Z	CWMD Systems: System Development and Demonstration	05					8,230		8,230	U
		System Development And Demonstration		292,419	308,943		308,943	341,821		341,821	
138	0604774D8Z	Defense Readiness Reporting System (DRRS)	06	4,678	4,678		4,678	6,941		6,941	U

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139	0604875D8Z	Joint Systems Architecture Development	06	3,007	4,499	4,499					U
140	0604940D8Z	Central Test and Evaluation Investment Development (CTEIP)	06	209,014	219,199	219,199					U
141	0604942D8Z	Assessments and Evaluations	06	127,827	28,706	132,106					U
143	0605100D8Z	Joint Mission Environment Test Capability (JMETC)	06	39,549	87,080	87,080					U
144	0605104D8Z	Technical Studies, Support and Analysis	06	24,121	23,069	23,069					U
146	0605128D8Z	Classified Program USD(P)	06	115,000							U
147	0605142D8Z	Systems Engineering	06	38,321	32,429	32,429					U
148	0605151D8Z	Studies and Analysis Support - OSD	06	2,696	3,797	3,797					U
149	0605161D8Z	Nuclear Matters-Physical Security	06	5,094	5,302	5,302					U
150	0605170D8Z	Support to Networks and Information Integration	06	5,113	7,246	7,246					U
151	0605200D8Z	General Support to USD (Intelligence)	06	1,686	1,874	10,374					U
156	0605502D8Z	Small Business Innovative Research	06	62,824							U
161	0605790D8Z	Small Business Innovation Research (SBIR)/ Small Business Technology Transfer	06	2,166	2,187	2,187					U
162	0605798D8Z	Defense Technology Analysis	06	15,538	22,650	22,650					U
165	0605804D8Z	Development Test and Evaluation	06	20,749	19,541	19,541					U
168	0606100D8Z	Budget and Program Assessments	06	3,973	4,014	4,014					U

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139	0604875D8Z	Joint Systems Architecture Development	06	4,499	4,499		4,499	4,851		4,851	U
140	0604940D8Z	Central Test and Evaluation Investment Development (CTEIP)	06	219,199	219,199		219,199	211,325		211,325	U
141	0604942D8Z	Assessments and Evaluations	06	28,706	132,106		132,106	30,144		30,144	U
143	0605100D8Z	Joint Mission Environment Test Capability (JMETC)	06	87,080	87,080		87,080	91,057		91,057	U
144	0605104D8Z	Technical Studies, Support and Analysis	06	23,069	23,069		23,069	22,386		22,386	U
146	0605128D8Z	Classified Program USD(P)	06								U
147	0605142D8Z	Systems Engineering	06	32,429	32,429		32,429	37,622		37,622	U
148	0605151D8Z	Studies and Analysis Support - OSD	06	3,797	3,797		3,797	5,200		5,200	U
149	0605161D8Z	Nuclear Matters-Physical Security	06	5,302	5,302		5,302	5,232		5,232	U
150	0605170D8Z	Support to Networks and Information Integration	06	7,246	7,246		7,246	12,583		12,583	U
151	0605200D8Z	General Support to USD (Intelligence)	06	1,874	10,374		10,374	31,451		31,451	U
156	0605502D8Z	Small Business Innovative Research	06								U
161	0605790D8Z	Small Business Innovation Research (SBIR)/ Small Business Technology Transfer	06	2,187	2,187		2,187	2,372		2,372	U
162	0605798D8Z	Defense Technology Analysis	06	22,650	22,650		22,650	24,365		24,365	U
165	0605804D8Z	Development Test and Evaluation	06	19,541	19,541		19,541	20,571		20,571	U
168	0606100D8Z	Budget and Program Assessments	06	4,014	4,014		4,014	3,992		3,992	U

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169	0606225D8Z	ODNA Technology and Resource Analysis	06	3,500		1,000					U
170	0203345D8Z	Defense Operations Security Initiative (DOSI)	06	1,888	2,072	2,072					U
175	0303260D8Z	Defense Military Deception Program Office (DMDPO)	06	942	916	916					U
178	0305193D8Z	Cyber Intelligence	06	6,567	18,523	18,523					U
180	0305245D8Z	Intelligence Capabilities and Innovation Investments	06								U
181	0306310D8Z	CWMD Systems: RDT&E Management Support	06								U
182	0804767D8Z	COCOM Exercise Engagement and Training Transformation (CE2T2) - MHA	06	41,735	34,384	34,384					U
	Management Support			736,881	522,166	635,066					
191	0607210D8Z	Industrial Base Analysis and Sustainment Support	07	21,792	16,195	16,195					U
192	0607310D8Z	CWMD Systems: Operational Systems Development	07	1,832	4,194	4,194					U
208	0303140D8Z	Information Systems Security Program	07	8,649	8,876	8,876					U
227	0305186D8Z	Policy R&D Programs	07	4,131	6,204	6,204					U
228	0305199D8Z	Net Centricity	07	17,532	17,971	17,971					U
237	0305387D8Z	Homeland Defense Technology Transfer Program	07	2,116	2,037	2,037					U
243	0307577D8Z	Intelligence Mission Data (IMD)	07		13,800	13,800					U

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169	0606225D8Z	ODNA Technology and Resource Analysis	06		1,000		1,000	1,000		1,000	U
170	0203345D8Z	Defense Operations Security Initiative (DOSI)	06	2,072	2,072		2,072	2,551		2,551	U
175	0303260D8Z	Defense Military Deception Program Office (DMDPO)	06	916	916		916	1,006		1,006	U
178	0305193D8Z	Cyber Intelligence	06	18,523	18,523		18,523				U
180	0305245D8Z	Intelligence Capabilities and Innovation Investments	06					18,992		18,992	U
181	0306310D8Z	CWMD Systems: RDT&E Management Support	06					1,231		1,231	U
182	0804767D8Z	COCOM Exercise Engagement and Training Transformation (CE2T2) - MHA	06	34,384	34,384		34,384				U
Management Support				522,166	635,066		635,066	534,872		534,872	
191	0607210D8Z	Industrial Base Analysis and Sustainment Support	07	16,195	16,195		16,195	10,882		10,882	U
192	0607310D8Z	CWMD Systems: Operational Systems Development	07	4,194	4,194		4,194	7,222		7,222	U
208	0303140D8Z	Information Systems Security Program	07	8,876	8,876		8,876	9,415		9,415	U
227	0305186D8Z	Policy R&D Programs	07	6,204	6,204		6,204	6,526		6,526	U
228	0305199D8Z	Net Centricity	07	17,971	17,971		17,971	18,455		18,455	U
237	0305387D8Z	Homeland Defense Technology Transfer Program	07	2,037	2,037		2,037	2,071		2,071	U
243	0307577D8Z	Intelligence Mission Data (IMD)	07	13,800	13,800		13,800	13,111		13,111	U

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		Operational System Development		56,052	69,277	69,277					
				3,381,638	3,430,277	3,770,685					
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		Operational System Development		69,277	69,277		69,277	67,682		67,682	
		Total Office of Secretary of Defense		3,430,277	3,770,685		3,770,685	4,041,233	25,000	4,066,233	

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Listing of Acronyms

ACRONYM	DEFINITION
ARDEC	Army Armament Research, Development, and Engineering Center
AMRDEC	Aviation and Missile Research, Development, and Engineering Center
ASD/R&E	Assistant Secretary of Defense for Research and Engineering
ASW	Anti-Submarine Warfare
AT&L	Acquisition Technology and Logistics
C2	Command and Control
C3	Command, Controls, and Communications
C4	Command, Controls, Communications, and Computer
C4I	Command, Controls, Communications, Computer, and Intelligence
C4ISR	Command, Controls, Communications, Computer, Intelligence, Surveillance and Reconnaissance
C4IAS	Command, Controls, Communications, Computer, and Intelligence Automation System
CBRNE	Chemical, Biological, Radiological, Nuclear, and high-yield Explosives
CIED	Counter-Improvised Explosive Device
CND	Computer Network Defense
COCOMs	Combatant Commands
CTTSO	Combating Terrorism Technical Support Office
CWMD	Countering Weapons of Mass Destruction
DARPA	Defense Advanced Research Projects Agency
DIUx	Defense Innovation Unit Experimental
DOD	Department of Defense
DPPG	Defense Policy and Planning Guidance
DSCS	Defense Satellite Communications System
DTRA	Defense Threat Reduction Agency
DTRMC	Defense Test Resource Management Center
DT&E	Development, Test and Evaluation
EDTC	Engineering and Development Test Center
EMP	Electromagnetic Pulse
EMREP	Electromagnetic Reliability and Effects Predictions
EOD	Explosive Ordnance Disposal
EOD/LIC	Explosive Ordnance Disposal/Low-Intensity Conflict
ESTCP	Environmental Security Technology Certification Program
FATGS	Fuze Area Technology Groups
FCT	Foreign Comparative Testing
FFRDC	FFRDC Federally Funded Research and Development Center
GCC	Global Command and Control

GEF	Guidance for Employment of the Force
GKMC	Global Knowledge Management System
GSA	Global Situational Awareness
GSM	Global System for Mobile Communications
HAMMER	Heated and Mobile Munitions Employing RocketsHANE High Altitude Nuclear Environments
HARP	High Altitude Radiological Phenomenology
HEBX	Hybridized Enhanced Blast Explosive
HEMP	HEMP High Altitude Electro Magnetic Pulse
HBCU/MI	Historically Black Colleges and Universities and Minority Institutions
HDBT	Hard and Deeply Buried Target
HPAC	Hazard Prediction and Assessment Capability
HPCMP	High Performance Computing Modernization Program
HSBC	Human Social Culture Behavior
HTD	Hard Target Defeat
IBRD	Interagency Biological Restoration Demonstration
IED	Improvised Explosive Device
IM	Insensitive Munitions
IMD	Intelligence Mission Data
IMEA	Integrated Munitions Effects Assessment
IOC	Initial Operational Capability
IoT	Internet of Things
IPODS	Integrated Precision Ordnance Delivery System
ISR	Intelligence, Surveillance, Reconnaissance
ISS	Integrated Sensor System
ISSP	Information Systems Security Program
IWS	Irregular Warfare Support
ITD	Integrated Technology Demonstration
JCIDS	Joint Capabilities Integration and Development System
JCTD	Joint Concept Technology Demonstration
JEM	Joint Effects Model
JFTP	Joint Fuze Technology Program
JIEDDO	Joint Improvised Explosive Device Defeat Organization
JIMTP	Joint Insensitive Munitions Technology Program
JMEWS	Joint Multi-Effects Warhead System
JSAF	Joint Semi-Automated Forces
JUON/JEON	Joint Urgent Operational Needs / Joint Emergent Operational Needs
M&S	Modeling and Simulation
MATGs	Munition Area Technology Groups

Listing of Acronyms

MEMS	MEMS - MicroElectro-Mechanical Systems (MEMS)
MCPP	Military Child Pilot Program
MIL STD	Military Standard
MRL	MRL - Manufacturing Readiness Level
NDAA	National Defense Authorization Act
NDEP	National Defense Education Program
NCNS	National Center for Nuclear Security
NMCC	National Military Command Center
NNSA	National Nuclear Security Administration
NSSEFF	National Security Science and Engineering Faculty Fellowship
NuCS	Nuclear Capability Services
NWC	Nuclear Weapons Council
NWE	Nuclear Weapon Effects
NWEN	Nuclear Weapon Effects Network
NWEDS	Nuclear Weapons Effects Database System
NWRM	Nuclear Weapons Related Materiel
OCO	Overseas Contingency Operations
OCONUS	Outside the Continental United States
OLED	Organic Light Emitting Diode
OSD	Office of the Secretary of Defense
OSTP	Office of Science and Technology Policy
PDV	Product Demonstration Vehicle
PEO	Program Executive Officers
QDR	Quadrennial Defense Review
R2TD	Rapid Reaction Tunnel Detection
RDT&E	Research Development Test and Evaluation
RadHard	Radiation Hardened
RFIS	Robust Fuzewell Instrumentation System
RHBD	Radiation Hardened by Design
RHM	Radiation Hardened Microelectronics
ROI	Return on Investments
ROM	Rough Order of Magnitude
S&E	Scientists and Engineers
S&T	Science & Technology
SBIR	Small Business Innovative Research
SCO	Strategic Capabilities Office
SCSP	Special Operations Command Combating Weapons of Mass Destruction-Terrorism Support Program
SMART	Science, Mathematics, and Research for Transformation

SMDC	Space and Missile Development Command
SNL	Sandia National Laboratory
SNM	Special Nuclear Material
SOF	Special Operations Forces
SPE	Source Physics Experiment
SPG	Short Pulse Gamma
SSBR	Strategic Support for Basic Research
STEM	Science, Technology, Engineering, and Mathematics
STTR	Small Business Technology Transfer
TB	Test Bed
TEAMS	Technical Evaluation Assessment and Monitor Site
TNF	Technical Nuclear Forensics
TOA	Total Obligation Authority
TOW	Tube-launched, Optically-tracked, Wireless-guided
TPMM	TPMM Technology Program Management Model
TRAC	Threat Reduction Advisory Committee
TRL	Technology Readiness Level
TSG	Technical Support Group
UAS	Unmanned Aerial Systems
UCP	Unified Command Plan
UGF	Underground Facility
UGT	UGT Underground Test
USFK	U.S. Forces Korea
USG	USG United States Government
USNORTHCOM	U.S. Northern Command
USPACOM	U.S. Pacific Command
USSOCOM	U.S. Special Operations Command
USSTRATCOM	U.S. Strategic Command
UTAS	Underground Targeting and Analysis System
UXO	Unexploded Ordnance
WACS	WMD Aerial Collection System
WCF	West Coast Facility
WEP	Weapon Effects Phenomenology
WESC	Weapon Effects Steering Committee
WMD	Weapons of Mass Destruction
WSMR	White Sands Missile Range

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 1: *Basic Research*	**R-1 Program Element (Number/Name)** PE 0601110D8Z / *Basic Research Initiatives*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	-	70.311	36.654	40.612	-	40.612	43.006	45.513	46.400	47.353	Continuing	Continuing
P010: *Basic Research Initiatives*	-	32.530	13.548	12.444	-	12.444	12.525	12.711	12.922	13.193	Continuing	Continuing
P060: *Vannevar Bush Faculty Fellowship*	-	37.781	23.106	28.168	-	28.168	30.481	32.802	33.478	34.160	Continuing	Continuing

A. Mission Description and Budget Item Justification

Supporting basic research provides the Department of Defense (DoD) with a deep and broad awareness of current directions in areas of research important to U.S. military capabilities – including physics and the physical sciences, materials science, chemistry and chemical engineering, electrical engineering, mathematics, computer science, mechanical and aerodynamic engineering, ocean sciences, biological sciences, and the social sciences, among others. Basic research sustains scientific and engineering communities as it generates the critical technical underpinnings of DoD capabilities. Basic research allows exploration and discovery, yielding disruptive non-incremental advances that can improve or radically change military capabilities, strategy, and operations.

The Basic Research Initiatives program element (PE) supports the defense basic research enterprise in three critical areas: Strategic Support for Basic Research (SSBR), the Minerva Research Initiative, and the Vannevar Bush Faculty Fellowship Program (Vannevar Bush), formerly known as the National Security Science and Engineering Faculty Fellowship (NSSEFF) program.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	71.940	36.654	40.649	-	40.649
Current President's Budget	70.311	36.654	40.612	-	40.612
Total Adjustments	-1.629	0.000	-0.037	-	-0.037
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.295	-			
• SBIR/STTR Transfer	-1.334	-			
• Other Adjustments	-	-	-0.037	-	-0.037

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 1	R-1 Program Element (Number/Name) PE 0601110D8Z / *Basic Research Initiatives*	Project (Number/Name) P010 / *Basic Research Initiatives*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P010: *Basic Research Initiatives*	-	32.530	13.548	12.444	-	12.444	12.525	12.711	12.922	13.193	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Basic Research Initiatives project code, P010, includes Strategic Support for Basic Research (SSBR) and the Minerva Research Initiative.

SSBR supports oversight, policies, and initiatives to implement the Assistant Secretary of Defense for Research and Engineering's (ASD(R&E)) strategic plan for defense basic research. This plan defines actions to help create conditions for defense basic research investments capable of producing high-payoff, transformative scientific breakthroughs for the Department. SSBR initiatives support the five Basic Research Office strategic goals: (1) drive the direction of DoD basic research investments; (2) coordinate and conduct oversight of DoD basic research programs; (3) improve science and engineering (S&E) workforce and public outreach; (4) enhance university-industry collaboration; and (5) engage with academic research community and international partners.

The Minerva Research Initiative, a department-wide basic research program in the social sciences directed by the Office of the Secretary of Defense (OSD) and executed by the Services, seeks to build a fundamental understanding of the sources of present and future conflict. It is one of the Nation's only social science basic research programs in support of national security (especially funding field research). Minerva promotes a deeper understanding of the social and cultural environments, where threats such as radicalization and regional instabilities develop, and supports more effective strategic and operational policy decisions. Minerva program priorities are consistent with the goals set forth in the 2014 Quadrennial Defense Review (QDR), informing DoD efforts to effectively build security globally, and are updated annually according to inputs from across the defense enterprise.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Strategic Support for Basic Research (SSBR)	11.002	2.000	2.235
Description: The SSBR program actively creates conditions for defense basic research investments capable of producing high-payoff, transformative scientific breakthroughs for the Department. SSBR initiatives support the five Basic Research Office strategic goals: (1) drive the direction of DoD basic research investments; (2) coordinate and conduct oversight of DoD basic research programs; (3) improve science and engineering (S&E) workforce and public outreach; (4) enhance university-industry collaboration; and (5) engage with academic research community and international partners.			
FY 2016 Accomplishments: Executed a series of new workshops for scientific situational awareness including machine learning, power and energy, and quantum information science, among others. Through these workshops, National research leaders convened to provide expert perspectives on potential breakthroughs and barriers of advancement in rapidly evolving fields of basic research, and have informed MURI topic priorities and Vannevar Bush research solicitation areas. With the goals of reinvigorating DoD laboratories as facilities of basic research and enhancing connectivity between the academic and defense laboratory communities, the Department launched the "Laboratory University Collaboration Initiative" (LUCI)			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 1	**R-1 Program Element (Number/Name)** PE 0601110D8Z / *Basic Research Initiatives*	**Project (Number/Name)** P010 / *Basic Research Initiatives*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
pilot, augmenting the Vannevar Bush Program, an ASD(R&E) Program. There were 16 collaborative research projects conducted between DoD researchers and Vannevar Bush Fellows in areas of scientific or technological importance to DoD, while also expanding the research capabilities of DoD laboratories. Additionally, the I-Corps Pilot Program aimed at accelerating commercialization of basic research innovations was successfully launched, with one team selected for support, and five additional teams in the queue. Modeled after the National Science Foundation's I-Corps program, the DoD program facilitates collaboration between academia and industry to spur the transition of defense innovations of interest into emerging products and services. Those emerging products and services have the potential for commercialization into industry or transition into DoD programs of record. ***FY 2017 Plans:*** Execute new "Future Directions" workshops for scientific situational awareness on topics recommended by DoD S&T community and academia. Convene National research leaders to provide expert perspectives on potential breakthroughs and barriers of advancement in rapidly evolving fields of basic research. Continue studies of how past DoD investments and high priority basic research has led to advances in new technologies and new capabilities for the Nation. As part of the ASD(R&E) mission, continue to analyze university-related business practices for improvement and efficiency. Continue support for scientific expertise to oversee science and engineering initiatives. Organize DoD I-Corps competition to select projects that could lead to commercialization into industry or transition into DoD programs of record, with a goal of selecting two teams to enter the training program (Pub. L. 113–66, div. A, title XVI, §1603), and partner with organizations such as OSBP to create opportunities for further technology maturation and potential entrance to programs of record. Launch the Defense Enterprise Scientific Initiative (DESI) pilot, which aims to build collaboration of universities, industry, and laboratories on defense-critical capabilities. Explore other opportunities to foster partnerships between academia and industry. ***FY 2018 Plans:*** Continue the series of workshops for scientific situational awareness that were planned in previous fiscal years. Convene national research leaders to provide expert perspectives on potential breakthroughs and barriers of advancement in rapidly evolving fields of basic research. Continue studies of how past DoD investments and high priority basic research has led to advances in new technologies and new capabilities for the Nation. As part of the ASD(R&E) mission, continue to analyze university-related business practices for improvement and efficiency. Continue support for scientific expertise to oversee science and engineering initiatives. Evaluate effectiveness of DESI and I-Corps pilot programs.			
Title: Minerva Research Initiative ***Description:*** The Minerva Research Initiative includes three primary components: (1) a university-based social science basic research grant program; (2) the Research for Defense Education Faculty (R-DEF) program for the professional military education (PME) institutions; and (3) a collaboration with the congressionally established United States Institute of Peace to award research support to advanced graduate students and early career scholars working on security and peace. All components contribute to Minerva goals of revitalizing connections between DoD and academic social science communities and building cultural and	21.528	11.548	10.209

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 1	**R-1 Program Element (Number/Name)** PE 0601110D8Z / *Basic Research Initiatives*	**Project (Number/Name)** P010 / *Basic Research Initiatives*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
foreign area knowledge on topics ranging from the mechanisms of radicalization to geopolitical power projection strategies in a multipolar world. This deeper scientific understanding will provide a more informed basis to shape doctrine, analysis, and other strategic and operational decisions made by war planners and warfighters. ***FY 2016 Accomplishments:*** Heightened challenges related to global terrorism and the Islamic State of Iraq and Syria (ISIL) indicate the need for serious intellectual investment into the sources of social conflict and cooperation. One of the only funders of fieldwork-based security research, Minerva received a one-time plus-up of funds to support research addressing emerging national security needs. Ongoing technical and logistical program support enables safe and ethical research in regions involving complex security challenges. In addition to new investments, the Minerva program continued its support of ongoing university-led research initiatives; maintained support of R-DEF program at defense education institutions; provided subject matter expertise to quick-turn studies requested by the operational community; established a joint pilot program with United States Institute of Peace (USIP) to support advanced graduate students and early career scholars working on security and peace; and facilitated building policy and operational community connections with ongoing Minerva efforts, in order to effectively connect new social science insights and methods to current and future defense leadership and inform tomorrow's key security decisions. ***FY 2017 Plans:*** Continue supporting university-led research initiatives on themes including: the social impact of autonomy; societal resilience; power and deterrence; cyber defense; interconnectivity between security and sociality; and great powers conflict. Maintain support of R-DEF program at defense education institutions. Enhance accessibility of research insights through a more robust website and outreach efforts. And continue connecting subject matter expertise to the operational community. ***FY 2018 Plans:*** Continue ongoing and start new university-led research initiatives with priorities shaped by defense needs; maintain support of R-DEF program at defense education institutions; continue active engagement providing subject matter expertise to the operational community; and continue building policy and operational community connections to ongoing Minerva efforts, in order to effectively connect new social science insights and methods to current and future defense leadership and inform tomorrow's key security decisions.			
Accomplishments/Planned Programs Subtotals	32.530	13.548	12.444

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 1	**R-1 Program Element (Number/Name)** PE 0601110D8Z / *Basic Research Initiatives*	**Project (Number/Name)** P010 / *Basic Research Initiatives*

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 1	R-1 Program Element (Number/Name) PE 0601110D8Z / *Basic Research Initiatives*	Project (Number/Name) P060 / *Vannevar Bush Faculty Fellowship*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P060: *Vannevar Bush Faculty Fellowship*	-	37.781	23.106	28.168	-	28.168	30.481	32.802	33.478	34.160	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Vannevar Bush Faculty Fellowship (Vannevar Bush), formerly National Security Science and Engineering Faculty Fellowship (NSSEFF), program supports world-class researchers in scientific areas of critical importance to DoD and ensures the cultivation of exceptional talent. Fellows' research spans a broad set of emerging scientific areas with transformative potential including Quantum Information Science, Novel Engineered Materials, Cognitive Neuroscience, Engineering Biology, Robotics and Data Analytics, etc. The Vannevar Bush program is a key resource to the entire Department that fosters close connections between academia and the DoD science and engineering enterprise, a primary goal of SSBR efforts. Fellows provide the Department the deep scientific expertise from today's leading research universities and collaborate with defense scientists and engineers. This program actively engages and coordinates basic research across the Department.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Vannevar Bush Faculty Fellowship (Vannevar Bush) Program	37.781	23.106	28.168

Description: The Vannevar Bush Program, formerly known as the National Security Science and Engineering Faculty Fellowship (NSSEFF), ensures that DoD has a research portfolio that supports the foremost creative, innovative, and productive university researchers. The objectives of the program are to: (1) support scientific research that may lead to extraordinary outcomes; (2) educate and train student and post-doctoral researchers for the defense and national security workforce; (3) foster long-term relationships between university researchers and the DoD; (4) familiarize select university researchers and their students with DoD's current and future challenges; and (5) increase the number of exceptionally talented technical experts that are contributing to DoD's mission.

FY 2016 Accomplishments:

Continued support for 32 current Vannevar Bush Fellows. Reviewed and updated program topic areas. Solicited for a new class of Vannevar Bush Fellows. Organized and conducted a Vannevar Bush Spring meeting at the Army Research Laboratory at Adelphi including DoD laboratory tours. Utilized this venue to identify and facilitate new connections between new Fellows and DoD scientists and engineers, including the Vannevar Bush Steering Committee. Organized and conducted a program review and report on Fellows' progress. To enhance connectivity between the Fellows and defense laboratory communities, the Basic Research Office launched a laboratory-wide "Laboratory University Collaboration Initiative" (LUCI) pilot, funded from the FY16 appropriated budget line (P010) and augmenting the Vannevar Bush program to support 16 collaborative research projects between DoD researchers and Vannevar Bush Fellows in areas of scientific or technological importance to DoD, while also expanding the research capabilities of the DoD laboratories.

FY 2017 Plans:

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 1	**R-1 Program Element (Number/Name)** PE 0601110D8Z / *Basic Research Initiatives*	**Project (Number/Name)** P060 / *Vannevar Bush Faculty Fellowship*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Continue support for 42 current Vannevar Bush Fellows and DoD collaborative research partners. Review and update program topic areas. Solicit for a new class of Vannevar Bush Fellows. Organize and conduct the Vannevar Bush annual meeting which will be hosted by Air Force Research Laboratory (AFRL) at Wright-Patterson Air Force Base, with goals to familiarize Fellows and their research goals with AFRL mission and research strengths. Utilize this venue to identify and facilitate new connections between new Fellows and DoD scientists and engineers, including the Vannevar Bush Steering Committee. Organize and conduct a program review and report on Fellows' progress. Continue support for 16 LUCI Fellows in DoD laboratories to conduct collaborative basic research with Vannevar Bush Fellows. Organize and conduct a new LUCI competition and selection for ten collaborative research projects between DoD researchers and Vannevar Bush Fellows in areas of scientific or technological importance to the Department. Conduct a review on LUCI projects and report the scientific progress and the impacts of LUCI projects. ***FY 2018 Plans:*** Continue support of 50 Vannevar Bush Fellows and DoD collaborative research partners (26 LUCI projects). Review and update program topic areas. Solicit for a new class of Vannevar Bush Fellows. Organize and conduct Vannevar Bush annual meeting including DoD laboratory tours. Utilize this venue to identify and facilitate new connections between new Fellows and DoD scientists and engineers, including the Vannevar Bush Steering Committee. Organize and conduct a program review and report on Fellows' progress. Conduct review of 26 LUCI Fellows in DoD laboratories and report the scientific progress and the impacts of the LUCI projects.			
Accomplishments/Planned Programs Subtotals	37.781	23.106	28.168

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 1: *Basic Research*	**R-1 Program Element (Number/Name)** PE 0601120D8Z / *National Defense Education Program (NDEP)*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	-	52.837	69.345	74.298	-	74.298	80.489	86.833	94.108	104.426	Continuing	Continuing
P120: *National Defense Education Program (NDEP)*	-	52.837	69.345	74.298	-	74.298	80.489	86.833	94.108	104.426	Continuing	Continuing

A. Mission Description and Budget Item Justification

The National Defense Education Program (NDEP) ensures the Department of Defense (DoD) will have access to high-quality science, technology, engineering, and mathematics (STEM) personnel vital to national defense now and in the future. NDEP is executed by the STEM Development Office, under the Defense Laboratories Office within the Office of the Assistant Secretary of Defense for Research and Engineering (ASD(R&E)). NDEP's portfolio includes the Science, Mathematics, and Research for Transformation (SMART) program, the Military Child Pilot Program (MCPP), STEM Education and Outreach, and STEM Operations. These programs provide a pathway to the best and the brightest minds through a continuum of DoD workforce development approaches, which include: (1) increasing STEM proficiency in the Nation's talent pool by improving the capacity to address ever-changing future Defense workforce needs; (2) shaping the Department as a STEM workplace of choice for scientists and engineers through public communications and outreach; (3) leading the Departmental STEM strategic efforts and coordinating STEM efforts in alignment with the workforce and mission requirements; and (4) identifying approaches for innovative solutions in support of the Nation's current and future defense challenges.

NDEP aligns to the DoD Science and Technology (S&T) priorities. It is synchronized with the Federal Five-Year STEM Education Strategic Plan, the DoD STEM Strategic Plan, the DoD Strategic Workforce Plan, and the DoD Agency Strategic Plan. NDEP components engage in assessment and evaluation as outlined by the Office of Management and Budget and the Government Accountability Office.

The SMART program awards highly competitive scholarships-for-service to undergraduate and graduate students in 19 STEM academic disciplines and transitions graduates directly into DoD's workforce following graduation. As part of the SMART experience, scholars engage in internships that allow for broadly relevant hands-on research and work experiences in DoD facilities, thereby enhancing their educational experience. Since its inception as a pilot program in FY 2005, SMART has awarded approximately 2,000 scholarships to students ranging from undergraduate to doctoral studies. To date, approximately 1,350 have completed program studies and approximately 1,100 are currently employed in the DoD workforce. SMART ensures that DoD has a steady infusion of high-quality technical talent, prepared in areas of critical importance to DoD, and ready to apply their technical knowledge, skills, and abilities to fulfill DoD's mission.

STEM Education and Outreach fosters conditions for activities to support and cultivate STEM talent to build a future force that is representative of the nation's diverse population and to reach underserved populations to meet national defense needs and future defense challenges. Initiatives include investing, promoting and participating in national-level STEM programs and initiatives, and providing authentic hands-on STEM experiences for students and teachers across the nation.

STEM Operations manages activities to implement the Department's strategic plan for STEM education and outreach. STEM Operations provides program management and oversight, research studies, and official responses to Congressional and non-Congressional inquiries. STEM Operations develops and maintains systems and standards to support STEM policy implementation, oversight, and assessment. Other STEM Operations activities include providing support to STEM

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 1: *Basic Research*	**R-1 Program Element (Number/Name)** PE 0601120D8Z / *National Defense Education Program (NDEP)*

education and outreach programs, implementing the Communications Plan, and collaborating across the federal government and public domain through interagency and intradepartmental working groups and partnerships.

The MCPP enhances the preparation of dependents of members of the armed forces for careers in STEM and provides assistance to STEM teachers at elementary or secondary schools at which a significant number of military dependents are enrolled. Section 233 of the National Defense Authorization Act (NDAA) for FY 2015, and the Consolidated and Further Continuing Appropriations Act, 2015, directed the Secretary of the Defense to establish this Pilot Program. The MCPP will continue to receive support through FY 2020 in accordance with legislative direction.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	54.355	69.345	113.084	-	113.084
Current President's Budget	52.837	69.345	74.298	-	74.298
Total Adjustments	-1.518	0.000	-38.786	-	-38.786
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.518	-			
• SMART Program Adjustments	-	-	-38.786	-	-38.786

Change Summary Explanation

FY 2018 adjustments are reflective of higher priority DoD requirements. Funding for the SMART Scholarship in the amount of $38.684 is transferred to DHRA, PE 0901220SE.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense											Date: May 2017	
Appropriation/Budget Activity 0400 / 1					R-1 Program Element (Number/Name) PE 0601120D8Z / *National Defense Education Program (NDEP)*				Project (Number/Name) P120 / *National Defense Education Program (NDEP)*			
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
P120: *National Defense Education Program (NDEP)*	-	52.837	69.345	74.298	-	74.298	80.489	86.833	94.108	104.426	Continuing	Continuing

A. Mission Description and Budget Item Justification

The National Defense Education Program (NDEP) ensures the Department of Defense (DoD) will have access to high-quality science, technology, engineering, and mathematics (STEM) personnel vital to national defense now and in the future. NDEP is executed by the STEM Development Office, under the Defense Laboratories Office within the Office of the Assistant Secretary of Defense for Research and Engineering (ASD(R&E)). NDEP's portfolio includes the Science, Mathematics, and Research for Transformation (SMART) program, the Military Child Pilot Program (MCPP), STEM Education and Outreach, and STEM Operations. These programs provide a pathway to the best and the brightest minds through a continuum of DoD workforce development approaches, which include: (1) increasing STEM proficiency in the Nation's talent pool by improving the capacity to address ever-changing future Defense workforce needs; (2) shaping the Department as a STEM workplace of choice for scientists and engineers through public communications and outreach; (3) leading the Departmental STEM strategic efforts and coordinating STEM efforts in alignment with the workforce and mission requirements; and (4) identifying approaches for innovative solutions in support of the Nation's current and future defense challenges.

NDEP aligns to the DoD Science and Technology (S&T) priorities. It is synchronized with the Federal Five-Year STEM Education Strategic Plan, the DoD STEM Strategic Plan, the DoD Strategic Workforce Plan, and the DoD Agency Strategic Plan. NDEP components engage in assessment and evaluation as outlined by the Office of Management and Budget and the Government Accountability Office.

The SMART program awards highly competitive scholarships-for-service to undergraduate and graduate students in 19 STEM academic disciplines and transitions graduates directly into DoD's workforce following graduation. As part of the SMART experience, scholars engage in internships that allow for broadly relevant hands-on research and work experiences in DoD facilities, thereby enhancing their educational experience. Since its inception as a pilot program in FY 2005, SMART has awarded approximately 2,000 scholarships to students ranging from undergraduate to doctoral studies. To date, approximately 1,350 have completed program studies and approximately 1,100 are currently employed in the DoD workforce. SMART ensures that DoD has a steady infusion of high-quality technical talent, prepared in areas of critical importance to DoD, and ready to apply their technical knowledge, skills, and abilities to fulfill DoD's mission.

STEM Education and Outreach fosters conditions for activities to support and cultivate STEM talent to build a future force that is representative of the nation's diverse population and to reach underserved populations to meet national defense needs and future defense challenges. Initiatives include investing, promoting and participating in national-level STEM programs and initiatives, and providing authentic hands-on STEM experiences for students and teachers across the nation.

STEM Operations manages activities to implement the Department's strategic plan for STEM education and outreach. STEM Operations provides program management and oversight, research studies, and official responses to Congressional and non-Congressional inquiries. STEM Operations develops and maintains systems and standards to support STEM policy implementation, oversight, and assessment. Other STEM Operations activities include providing support to STEM

education and outreach programs, implementing the Communications Plan, and collaborating across the federal government and public domain through interagency and intradepartmental working groups and partnerships.

The MCPP enhances the preparation of dependents of members of the armed forces for careers in STEM and provides assistance to STEM teachers at elementary or secondary schools at which a significant number of military dependents are enrolled. Section 233 of the National Defense Authorization Act (NDAA) for FY 2015, and the Consolidated and Further Continuing Appropriations Act, 2015, directed the Secretary of the Defense to establish this Pilot Program. The MCPP will continue to receive support through FY 2020 in accordance with legislative direction.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Science, Mathematics, and Research for Transformation (SMART) Defense Education Program	38.883	53.571	60.747

Description: SMART is a scholarship-for-service program that provides support to high performing U.S. graduate and undergraduate students in 19 academic science, technology, engineering, and mathematics (STEM) disciplines identified as areas of future workforce needed by DoD.

The disciplines align with the Department's Science and Technology (S&T) priorities and emerging scientific research areas. The disciplines include: Aeronautical and Astronautical Engineering; Biosciences; Chemical Engineering; Chemistry; Civil Engineering; Cognitive, Neural, and Behavioral Sciences; Computer Science; Electrical Engineering; Geosciences; Industrial and Systems Engineering; Information Sciences; Materials Science and Engineering; Mathematics; Mechanical Engineering; Naval Architecture and Ocean Engineering; Nuclear Engineering; Oceanography; Operations Research; and Physics. Upon completion of their degree, students fulfill a service commitment to DoD on a one-to-one payback per year of education funded. In part, SMART's success is measured by participants that choose to remain in the DoD workforce beyond their required service commitment. A total of 800 participants have successfully completed the program through their DoD commitment; 75 percent of those participants are still employed by DoD.

Oversight of the SMART program falls under the Office of the Assistant Secretary of Defense for Research and Engineering (OASD(R&E)). Two types of individuals participate in the program: (1) retention scholars who are current DoD employees; and (2) recruitment scholars who are college students enrolled in undergraduate and graduate programs, and represent new talent for the Department. Internships provide SMART scholars with an opportunity to engage in relevant hands-on research, and work experiences in defense laboratories, thereby enhancing their educational experience.

Since FY 2005, approximately 2,000 students have participated in the SMART program at approximately 160 sponsoring facilities. As of August 2016, approximately 1,350 SMART scholars have transitioned into the service commitment phase. To date, these scholars have transitioned as civilian employees into the Air Force, Army, Navy, and other DoD components.

FY 2016 Accomplishments:

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 1	**R-1 Program Element (Number/Name)** PE 0601120D8Z / *National Defense Education Program (NDEP)*	**Project (Number/Name)** P120 / *National Defense Education Program (NDEP)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Provided oversight of the execution of the SMART program. • Fully transitioned the SMART program execution to the Services. • Assessed the SMART scholar inception process into DoD facilities and laboratories. • 133 academic degrees completed. • 239 new SMART scholarships awarded. • 661 SMART scholars in school. ***FY 2017 Plans:*** • Anticipate a 60% increase in new SMART awards to better meet DoD STEM workforce requirements. • Provide oversight of the SMART program, per SMART DoD Instruction (DoDI) 1025.09. • Continue assessment of the SMART scholar inception process into DoD facilities and laboratories. ***FY 2018 Plans:*** • Increase new SMART awards by 10% to better meet DoD STEM workforce requirements.			
Title: Pilot Program to Enhance the Preparation of Dependents of Members of the Armed Forces for Careers in STEM (Military Child Pilot Program) ***Description:*** The Military Child Pilot Program was established by the FY 2015 National Defense Authorization Act (NDAA), Section 233. The objectives are to enhance the preparation of dependents of members of the armed forces for careers in STEM, and to provide assistance to STEM teachers at elementary or secondary schools at which a significant number of military dependents are enrolled. The Department's methodology includes: (1) providing support to the National Math and Science Initiative (NMSI) program in collaboration with the DoD Education Activity (DoDEA) to expand the number of covered schools to support the national goal; and (2) coordinating with the DoD components, federal and local government partners, and private sector organizations to complement the NMSI program. ***FY 2016 Accomplishments:*** • Continued implementation and assessment of the pilot program with DoDEA and NMSI in preparation for a preliminary report due to Congress in December 2016. • Coordinated the Department-wide pilot program with federal and local government partners and private sector organizations. • Achieved the national goal of 200 covered schools reached, in partnership with DoDEA and NMSI, by expanding access for military-connected children to attend Advanced Placement (A.P.) classes in STEM. • Implemented activities to improve the quality of STEM educational and training opportunities for students and teachers, including the development and improvement of curricula. • Expanded focus of the program to provide activities that engage and meet demands in STEM education for overseas students. ***FY 2017 Plans:***	8.641	11.112	8.889

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 1	**R-1 Program Element (Number/Name)** PE 0601120D8Z / *National Defense Education Program (NDEP)*	**Project (Number/Name)** P120 / *National Defense Education Program (NDEP)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Continue implementation and assessment of the pilot program. • Reach 44 additional covered schools across 12 states. • Continue to expand access for military-connected children to attend classes in STEM, supporting the computer science national initiative (CS4All). • Implement and assess the Department-wide pilot program in coordination with the DoD components, federal and local government partners, and private sector organizations. • Implement activities to improve the quality of STEM educational and training opportunities for students and teachers, including the development and improvement of curricula. • Submit to the Committees on Armed Services of the U.S. Senate and the House of Representatives a progress report on activities carried out under the pilot program. ***FY 2018 Plans:*** • Continue implementation and assessment of the pilot program. • Continue to expand access for military-connected children to attend classes in STEM, supporting the computer science national initiative (CS4All). • Continue to implement and assess the Department-wide pilot program in coordination with the DoD components, federal and local government partners, and private sector organizations. • Implement activities to improve the quality of STEM educational and training opportunities for students and teachers, including the development and improvement of curricula.			
Title: STEM Education and Outreach ***Description:*** STEM Education and Outreach fosters conditions for STEM activities to support and cultivate STEM talent to build a future force that is representative of the nation's diverse population and reaches underserved populations to meet national defense needs and future defense challenges. Investments are made to promote participation in national-level STEM programs and initiatives and provide authentic hands-on experiences for students and teachers across the globe. Specific initiatives include internships, scholarships, and mentorships through partnerships with industry to include the FIRST Robotics events and teams, MATCHCOUNTS events, and the Center for Excellence in Education's (CEE) "Rickover" and Research Science Institute (RSI) internship programs. ***FY 2016 Accomplishments:*** • Continued STEM Education and Outreach and provided authentic hands-on experiences to approximately 17,452 students and 1,645 teachers across 905 schools. • Actively participated in the White House's Committee on STEM Education's (CoSTEM) Federal Coordination in STEM (FC-STEM) five Interagency Working Groups in support of the Federal STEM Education 5-Year Strategic Plan. • Provided support to STEM education and outreach programs.	3.477	2.773	2.773

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 1	**R-1 Program Element (Number/Name)** PE 0601120D8Z / *National Defense Education Program (NDEP)*	**Project (Number/Name)** P120 / *National Defense Education Program (NDEP)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Implemented the Department's STEM Strategic Plan and Communications Plan to establish a clear alignment to the Federal STEM Education 5-Year Strategic Plan and continued to establish a place for DoD within the broader Federal system. ***FY 2017 Plans:*** • Continue STEM Education and Outreach that provides authentic hands-on experiences to students and teachers and evaluate the effectiveness of the increased outreach. • Continue participation in inter- and intra-departmental collaboration with program partners to achieve federal and DoD STEM objectives. • Continue providing support to STEM education and outreach programs. • Establish clear and consistent assessment and evaluation metrics to evaluate progress. • Continue implementation of the Department's STEM Strategic Plan and Communications Plan. ***FY 2018 Plans:*** • Continue NDEP Education and Outreach that provides authentic hands-on experiences to students and teachers and evaluate the effectiveness of the increased outreach. • Continue participation in inter- and intra-departmental collaboration with program partners to achieve federal and DoD STEM objectives. • Continue providing support to STEM education and outreach programs. • Continue implementation of the Department's STEM Strategic Plan and Communications Plan. • Measure program progress against established desired outcomes and consistent metrics.			
Title: STEM Operations ***Description:*** STEM Operations manages activities to implement the Department's strategic plan for STEM education and outreach. STEM Operations provides program management and oversight, research studies, and official responses to Congressional and non-Congressional inquiries. STEM Operations develops and maintains systems and standards to support STEM education and outreach programs, implementing the Communications Plan, and collaborating across the Federal government and public domain through inter-agency and intra-departmental working groups, and partnerships. ***FY 2016 Accomplishments:*** • Continued program management and oversight, studies support, and responses to Congressional inquiries and other reports. • Developed and/or maintained systems and standards to support STEM policy implementation, oversight, and assessment. • Implemented the DoD STEM Advocate of the Quarter program. • Enhanced assessment and evaluation standards to support investment decisions. • Implemented the Communications Plan. • Completed the survey on the scope of DoD K-12 STEM programs, in accordance with Better Buying Power 3.0.	1.836	1.889	1.889

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 1	**R-1 Program Element (Number/Name)** PE 0601120D8Z / *National Defense Education Program (NDEP)*	**Project (Number/Name)** P120 / *National Defense Education Program (NDEP)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Implemented policy, assigned responsibilities, and provided policy guidance including the STEM DoD Instruction and legislative proposals. ***FY 2017 Plans:*** • Continue program management and oversight, studies support, and responses to Congressional inquiries and other reports. • Develop and/or maintain systems and standards to support STEM policy implementation, oversight, and assessment. • Continue to enhance assessment and evaluation reporting to support investment decisions. • Continue implementing STEM Advocate of the Quarter program. • Continue implementing Communications Plan. • Implement policy, assign responsibilities, and provide policy guidance including the STEM DoD Instruction and legislative proposals. ***FY 2018 Plans:*** • Continue program management and oversight, studies support, and responses to Congressional inquiries and other reports. • Develop and/or maintain systems and standards to support STEM policy implementation, oversight, and assessment. • Continue to enhance assessment and evaluation reporting to support investment decisions. • Continue implementing STEM Advocate of the Quarter program. • Continue implementing Communications Plan.			
Accomplishments/Planned Programs Subtotals	52.837	69.345	74.298

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Current metrics listed are subject to ongoing evaluation and analysis of appropriateness and effectiveness of the metrics being performed.

• The increase in the number of SMART scholars who are transitioned into the DoD workforce.
• The number of SMART scholars who are retained by DoD post-service commitment.
• The number of eligible SMART applicants from underrepresented groups, including HBCU/MIs.
• The number of SMART application reviewers from HBCU/MIs.
• The number of military-connected children that attended covered schools in the Military Child Pilot Program (MCPP).

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 1	**R-1 Program Element (Number/Name)** PE 0601120D8Z / *National Defense Education Program (NDEP)*	**Project (Number/Name)** P120 / *National Defense Education Program (NDEP)*

- The number of covered schools impacted by the MCPP.
- The number of teachers trained through the MCPP.
- Matriculation of participants into college.
- Participation by underserved populations; and, where applicable, course completions and credentials received.
- Improvements in student educational assessments.
- Infrastructure development and matching efforts by educational institutions or school districts.
- Matching efforts by Component agency and alignment with DoD workforce needs.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 1: *Basic Research*	**R-1 Program Element (Number/Name)** PE 0601228D8Z / *Historically Black Colleges and Universities and Minority-Serving Institutions*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	-	34.943	23.572	25.865	-	25.865	30.626	30.972	31.578	32.227	Continuing	Continuing
P448: *Historically Black Colleges and Universities and Minority-Serving Institutions*	-	34.943	23.572	25.865	-	25.865	30.626	30.972	31.578	32.227	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program element (PE) provides support for Historically Black Colleges and Universities and Minority-Serving Institutions (HBCU/MI) program in the fields of science and engineering that are important to national defense. The Department of Defense (DoD) HBCU/MI Program encourages participation of small minority schools as well as large minority research institutions. The HBCU/MI program is authorized by 10 U.S.C. § 2362 and is funded by annual appropriations. This competitive program provides support through grants, cooperative agreements, or contracts for research, education assistance, and instrumentation purchases.

Work in this PE provides a foundation to enhance participation of HBCUs/MIs in DoD research, including infrastructure; strengthen research and educational opportunities at HBCUs/MIs and increase the number of minority graduates in the science, technology, engineering, and mathematics (STEM) disciplines important to the national defense; and build a more diverse pool of scientists and engineers to meet future workforce needs.

Work in this PE is performed by the Services' Research Offices and DoD Laboratories (includes the Army Research Laboratory and the Air Force Research Laboratory) for Centers of Excellence (COE). Currently funded centers through cooperative agreements include COE in Autonomy, Cyber Security, and Research Data Analysis.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	35.834	23.572	25.888	-	25.888
Current President's Budget	34.943	23.572	25.865	-	25.865
Total Adjustments	-0.891	0.000	-0.023	-	-0.023
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.891	-			
• SBIR/STTR Transfer	-	-			
• Other Adjustments	-	-	-0.023	-	-0.023

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 1	**R-1 Program Element (Number/Name)** PE 0601228D8Z / *Historically Black Colleges and Universities and Minority-Serving Institutions*	**Project (Number/Name)** P448 / *Historically Black Colleges and Universities and Minority-Serving Institutions*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P448: *Historically Black Colleges and Universities and Minority-Serving Institutions*	-	34.943	23.572	25.865	-	25.865	30.626	30.972	31.578	32.227	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project funds the Historically Black Colleges and Universities and Minority-Serving Institutions (HBCU/MI) program which provides support in fields of science and engineering that are important to national defense. The Department of Defense (DoD) HBCU/MI Program encourages participation of small minority schools as well as large minority research institutions. This competitive program provides support through grants or contracts for research, education assistance, instrumentation purchases, and technical assistance as described below.

• Research. The research grants are to further the knowledge in the basic scientific disciplines through theoretical and experimental activities. Collaborative research allows university professors to work directly with military laboratories or other universities.

• Education. Education assistance funds are used by minority institutions to strengthen their academic programs in science, technology, engineering, and mathematics (STEM), thereby increasing the number of under-represented minorities obtaining undergraduate and graduate degrees in these fields. These grants provide equipment, scholarships, cooperative work/study opportunities, visiting faculty programs, summer intern programs, and a variety of other enhancements designed to support students and to encourage them to pursue careers in STEM.

• Instrumentation purchases. The program allows universities to purchase basic laboratory equipment for research and education program enhancements to essential research instruments, such as lasers and spectrometers.

• Technical assistance. The funds are used to design programs that enhance the ability of minority institutions to successfully compete for future Defense funding. The objective is to assist the HBCU/MI community in areas such as proposal writing and administration of grants and contracts.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Historically Black Colleges and Universities and Minority-Serving Institutions (HBCU/MI)	34.943	23.572	25.865
Description: The HBCU/MI program provides support for research and collaboration with DoD facilities and personnel. The research grants further knowledge in the basic physical scientific and engineering disciplines through theoretical and empirical activities. Collaborative research allows university professors to work directly with DoD laboratories or other universities.			
FY 2016 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 1	**R-1 Program Element (Number/Name)** PE 0601228D8Z / *Historically Black Colleges and Universities and Minority-Serving Institutions*	**Project (Number/Name)** P448 / *Historically Black Colleges and Universities and Minority-Serving Institutions*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Conducted annual competition of the HBCU/MI program for equipment. The competition resulted in 75 equipment grant awards totaling $28.500 million. Recipients included: 29 HBCUs, one Tribal College, and 45 in other categories of MIs. Initiated a special leadership project with the Thurgood Marshall College Fund (TMCF) under which TMCF, a non-profit organization, assists in the selection of HBCU/MI students for scholarships and internships in pursuit of STEM careers. Under the newly established Centers of Excellence (COEs) in support of the ASD(R&E) Science and Technology priorities in the areas of Cyber Security, Research Data Analysis, and Autonomy, supported 12 students in the summer of 2016 at the Air Force Research Laboratory in Rome, NY. Under the TMCF and the COEs, increased the number of FY 2016 summer interns from 79 (in FY 2015) to 85 participants in the DoD laboratories. The students received stipends for participating in the research at the DoD laboratories. Established an OSD and Department of the Navy (DoN) Cyber Security Information Assurance Program Partnership, which provided internship/co-op opportunities for four HBCU/MI students in the area of information assurance/cyber security. Conducted two outreach webinars to expose HBCUs/MIs to opportunities in DoD totaling $0.230 million. Nearly 250 individuals representing over 50 HBCUs/MIs attended the webinars. Co-hosted two technical workshops (October 2015 and January 2016) with the Office of Naval Research in which representatives from seven local HBCUs and three other institutions of higher education participated. ***FY 2017 Plans:*** Continue efforts from FY 2016. Conduct annual competition of the HBCU/MI program for basic research and student support. Continue the research and educational collaboration with the TMCF Leadership Project. The goal is to maintain the number of FY 2017 summer interns at 85 participants. Issue a funding opportunity announcement to establish a new Center of Excellence for STEM Scholarships in response to H.R. 114-139 (accompanying H.R. 2685, the FY 2016 DoD Appropriations act), which required DoD to expand STEM opportunities for underrepresented minorities. Conduct annual review of the existing Centers in Cyber Security, Research Data Analysis, and Autonomy. Continue the OSD and DoN Cyber Security Information Assurance Program Partnership. Host one webinar and two technical assistance workshops. The first FY 2017 workshop was held on October 26, 2016. More than 150 individuals attended. ***FY 2018 Plans:*** Continue efforts from FY 2017. Conduct annual competition of the HBCU/MI program for basic research, student support, and/or equipment/instrumentation. Continue the research and educational collaboration with the TMCF. The goal is to increase the number of FY 2018 summer interns from 85 to 90 participants. Monitor established Centers of Excellence in support of the ASD(R&E) Science and Technology priorities in the areas of Cyber Security, Research Data Analysis, Autonomy, Nanotechnology, and Materials Science. Conduct annual review of the Centers. Host one webinar and two technical assistance workshops.			
Accomplishments/Planned Programs Subtotals	34.943	23.572	25.865

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 1	**R-1 Program Element (Number/Name)** PE 0601228D8Z / *Historically Black Colleges and Universities and Minority-Serving Institutions*	**Project (Number/Name)** P448 / *Historically Black Colleges and Universities and Minority-Serving Institutions*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

- Number of students funded other than undergraduates
- Number of undergraduate students funded
- Number of undergraduates funded who graduated
- Number of students participating in the Centers of Excellence for Research and Education
- Number of students working in Defense Laboratories
- Number of undergraduates funded who graduated with degrees in STEM
- Number of graduates who will continue to pursue graduate or Ph.D. degrees in STEM
- Number of graduates who intend to work for DoD
- Number of undergraduates who will receive scholarships and fellowships for further studies in STEM

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 2: *Applied Research*	**R-1 Program Element (Number/Name)** PE 0602000D8Z / *Joint Munitions Technology*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	76.183	18.993	17.745	19.111	-	19.111	19.307	19.472	19.787	20.203	Continuing	Continuing
P000: *Insensitive Munitions*	52.967	12.828	11.993	12.910	-	12.910	13.049	13.156	13.367	13.658	Continuing	Continuing
P204: *Enabling Fuze Technology*	23.216	6.165	5.752	6.201	-	6.201	6.258	6.316	6.420	6.545	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program addresses applied research associated with improving the lethality, reliability, safety, and survivability of munitions and weapon systems. The goal is to develop and demonstrate joint enabling technologies that can be used by the Program Executive Officers (PEOs) as they develop their specific weapon programs. The program invests in and demonstrates technologies from a Joint Service perspective, thus maximizing efficiencies, ensuring the development of technology with the broadest applicability while avoiding duplication of efforts.

Munition Area Technology Groups (MATGs) and Fuze Area Technology Groups (FATGs) have been established for each munition and capability area and are tasked with: 1) coordinating, establishing, and maintaining 2018 and 2023 year technology development plans and roadmaps, 2) coordinating biannual meetings to review technical and programmatic details of each funded and proposed effort, 3) developing and submitting Technology Transition Agreements in coordination with appropriate PEOs for insertion in their Insensitive Munitions (IM) Strategic Plans / Fuze Technology Development Plan, and 4) interfacing with other MATGs / FATGs and IM / fuze science and technology projects as appropriate. The Joint Insensitive Munitions Technology Program (JIMTP) and Joint Fuze Technology Program (JFTP) will utilize a Technical Advisory Committee (TAC) (consisting of senior Department of Defense (DoD) and Department of Energy (DOE) laboratory representatives, and senior Munitions PEO representatives) to provide program oversight, policy, direction, and priorities during its annual meeting.

The IM effort will demonstrate enabling technologies needed to develop weapons in compliance with requirements established in United States Code, Title 10, Chapter 141, Section 2389 and DoD Instruction 5000.1. This effort will take promising technologies demonstrated at the laboratory scale and transition them into demonstration programs utilizing generic hardware based on priority munitions identified in the PEO IM Strategic Plans. Mature demonstrated IM technology can be transitioned, thereby decreasing their program costs and schedule risk and facilitating spin-offs to other non-compliant munitions within their portfolios.

The JIMTP investments focus on five Munition Areas: 1) High Performance Rocket Propulsion (HPP), 2) Minimum Signature Rocket Propulsion (MSP), 3) Blast and Fragmentation Warheads (BFW), 4) Anti-Armor Warheads (AAW), and 5) Gun Propulsion (GP). MATGs, under tri-service leadership, have developed technology roadmaps for each Munition Area that are used to guide investments based on goals consistent with the DoD IM Strategic Plan. These IM technologies, alone or in combination, will be developed and tested at the small-scale, and for eventual incorporation in hardware, simulating real-world munitions, to demonstrate their utility and feasibility.

The Enabling Fuze Technology effort will also demonstrate fuze enabling technologies needed to develop weapons that address priority capability areas identified in the Guidance for Development of the Force (GDF), the Secretary of Defense Memorandum, DoD Policy on Cluster Munitions and Unintended Harm to Civilians, and shortfalls in current weapon systems. This effort will develop fuzing technologies and mature them for transition into advanced technology (Budget Activity (BA)

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 2: *Applied Research*	**R-1 Program Element (Number/Name)** PE 0602000D8Z / *Joint Munitions Technology*

6.3) programs and/or design tools and protocols for weapon fuzing. In this way, the Service and Industrial base weapon and fuze communities will be able to heavily leverage and apply these emerging and promising technologies in fuzing modeling and simulation tools, multi-point initiation, high reliability fuze architectures, survivable components, modular fuze packaging, and fuze sensor.

The Joint Fuze Technology Program investments focus on four specific capability areas that have been identified by Department's strategic guidance and current shortfalls in weapon systems and will be validated by the PEOs and the Heads of the Service Science and Technology (S&T) communities. The capability areas are: 1) Hard Target Survivable Fuzing, 2) Tailorable Effects Weapon Fuzing, 3) High Reliability Fuzing, and 4) Enabling Fuze Technologies and Common Architecture.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	19.314	17.745	19.128	-	19.128
Current President's Budget	18.993	17.745	19.111	-	19.111
Total Adjustments	-0.321	0.000	-0.017	-	-0.017
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.321	-			
• Other Adjustments	-	-	-0.017	-	-0.017

Change Summary Explanation

FY 2018 adjustments are a result of internal realignment which reflects funding for higher Departmental priorities and requirements.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 2	R-1 Program Element (Number/Name) PE 0602000D8Z / *Joint Munitions Technology*	Project (Number/Name) P000 / *Insensitive Munitions*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P000: *Insensitive Munitions*	52.967	12.828	11.993	12.910	-	12.910	13.049	13.156	13.367	13.658	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Joint Insensitive Munitions (IM) Technology Program (JIMTP) aims to develop the enabling technologies needed to build weapons in compliance with statutory requirements (United States Code, Title 10, Chapter 141, Section 2389) and regulation (DoDI 5000.1 and 5000.02, and CJCSI 3170.01F). This effort will take promising technologies developed at the laboratory scale and mature them for transition into advanced technology (Budget Activity (BA) 6.3) programs based on the priority munitions identified in the DoD IM Strategic Plans. Mature and demonstrated IM technology can be transitioned to the Program Executive Officers (PEOs), thereby decreasing the program costs and schedule risk. This will additionally promote spin-offs to other non-compliant munitions within the DoD portfolio. Without new technology, future variants of current weapon systems will have the same, or worse, response to IM stimuli. New weapon developments will face similar challenges. This is especially true with increased performance requirements for improved and new systems.

The JIMTP investments focus on five Munition Areas: 1) High Performance Rocket Propulsion, 2) Minimum Signature Rocket Propulsion, 3) Blast and Fragmentation Warheads, 4) Anti-Armor Warheads, and 5) Gun Propulsion. Munition Area Technology Groups (MATGs), under tri-service leadership, have developed technology roadmaps for each Munition Area that are used to guide investments based on goals consistent with the DoD IM Strategic Plans. The program is structured around these five areas with clear cross-cutting tasks.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: High Performance Rocket Propulsion (HPP)	3.505	3.349	3.537
Description: HPP focuses on the development of technologies to improve the IM response of HPP systems, rocket motors with Ammonium Perchlorate and with or without a metal fuel, for rockets and missiles launched from air, ground, and sea platforms. These technologies, when applied to rocket motors, improve to one or more threats, while not degrading the response to other IM threats and, at minimum, maintaining munition performance. Technologies include, but are not limited to, rocket propellant ingredients, including synthesis, characterization and scale-up; reduced smoke or smoky propellants, including formulation, characterization and scale-up; rocket motor case design; materials for active and passive thermal mitigation; shock mitigation materials and techniques; passive and active coatings; active and passive venting techniques for motor cases or containers; ignition systems; sensors; and thrust mitigation techniques. Operating conditions may be controlled or widely varying in both temperature and vibration. The 2018 and 2023 year goals of the HPP MATG are concentrated on solving the IM response of missile propulsion systems due to Fragment Impacts and Slow Cook Off for the majority of HPP rocket motors, and solving the Fast Cook Off response of very large HPP motors.			
FY 2016 Accomplishments: - Formulated and conducted characterization, aging, and small scale performance testing on rocket propellant formulation composed of less reactive ingredients.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602000D8Z / *Joint Munitions Technology*	**Project (Number/Name)** P000 / *Insensitive Munitions*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Optimized novel mitigation device design and conducted small scale tests. - Produced 25 gram batches and completed characterization data on new slow cook-off propellant formulation. - Conducted critical temperature and auto ignition tests on formulations and down selected best performing modifications for year 2 formulation effort using a new sub-scale test to predict full-scale reactions in cook-off and impact testing. - Conducted preliminary testing on remote sensing device and interface sensing unit with venting device. - Established a baseline thermal history model to optimize current code to create a baseline model to correctly simulate the heat transfer and propellant decomposition chemistry. ***FY 2017 Plans:*** - Demonstrate acceptable small scale slow cook-off properties and demonstrate acceptable safety, tensile, and ballistic properties at the pint scale for new slow cook-off propellant formulation. - Demonstrate the concept and feasibility of a plateau burning propellant that will not maintain a reaction at elevated pressure - Integrate di-electric sensors into subscale motor test article. - Collect thermally damaged propellant burning rates to measure burning rate as a function of thermal exposure. ***FY 2018 Plans:*** - Solving the IM response of missile propulsion systems due to Fragment Impacts and Slow Cook Off for the majority of HPP rocket motors - Solving the Fast Cook Off response of very large HPP motors.			
Title: Minimum Signature Rocket Propulsion (MSP)	2.421	2.254	2.442
Description: MSP focuses on the development and demonstration of technologies to improve the IM response of MSP systems. The development and demonstration of minimum signature (MS) rocket technologies, when applied to munition systems, will improve munition IM response to one or more threats, while not degrading the response to other IM threats and, at minimum, maintaining munition performance. Technologies include, but are not limited to, MS rocket propellant formulations, ingredients for MS propellant formulations (including synthesis, characterization and scale-up), case and packaging design, active and passive venting techniques, rocket motor case design, ignition systems, and thrust mitigation techniques. Of particular interest are technologies that provide a higher burning rate minimum signature propellant with state-of-the-art energy and reduced shock sensitivity. The 2018 and 2023 year goals of the MSP MATG are concentrated on solving the IM response of missile propulsion systems due to Fragment Impact, Slow Cook Off, and Shaped Charge Jet (SCJ) threats. ***FY 2016 Accomplishments:*** - Conducted impact testing on baseline and novel MS propellants in representative cylindrical container to investigate propellant reactions relative to Army Burn-to-Violent Reaction (ABVR) test result predictions. - Fabricated and tested composite materials to validate modeling and analysis. Optimized materials and design for future testing.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602000D8Z / *Joint Munitions Technology*	**Project (Number/Name)** P000 / *Insensitive Munitions*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Synthesized and scaled up newly selected propellant ingredient to one kilogram batch for initial characterization studies. - Analyzed and fabricated composite material launch tube and perform fragment impact testing to gain data on material and fragment response. Optimized design based upon results. - Conducted cylindrical configuration propellant response testing to validate testing conducted on flat samples. - Scaled up to one pint mix new minimum signature propellant formulations and conducted safety testing. - Produced 250 gram batches of novel material for propellant formulation. ***FY 2017 Plans:*** - Fabricate baseline and optimized configurations with inert energetic and embedded sensors and conduct fragment impact testing of baseline and optimized configurations. - Validation of modeling will be conducted using a full scale propellant subjected to fragment impact testing. Comparison of data to predicted results will determine success of model. - Formulate extruded double base (NC/NG) types of energy levels without the use of nitro glycerin (NG) making the propellant much safer and resistant to shock - Develop predictive test tools for evaluation of novel propellant materials based on web thickness and bore size. ***FY 2018 Plans:*** - Solving the IM response of missile propulsion systems due to Fragment Impact, Slow Cook Off, and Shaped Charge Jet (SCJ) threats.			
Title: Blast and Fragmentation Warheads (BFW)	2.582	2.415	2.601
Description: BFW focuses on the development of technologies to improve the IM response of Blast/Fragmentation munitions. These technologies, when applied to munitions, improve IM response to one or more threats, while not degrading the response to other IM threats and, at minimum, maintain munition performance. Munition operating conditions may be controlled or have widely varying environmental conditions, such as temperature and vibration, and other factors such as cost, availability and reliability may be critically important depending on the intended munition application. Technologies include, but are not limited to, new ingredient synthesis and characterization, initial formulation development, scale-up, warhead/charge configuration, venting techniques for both munitions and their containers, protection or packaging materials and systems, shock mitigation liners, initiation devices, techniques, and technologies. Applications vary but include high performance warhead fills, booster explosives, bulk demolition charges, and bulk fills for blast and/or fragmentation charges. The 2018 and 2023 year goals of the BFW MATG are concentrated on solving the IM response of blast fragment warheads to the Sympathetic Detonation, Fast Cook Off, and SCJ threats. ***FY 2016 Accomplishments:***			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602000D8Z / *Joint Munitions Technology*	**Project (Number/Name)** P000 / *Insensitive Munitions*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Conducted large scale gap experiment, as well as bullet and fragment impact testing on unique explosive formulation for large warheads. - Continued to mature explosive initiation device design and conducted small-scale performance testing. Down-selected design and began design refinement. - Utilized novel coating process and scaled up formulations of high energy explosive. Prepared samples and conducted screening tests. - Refined fuze booster design, conducted M&S to develop companion auxiliary booster to complete the explosive train, and include implications to future cost and manufacturing process. - Investigated unique initiation method in environmental operating range while meeting IM criteria. - Conducted small scale experiments to investigate impact on performance and sensitivity of novel lining material for air to air warhead. - Conducted baseline testing with known explosive materials to validate new model. ***FY 2017 Plans:*** - Conduct verification tests on fuze booster design in preparation for transition to Budget Activity (BA3) demonstration. - Develop replacement explosives for higher power Artillery and mortar systems such as the M1130 and MAPAM. - Develop and scale up novel meltable materials to improve munitions responses to slow cook off. - Conduct fragment impact tests on materials after unique initiation method exposure. - Demonstrate the possibility of fully insensitive materials (off) that can be “activated” (on) before being used to improve the safety and logistics burden. - Validate the predicted results with experimental results from two explosive materials, at two different sizes. Compare to existing data. ***FY 2018 Plans:*** - Solving the IM response of blast fragment warheads to the Sympathetic Detonation, Fast Cook Off, and SCJ threats.			
Title: Anti-Armor Warheads (AAW) ***Description:*** AAW focuses on the development of explosive ingredients, explosives, and warhead and fuze technologies for improving IM of AAW munitions. The development of explosive ingredients, explosives, and warhead and fuze technologies, when applied to munitions, improve IM response to one or more threats, while not degrading the response to other IM threats and, at minimum, maintain munition performance. Technologies include, but are not limited to, new ingredient synthesis and characterization, initial formulation development, scale-up, warhead/charge configuration, venting techniques for both munitions and their containers, protection/packaging materials and systems, shock mitigation liners, and initiation devices, techniques, and technologies. Applications vary but include high performance warhead fills, booster explosives, and all other technology to mitigate the violent response of AAW munitions to IM threats. Munition operating conditions may be controlled or have widely	2.352	2.185	2.371

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602000D8Z / *Joint Munitions Technology*	**Project (Number/Name)** P000 / *Insensitive Munitions*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
varying environmental conditions, such as temperature and vibration, and other factors such as cost, availability, and reliability may be critically important depending on the intended munition application. The 2018 and 2023 year goals of the AAW MATG are concentrated on solving the IM response of anti-armor warheads to the Fragment Impact, Sympathetic Reaction, and Shaped Charge Jet threats for larger munitions and the Fragment Impact, Slow Cook-off, and Sympathetic Reaction / Shaped Charge Jet threats for Medium Caliber Munitions. ***FY 2016 Accomplishments:*** - Conducted tests using surrogate munition and shaped charge jet impact initiation testing configurations to validate models utility for weapon design. - Completed design of experiments, manufactured down-selected formulations, and conducted characterization study of newly identified explosive ingredient with high performance and low sensitivity potential. - Investigated initiation response of explosive due to SCJ stimuli using the model. - Matured formulation and process ability using new production technique. - Produced 100 pounds of a unique material and conducted formulation studies using a design of experiments to optimize the IM response. - Conducted small-scale mixtures to assist design of experiments for formulation of plastic explosive. ***FY 2017 Plans:*** - Complete in-situ mixing and casting of warheads in preparation for component testing using RAM technology. - Prepare and demonstrate an IM shock improvement by creation of nano explosive composites. - Demonstrate a ground to air weapon with improved shock sensitivity to the current Javelin system. ***FY 2018 Plans:*** - Solving the IM response of anti-armor warheads to the Fragment Impact, Sympathetic Reaction, and Shaped Charge Jet threats for larger munitions and the Fragment Impact, Slow Cook-off, and Sympathetic Reaction / Shaped Charge Jet threats for Medium Caliber Munitions.			
Title: Gun Propulsion (GP) ***Description:*** GP focuses on the development and demonstration of technologies in the area of GP systems. The development and demonstration of gun propulsion technologies, when applied to munition systems, will improve munition IM response to one or more threats, while not degrading the response to other IM threats and, at minimum, maintaining munition performance. Technologies include, but are not limited to, gun propellant formulations, ingredients for gun propellant formulations, including synthesis, characterization and scale-up, cartridge case and packaging design, active and passive venting techniques, reduced sensitivity primer propellant and primer systems, and robust primers for insensitive propellants. Applications vary, but include both large and medium caliber munitions, as well as propelling charges for mortars and shoulder launched munitions. Operating	1.968	1.790	1.959

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602000D8Z / *Joint Munitions Technology*	**Project (Number/Name)** P000 / *Insensitive Munitions*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
requirements vary, and other factors such as barrel life and operation over varying environmental conditions may be critically important depending on the intended munition application. The 2018 and 2023 year goals of the GP MATG are concentrated on solving the IM response of gun propulsion munitions to Fragment Impact and Slow Cook Off threats. ***FY 2016 Accomplishments:*** - Matured unique process ingredient propellant formulation, conducted gun testing and prepared for large scale manufacturing of propellant to prepare for slow cook-off testing. - Conducted impact performance testing of propellant and primer for new projectile. - Compiled ballistic performance data on coated propellant for modelers. - Scaled up two candidate materials for manufacturing and conducted characterization studies for new propellant. - Prepared propellant formulations using three different methods, to compare product sensitivity and processing characteristics. - Developed two new large caliber propellant production techniques and used modeling and simulation to down select the formulations that will produce the least sensitive materials. ***FY 2017 Plans:*** - Integrate primer and conduct full scale gun testing on new propellant for fragment impact and slow cook-off response. - Prepare advanced coating materials and mixing methods to improve sensitivity to shock. - Conduct characterization studies on new large caliber propellant formulations, down select and conduct sub-scale IM testing. - Demonstrate a new gun propellant and cook off system for the 120mm rifled mortar system that can also improve the response of the High Explosive Guided Mortar (HEGM) system. ***FY 2018 Plans:*** - Solving the IM response of gun propulsion munitions to Fragment Impact and Slow Cook Off threats.			
Accomplishments/Planned Programs Subtotals	12.828	11.993	12.910

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 0603000D8Z P002: *BA 3 Insensitive Munitions Advanced Technology*	18.867	17.756	19.039	-	19.039	19.152	19.323	19.640	20.028	Continuing	Continuing

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602000D8Z / *Joint Munitions Technology*	**Project (Number/Name)** P000 / *Insensitive Munitions*

E. Performance Metrics

1) Transition of technologies developed by the Program are tracked and documented by technology maturity.
2) Munition Area Technology Group (MATG) Technology Roadmaps are prepared, evaluated, and analyzed by Joint Insensitive Munitions Technology Program management and technical staff.
3) Chairman's Annual Assessments for each MATG are critically reviewed by the Technical Advisory Committee to determine progress, transition plans, and relevance of each project.
4) Project progress toward goals and milestones is assessed at each MATG meeting.
5) Annual technical reports and papers are tracked and documented for the Program.
6) External Peer Review of Projects conducted as part of Joint Army/Navy/NASA/Air Force meetings.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 2	R-1 Program Element (Number/Name) PE 0602000D8Z / *Joint Munitions Technology*	Project (Number/Name) P204 / *Enabling Fuze Technology*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P204: *Enabling Fuze Technology*	23.216	6.165	5.752	6.201	-	6.201	6.258	6.316	6.420	6.545	Continuing	Continuing

A. Mission Description and Budget Item Justification

This RDT&E effort will demonstrate fuze enabling technologies needed to develop weapons that address priority capability areas identified in the Guidance for Development of the Force (GDF), the Secretary of Defense Memorandum, DoD Policy on Cluster Munitions and Unintended Harm to Civilians, and shortfalls in current weapon systems. This effort will develop enabling technologies at the laboratory scale and transition them into Budget Activity (BA) 6.3 demonstration programs for weapons where priority capabilities and technology needs have been identified and validated by the Program Executive Officers (PEOs) and the Heads of the Service Science and Technology (S&T) communities. Mature BA 6.2 fuze technologies will be transitioned, thereby decreasing their program costs and schedule risk and facilitating spin-offs to other munitions within their portfolios.

Under the Joint Fuze Technology Program (JFTP), investments are focused on specific capability areas that have been identified by the Department's strategic guidance and current shortfalls in weapon systems and validated by the PEOs and Heads of the Service S&T communities. The four capability areas are: 1) Hard Target Survivable Fuzing, 2) Tailorable Effects (TE) Weapon Fuzing, 3) High Reliability Fuzing, and 4) Enabling Fuze Technologies and Common Architecture.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Hard Target Fuzing	1.590	1.504	1.617
Description: The Hard Target Fuzing challenges are grouped into three Technology Areas. First, improved modeling and simulation (M&S) capabilities provide the validated computational tools necessary for hard target applications. Second, basic phenomenology and understanding of the Fuze Environment is the science-based endeavor of providing the test equipment, instrumentation, and analysis techniques for experimentation and data gathering necessary for next generation fuzing. Third, hard target survivable fuze components are developed to increase the effectiveness of facility denial munitions by improving the prediction tools and testing methodologies to evaluate the survivability and functionality of legacy and future fuzes. Development of these technologies will enable next generation boosted and hypersonic penetrators to execute missions against hardened and deeply buried targets.			
FY 2016 Accomplishments: - Developed high shock survivable low-cost target layer detection fuze sensor to measure post impact environments in hardened target weapons. - Developed modeling & simulation code that enables simulation of fuze response at high frequency regimes in the hard target environment.			
FY 2017 Plans:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602000D8Z / *Joint Munitions Technology*	**Project (Number/Name)** P204 / *Enabling Fuze Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Develop and demonstrate 3-D printed fuze electronic components and packaging technologies for survivability and reliability in DoD hypersonic penetrating weapons. - Develop fuze energetic and firing components to reliably function in boosted and hypersonic penetrators munitions. ***FY 2018 Plans:*** - Release modeling and simulation tools to improve the prediction of the dynamic response of embedded fuze systems for a specific shock environment. - Conduct characterization testing for establishing design guidelines of ruggedizing fuzes in high shock environment.			
Title: Tailorable Effects Fuzing ***Description:*** Develop fuzing for tailorable effects weapons that encompasses the ability to selectively vary the output of the weapon (Dial-a-Yield) and/or the ability to generate selectable effects (directed blast, fragmentation). Develop initiation and multi-point technologies; electronic safe and arm based multi-point initiators for tunable output – scalable yield warheads; MicroElectro-Mechanical Systems (MEMS) based multi-point initiators for tunable output/scalable yield warheads; and smart fuzing for tailorable effects weapons. These technologies will enable weapons that can effectively defeat a variety of targets while minimizing unintentional collateral effects. ***FY 2016 Accomplishments:*** - Development of multi-point inline firing system in simultaneous and/or post-impact delay into Double Reinforced Concrete (DRC) / Brick over Block (BOB) or equivalent target in accordance with Redstone Test Center (RTC) standards. ***FY 2017 Plans:*** - Develop wirelessly powering and functioning distributed detonating output nodes in a multi-output safe, arm, and fire system for distributed weapon fuzing and initiation systems, eliminating the need for complex cable assemblies and adding flexibility for easily customizing. - Demonstrate and transition into Budget Activity (BA) 6.3 advanced technology development of Hardened Selectable Multipoint Fireset technologies that provides reliable, selectable detonation of tailorable effects warheads. ***FY 2018 Plans:*** - Develop government owned detonator formulation for weapons with inline fuzing architectures conventional or high-g applications. - Demonstrate wirelessly powering and functioning distributed detonating output technology in a multi-output safe, arm, and fire system.	1.486	1.303	1.415
Title: High Reliability Fuzing	1.569	1.475	1.587

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602000D8Z / *Joint Munitions Technology*	**Project (Number/Name)** P204 / *Enabling Fuze Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Description: Develop high reliability fuzing architectures, fuzing components, and Unexploded Ordnance (UXO) reduction features. These technologies will enable the next generation of cluster munitions to achieve the required greater than 99 percent reliability goal. Evolving DoD emphasis on increased weapon system reliability is driving the need to consider new and novel approaches for achieving increased fuze reliability while maintaining or enhancing fuze design safety. DoD policy, higher weapon reliability expectations and harsher weapon system operational requirements are dictating the need for higher fuze reliability than available using current technologies. ***FY 2016 Accomplishments:*** - Completed testing and characterization of MEMS safety and arming (S&A) micro scale materials and energetics to transition into high reliability low cost munitions technology applications. - Developed experimental techniques and applied M&S tools to analyze and evaluate fuze components and explosive trains to increase margin of reliability in fuze design. ***FY 2017 Plans:*** - Develop and demonstrate energy harvesting and free fall sensor technologies to power an electronic safe-arm fuze resulting in an increased margin of reliability in general purpose bomb fuzes. - Investigate reactive growth process at ideal and marginal conditions to guide the quantification of fuze explosive train margin and performance. Applications include: Air Force penetrator weapon demo programs and Army M935 and Precision Guidance Kit (PGK) fuzes. ***FY 2018 Plans:*** - Develop liquid reserve lithium oxyhalide battery technology with fast rise time and maintain low temperature performance in weapon applications. - Develop MEMS scale stab detonator and micro-scale firetrain technologies for miniature fuzing applications.			
Title: Enabling Fuze Technologies ***Description:*** Develop common/modular fuze architecture; innovative fuze component technologies; sensors; next generation fuze setting capability, tools and modeling; and fuzing power sources. These fuzing technologies will provide smaller, more cost effective solutions while meeting or exceeding the performance of existing technologies. Development of these technologies will enable future weapon applications to be more mission adaptive and smaller along with improved target detection capabilities. ***FY 2016 Accomplishments:*** - Developed and demonstrated low cost, small energy harvesting and event detection sensors for application in cannon fire projectile fuzing that improves safety.	1.520	1.470	1.582

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602000D8Z / *Joint Munitions Technology*	**Project (Number/Name)** P204 / *Enabling Fuze Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Continued development of prototype wireless technology system so as to provide power and data transfer to aerial rockets and small guided munitions for use on US Army rotary aircraft. ***FY 2017 Plans:*** - Develop fast radar signature simulation tool for application in fuzing sensor algorithms that will enables rapid detection and processing of complex targets during weapon end-game. - Develop a reliable, low cost (reduce by 40%) pulse discharge switch for application in electronic safe/arm fuzes (ESAFs). ***FY 2018 Plans:*** - Develop conformal antennas with wideband operation to provide fuze sensor waveforms for target detection. - Develop miniature thermal battery technology to yield fast rise time and high power density required for small munitions.			
Accomplishments/Planned Programs Subtotals	6.165	5.752	6.201

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 0603000D8Z P301: *BA 3 Enabling Fuze Advanced Technology*	6.585	6.146	6.588	-	6.588	6.627	6.678	6.781	6.949	Continuing	Continuing

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

1) Transition of technologies developed by the Program are tracked and documented by technology maturity.
2) Fuze Area Technology Group (FATG) Technology Roadmaps are prepared, evaluated, and analyzed by Joint Fuze Technology Program management and technical staff.
3) Chairman's Annual Assessments for each FATG are critically reviewed by the Technology Advisory Committee to determine progress, transition plans, and relevance of each project.
4) Project progress toward goals and milestones is assessed at each FATG meeting.
5) Annual technical reports and papers are tracked and documented for the Program.
6) Technology Transition Agreements in place with Munitions programs.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 2: *Applied Research*	**R-1 Program Element (Number/Name)** PE 0602230D8Z / *Defense Technology Innovation*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	0.000	0.000	30.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
P835: *Defense Technology Innovation*	0.000	0.000	30.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program will fund the development of novel leading-edge technologies emerging from high-tech companies that are not traditional defense contractors. These funds will enable the Department to source break through and emerging technologies applicable to the defense mission as identified in the Defense Innovation Unit Experimental (DIUx), or the Components, for potential incorporation into the Department's weapon systems and operational capabilities.

An objective of this program is to obtain innovative ideas from industry that have low technology readiness of high priority to DoD leadership. Incoming proposals will be approved by the Assistant Secretary of Defense, Research and Engineering to ensure alignment with the DoD's strategic objectives and increase our permeability to disruptive change, and strengthen our nation's security.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	0.000	30.000	30.000	-	30.000
Current President's Budget	0.000	30.000	0.000	-	0.000
Total Adjustments	0.000	0.000	-30.000	-	-30.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Other Adjustments	-	-	-30.000	-	-30.000

Change Summary Explanation

The DIUx program in this PE and associated funding have been transferred to Washington Headquarters Services (WHS), PE 0603342D8W, beginning in FY 2018.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 2	R-1 Program Element (Number/Name) PE 0602230D8Z / *Defense Technology Innovation*	Project (Number/Name) P835 / *Defense Technology Innovation*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P835: *Defense Technology Innovation*	0.000	0.000	30.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program will fund the development of novel leading-edge technologies emerging from high-tech companies that are not traditional defense contractors. These funds will enable the Department to source break through and emerging technologies applicable to the defense mission as identified in the Defense Innovation Unit Experimental (DIUx), or the Components, for potential incorporation into the Department's weapon systems and operational capabilities.

An objective of this program is to obtain innovative ideas from industry that have low technology readiness of high priority to DoD leadership. Incoming proposals will be approved by the Assistant Secretary of Defense, Research and Engineering to ensure alignment with the DoD's strategic objectives and increase our permeability to disruptive change, and strengthen our nation's security.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Defense Technology Innovation	0.000	30.000	-
Description: This program will fund the development of novel leading-edge technologies emerging from high-tech companies that are not traditional defense contractors. These funds will enable the Department to source break through and emerging technologies applicable to the defense mission as identified in the Defense Innovation Unit Experimental (DIUx), or the Components, for potential incorporation into the Department's weapon systems and operational capabilities. An objective of this program is to obtain innovative ideas from industry that have low technology readiness of high priority to DoD leadership. Incoming proposals will be approved by the Assistant Secretary of Defense, Research and Engineering to ensure alignment with the DoD's strategic objectives and increase our permeability to disruptive change, and strengthen our nation's security. ***FY 2016 Accomplishments:*** New Start in FY17. ***FY 2017 Plans:*** This program will fund the development of novel leading-edge technologies emerging from high-tech companies that are not traditional defense contractors. These funds will enable the Department to source break through and emerging technologies applicable to the defense mission as identified in the Defense Innovation Unit Experimental (DIUx), or the Components, for potential incorporation into the Department's weapon systems and operational capabilities.			
Accomplishments/Planned Programs Subtotals	0.000	30.000	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602230D8Z / *Defense Technology Innovation*	**Project (Number/Name)** P835 / *Defense Technology Innovation*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 2: *Applied Research*	**R-1 Program Element (Number/Name)** PE 0602234D8Z / *Lincoln Laboratory*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	49.409	53.517	48.269	49.748	-	49.748	55.971	56.495	57.312	58.517	Continuing	Continuing
P534: *Lincoln Laboratory*	40.135	44.886	39.576	44.275	-	44.275	49.254	49.717	50.436	51.494	Continuing	Continuing
P535: *Technical Intelligence*	9.274	8.631	8.693	5.473	-	5.473	6.717	6.778	6.876	7.023	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Lincoln Laboratory (LL) research line program is an advanced technology research and development effort conducted through a cost reimbursable contract with the Massachusetts Institute of Technology (MIT). The LL Program supports innovative, multi-disciplined research that addresses critical national security problems. The LL Program funds innovations that directly lead to the development of new system concepts, technologies, components and materials in support of DoD missions. Funding is applied to support high-risk, high-payoff research that provides unique and specialized capabilities to the current and emerging needs of the DoD. The LL P534 Program funds ten technology project areas. Of these, there are five core-technology areas:

- Advanced Devices
- Optical Systems and Technology
- Information, Computation and Exploitation
- Radio-Frequency (RF) Systems and Technology
- Cyber Security

In addition, there are four emerging-technology initiatives:

- Novel and Engineered Materials
- Quantum System Sciences
- Biomedical Sciences and Technology
- Autonomous Systems

In FY 2017, an Integrated Systems initiative has been added. This area focuses on combining novel technologies from Lincoln Laboratory's research and development efforts (as well as from commercial and academic R&D) with Lincoln Laboratory's system architecture and system engineering expertise to create breakthrough system-level designs and prototypes.

The ten technology areas provide critical capabilities that support all the Department of Defense (DoD) mission areas pursued at the Laboratory. In general, the categories are selected in consultation with ASD(R&E) and with guidance from other DoD agencies to address technology as well as system needs. The new initiatives are chosen to address difficult emerging problems as well as longstanding problems to which new technology advances can be applied. The individual projects in each area are selected with a goal of enhancing DoD capabilities significantly, rather than incrementally.

Supporting these and other priority technology and capability areas are work efforts entitled Technical Intelligence:

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 2: *Applied Research*	**R-1 Program Element (Number/Name)** PE 0602234D8Z / *Lincoln Laboratory*

- The Technical Intelligence Program provides global science and technology (S&T) awareness and context in order to assist Defense decision-makers plan for an uncertain future. The program uses intelligence-based and open-source information to characterize today's global S&T environment, exploiting novel technology watch and horizon scanning (TW/HS) tools to identify nascent and disruptive technologies that will shape tomorrow's future. The program complements this with tailored technical assessments that identify the military relevance, research opportunities, and policy recommendations for emerging and disruptive technologies.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	50.925	48.269	49.793	-	49.793
Current President's Budget	53.517	48.269	49.748	-	49.748
Total Adjustments	2.592	0.000	-0.045	-	-0.045
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	4.300	-			
• SBIR/STTR Transfer	-1.708	-			
• Other Adjustments	-	-	-0.045	-	-0.045

Change Summary Explanation

In FY 2016, $4.3 million was reprogrammed into the X-Lab project to support Missile Defeat initiatives.

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COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
P534: *Lincoln Laboratory*	40.135	44.886	39.576	44.275	-	44.275	49.254	49.717	50.436	51.494	Continuing	Continuing

A. Mission Description and Budget Item Justification

The ten Lincoln Laboratory research areas that comprise the overall LL P534 research and development portfolio are described below:

Five core-technology areas:

• Advanced Devices emphasizes the development of devices and subsystems utilizing microelectronic, photonic, biological, and chemical technologies to enable new approaches to Department of Defense (DoD) systems. Projects include technologies for high power radio-frequency (RF) devices; multi-function, highly integrated lasers; fast and sensitive imagers; and mechanical microsystems for autonomous systems.

• Optical Systems and Technology focuses on developing optical technologies for visible, infrared, and wide band spectroscopic sensing as well as communications systems. The projects areas include high energy lasers; scalable focal plane imaging technology; photonic integrated circuits; optical system prototypes; and associated phenomenology measurements.

• Information, Computation and Exploitation develops novel architectures, tools, and techniques for the processing, fusion, interpretation, computation, and exploitation of multi-sensor, multi-intelligence data. Projects include innovative hardware and software technologies for graph processors and cloud computing; artificial intelligence and graph algorithms for analytics, including deep learning algorithms; multi-intelligence analytics, including open-source data processing techniques; and human-machine interfacing and automation technologies to enhance warfighter effectiveness and ability to work with advanced computing systems.

• Radio-Frequency (RF) Systems and Technology focuses on RF technologies to enhance warfighting capabilities in radars, electronic warfare (EW), and communications. Projects include development of next generation phased arrays; ultra-wideband RF systems; compact RF systems; small satellite RF payload; and advanced algorithms for jammer mitigation and EW.

• Cyber Security focuses on the development of technologies and new techniques for the protection of systems against cyber-attack and exploitation. Projects include research into technologies for cyber situational awareness, command and control; technology to improve resilience of systems to cyber-attack; and technologies for system exploitation research. A new area focusing on cyber-EW systems is being planned for future work.

Four emerging-technology initiatives:

• Novel and Engineered Materials emphasizes research in new materials for additive manufacturing and emerging nanoscale materials. Projects include research in RF materials for 3D printing; other advanced 3D printing technologies; revolutionary semiconductor materials; and microsystems using metamaterials.

• Quantum System Sciences focuses on the development of quantum-based technologies that support sensing, communication, computation, and algorithms using quantum information. The projects include the demonstration of scalable computation platforms, demonstration of quantum protected communications and magnetic field sensing using highly-compact, atomic-like defects in diamond, prototyping revolutionary quantum networking systems and technology, and research into advanced quantum algorithms.

• Biomedical Sciences and Technology supports the development of bio-engineered and biomedical technologies to aid the warfighter. Projects include brain imaging technologies; relevant research in brain and cognitive sciences; engineered biological systems to aid physiology understanding; and technologies to assess physical performance and enhance injury recovery.

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• Autonomous Systems has the objective of developing mobile, autonomous, robotic platforms, as well as sensors and algorithms that support key capabilities needed for a wide range of DoD applications. Projects span advanced artificial intelligence and processing; sensors and communications for unmanned platforms; platform designs and energy systems; human-machine interactions; and verification and validation of autonomous systems.

One system technology initiative:
• Integrated Systems uses multiple new technologies to solve an important national need. Systems selected for funding have an applied research component related to the integration process. Projects target key DoD warfare domains, including space, air, land, sea surface, and undersea. This is a new area in FY 2017, and currently projects addressing the space (3D Ladar for small satellites), land (cloud-assisted tactical computing), and undersea (maritime laser-communications) are underway. There are plans to initiate projects for the air (autonomous micro-air vehicles) and sea (unmanned surface vehicles) domains in FY 2018 and FY 2019.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Advanced Devices	5.482	4.744	5.291

Description: This project area targets the research and development of unique and innovative components, subsystems, and sensing concepts or methodologies that will enable new solutions to important Department of Defense (DoD) problems. Activities under this technology area include specialized silicon and compound semiconductor-based devices for radio-frequency (RF), analog, mixed-signal, and digital electronics; photonics, optoelectronics and laser technologies; and novel devices and concepts for chemical, biological, and radiation sensing.

FY 2016 Accomplishments:
In FY 2016, five projects were continued from FY 2015 and three projects were new starts. The continuing digital charge-coupled device (CCD) imager project constructed and demonstrated two cameras that incorporated the new imager technology fabricated in the Lincoln Laboratory Microelectronics Laboratory (ML). One of the cameras included a novel low-noise readout circuit and the other camera incorporated the hybrid integration of a CCD and analog-to-digital converters (ADCs) to enable kilohertz readout rates. Development also continued on germanium (Ge) CCD imagers that can offer broadband visible and short-wave infrared imaging, as well as sensitivity for higher-energy x-rays relative to silicon-based detectors. In FY 2016, the germanium CCD fabrication process was transferred to the 200-mm toolset available in the ML and prototype imagers were designed and fabricated. A new advanced-imager project involved the development of pixel-to-pixel crosstalk reduction techniques for compound-semiconductor Geiger-mode avalanche photodiode (GmAPD) arrays. These techniques enable the reduction of the pixel pitch to enable GmAPD arrays having larger formats. Work continued on the development of a low size, weight and power (SWaP) optical communications transceiver incorporating silicon photonic integrated circuits (PICs). During the past year, silicon PICs were characterized and second-generation PICs were designed. A new integrated-photonics project involved the development of high-power, broadband optical sources for interferometric fiber-optic gyroscopes (IFOGs). Both the spectral bandwidth and the electrical-to-optical conversion efficiency of these optical sources were improved. Work continued on the development of designs and models to increase the efficiency of quantum-cascade lasers (QCLs) operating in the 9-μm-wavelength region for infrared countermeasures. In the area of advanced electronics, work continued on the development of high-power, microwave diamond transistors for radar, electronic-warfare, and communications applications. The current density of

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
diamond p-MOSFETs was increased 100X by applying a NO2 surface treatment and a growth reactor was installed to enable the in-house growth of diamond materials to accelerate progress on this project. The microhydraulic actuator project was refocused to realize configurations that emulate human muscle and single-layer demonstrations were performed. ***FY 2017 Plans:*** For FY 2017, Advanced Devices has eight projects: (1) Digital CCD is a continuing effort that is combining the best attributes of CCD and CMOS-based imaging devices, including a massively parallel analog-to-digital converter architecture with scientific-grade CCD pixels and amplifier designs with sub-electron noise; (2) Diamond Power Transistors is a continuing effort that is developing high-performance power transistors for radar, electronic warfare, and communication applications; (3) Germanium CCDs is a continuing program to develop germanium-based CCDs for large-format, high-quality short-wave IR imaging; (4) Zero-Crosstalk IR Geiger-mode Avalanche Photodiodes (GmAPDs) for Multi-mode Imagers is a continuing project that focuses on the elimination of crosstalk between pixels in InGaAs-based GmAPD arrays to enable dramatically reduced spacing between pixels; (5) Photonic Integrated Navigation-Grade Gyroscope (PING) is a continuing effort that is developing environmentally stable optical sources to improve the long-term stability of interferometric fiber-optic gyroscopes (IFOGs); (6) Flexible Microhydraulically Actuated Fibers is a continuing effort that is developing of a liquid-solid scalable actuator that mimics biological muscle; (7) Scalable Silicon Geiger-mode APD Arrays is a new effort that is developing novel crosstalk reduction techniques for silicon-based GmAPDs for lidar and passive-imaging applications; (8) Multifunction Undersea Blue-Green Laser Transmitter is a new project that is developing gallium-nitride (GaN) based materials and photonic components (e.g., lasers, optical modulators) for high-power transmitters for underwater optical communications. ***FY 2018 Plans:*** More sensitive, larger format imagers integrated with small-pitch read-out integrated circuits (ROICs) will become available. Subsystem demonstrations of photonic-integrated gyroscopes will measure the gyroscope accuracy and reliability. Prototype of high-power, wideband circuits based on diamond transistors will help evaluate the promise of this technology. GaN-based photonic components operating at blue-green wavelengths will be matured and demonstrated in system prototypes. For the most advanced devices, diamond electronics will focus on realizing radio-frequency metal-oxide having current-gain—bandwidth product of 50 GHz.			
Title: Optical Systems and Technologies ***Description:*** This project-area conducts research through the development, analysis, and demonstration of novel concepts, technology, and systems for the next-generation of optical systems for the DoD. The primary goal of this project area is to invest in optical-based technologies that fill the critical technology gaps in emerging DoD threat areas, such as anti-access/area denial (A2/AD), counter–weapons of mass destruction (C-WMD), and asymmetric warfare, as well as to develop revolutionary optical technologies in the traditional DoD mission areas such as intelligence, surveillance, and reconnaissance (ISR), space control, communications, and ballistic missile defense.	6.100	4.877	5.440

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018

FY 2016 Accomplishments:

In FY 2016, Optical Systems and Technology entailed a total of twelve projects, including computational imaging, LADAR technologies, free-space communication technologies and space surveillance capabilities. The portfolio included novel optical technology developments applicable across a broad range of DoD problems. A Digital Coherent Aperture Combiner was developed that performs adaptive optics in the digital domain to synthesize a much larger aperture receiver to reduce the size and cost of communication ground terminals while improving resistance to signal fading. A Deployable In-Space Coherent Imaging Telescope (DISCIT) was designed with the ability to “unfold” a large optical aperture from a small satellite in order to provide transformational advantages to the DoD. This telescope has the goal of demonstrating a 70 cm telescope with single-fold composite hinges and using target in the loop image compensation to achieve image quality comparable to a full-aperture telescope, as well as addressing multiple hinge technology for scaling to larger (multiple meters) apertures. A novel Micro LADAR system for the use on hand-launched unmanned air vehicle was designed, supporting subsystems were developed, and a prototype system was demonstrated on a testbench. An Undersea Optical Communication testbed was developed that successfully demonstrated high data rate optical communication techniques under water. After four years of funding, the Long-Baseline Interferometer testbed completed its final year by successfully designing, fabricating and integrating a novel spectrometer in order to improve the state-of-the-art in sensitivity and image quality by nearly and order of magnitude. A photo-thermal speckle detection technology was developed that can identify chemicals present in trace amounts at small stand-off distances. Such capability is important in the modern battlefield and for protecting crowd in various venues. The Panelized Laser Transceiver effort started mid-year FY 2016 to develop a new architecture for a scalable phased array laser transmitter and receiver.

FY 2017 Plans:

In FY 2017, Optical Systems and Technology is continuing to fund four previous-year projects in order to bring their efforts to successful demonstrations: DISCIT, MicroLADAR, Digital Coherent Aperture Combiner, and Panelized Laser Transceiver. In FY 2017, five new projects have been initiated: (1) the Zero-Seam-Loss Large Format Tiled IR DFPA project, which shows great promise to scale focal plane sizes for many different imaging detectors by orders of magnitude; (2) the Long-wave Infrared (LWIR) Coherent Laser Radar project, bringing to remote sensing methodologies orders of magnitude increase in sensitivity in tactically useful wavebands; (3) the Computational Reconfigurable Imaging Spectrometer project to extend the SEEIT methodology to hyperspectral imaging; (4) the On Orbit Sensor Test and UV Phenomenology for Space Situational Awareness Systems project, that is leveraging a Lincoln developed UV space sensor for an experiment on the International Space Station; and finally (5) an Integrated Planar-Lens Based Chip-Scale Lidar project that takes optical LADAR into the extremely small form factor, integrated photonics domain.

FY 2018 Plans:

Optical Systems and Technology will continue to develop advanced technologies in lasers and receivers as well as in novel optical systems and architectures for next-generation capabilities for national security challenges. An ultraviolet spectral band sensor

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
being built in FY 2017 will launch on the International Space Station to sense the local space environment. This experiment will provide new insights into the near-earth space environment. Demonstration of the small laser radar will reveal limits to real-time three-dimensional images obtainable from a small platform. Design will commence on integration into an unmanned air vehicle. A number of military applications are expected to spin out of the digital coherent aperture combining, the deployable optics in space, and large Geiger-mode APDs.			
Title: Radio Frequency (RF) Systems and Technologies	5.020	3.761	4.195
Description: This project area focuses on research, development, and evaluation of innovative RF technologies and concepts in anticipation of Department of Defense (DoD) and intelligence community requirements for radar, signals intelligence (SIGINT), communications, and electronic-warfare (EW) applications. Key RF challenges being addressed include a rapidly expanding threat spectrum, platforms with severely constrained payloads, operations in strong clutter and interference environments, detection of difficult targets, and robustness against sophisticated electronic attack. RF technologies of interest include antennas, filters, transmit/receive modules (high-power amplifier, low-noise amplifier, phase shifter, time domain up-sampling), beamformers (analog, digital, photonic), receivers/exciters (local oscillator, mixers, filters, analog-to-digital converter, digital-to-analog converter), and novel RF packaging concepts. RF systems concepts that address novel analog/digital/photonic architectures and signal processing techniques for improved RF performance are also being pursued. ***FY 2016 Accomplishments:*** In FY 2016, key accomplishments included; (1) the demonstration of an aperture-level simultaneous transmit and receive (STAR) array with over 100dB of coupling isolation on the Aperture-Level STAR (ALSTAR) project; (2) the demonstration of integrated Si-based micro-jet cooling for high power density arrays on the Embedded Micro-jets project; (3) the design of an ultra-light, deployable space-based radar phased array panel with a mass density of 5 kg/m^2. This project built a mechanism for satellite deployment with one-micron reproducibility, which enables the deployment of a 20m x 1m array; (4) the demonstration of a high output power GaN on Si HEMT transistors with high transition frequency as part of the GaN on Si CMOS project; (5) The system design and analysis of Multiple-beam Directional Networking system concept was completed and summarized in a detailed technical report; (6) The array based compressed sensing receiver (ACRA) prototype was completed and tested, with demonstrated results showing significant benefits of a wideband ESM system in a sparse spectrum environment. This work is expected to have a major impact on electronic warfare capabilities; and finally, (7) The Out-Phased Array Linearized Signaling (OPALS) project completed testing using emulated channels; the successes in this project have led to a patent filing. ***FY 2017 Plans:*** In FY 2017, a number of projects are continuing in the areas of advanced RF electronics, including Aperture Level Simultaneous Transmit and Receive (STAR) for Phased Array Applications, Gallium Nitride (GaN) on Silicon for Next-Generation Phased Arrays, Embedded Microjets for high thermal power density cooling, and Lightweight Deployable Antenna arrays for small-satellite applications. Two new projects were started in FY 2017, including (1) the Jammer Mitigation and Jammer System Development project, which is developing uninterrupted wireless communication in realistic jammer environments enabled by			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Receiver processing mitigation (RPM) algorithms that require no additional antennas and no changes in the waveform; and (2) the Wideband RF Advanced Spectral Processor (WRASP) effort, which is developing new architectures for ultra-wideband receivers with high dynamic range and on-chip spectral power detection, digital cueing, and signal processing to minimize off-chip data transfer. ***FY 2018 Plans:*** RF Systems and Technology will continue to focus research on advanced RF technologies in support of emerging needs for radar, SIGINT, communications, and EW systems. Some of the newer efforts that require fabrication of components, such as the GaN-on-Silicon for Next-Generation Phased Arrays projects, will likely require significant multiyear investments to be at an appropriate stage of development for transition. Other projects that utilize mostly commercial components in novel architectures or that have already been supported for multiple years will seek nearer-term transition opportunities. The selection and evolution of efforts will support the wide range of Laboratory mission areas that rely on new RF technology components and systems.			
Title: Information, Computation, and Exploitation Sciences	4.606	5.189	5.788
Description: This project area is intended to achieve significant technical gains in data processing, computation, exploitation, and information visualization for DoD applications. The volume, velocity, and variety of information production and consumption are growing at exponential rates, requiring the development of innovative ways to deal with this “big data” deluge. Projects focus on novel computing architectures, hardware, analytical techniques, and tools for high throughput processing, fusion, interpretation, and exploitation of “big data”, especially for multi-sensor, multi-intelligence data. ***FY 2016 Accomplishments:*** ICE had several major accomplishments in FY 2016: (1) The initial Graph Processor prototype system composed of commercially developed FPGA boards achieved performance exceeding that of commercial supercomputers for the sparse matrix-matrix multiply function, which is the most processing-intense computational kernel associated with graph-based analytics; (2) The Lincoln Laboratory Supercomputer Center (LLSC) achieved world-record performance for ingesting “big data”, which is critical for the emerging DoD Internet of Things (IoT) architecture, across SQL, NoSQL, and NewSQL databases; (3) The highly integrated low-power embedded analytics processor demonstrated 3-10x performance gains compared to conventional systems for several important “big data” techniques; (4) Algorithmic techniques to address low-truth databases, which are typical for DoD applications, were developed and refined. In particular, the Dynamic Deep Learning (DDL) project developed an approach that optimizes the required neural network architecture in such low-truth environments while achieving near-human-level classification performance on surveillance video data; (5) The architecture for Computer-on-Watch project, an autonomous Processing, Exploitation, and Dissemination (PED) system focused on Indicator & Warning (I&W) applications, was defined and initial machine learning algorithms for target recognition were developed that use transfer learning techniques to improve performance; (6) Additional data sources were added to the collaborative Open Source Data Initiative (OSDI) infrastructure framework for researchers exploring large data sets obtained from multiple data source types and formats; (7) Work was completed on the development of formal			

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bounds for detection of anomalies in complex networks and on the use of information theoretic approaches to better assess team decision making in a multiple source, rapidly changing Big Data environment. ***FY 2017 Plans:*** The Graph Processor effort is completing its three-year development by executing multiple real-time graph analytics functions on a 64-node field-programmable gate array (FPGA) integrated into the Lincoln Laboratory Supercomputer Center (LLSC). Data sets of interest to the Department of Defense (DoD) and Intelligence Community are being benchmarked. Concepts for lower power application-specific integrated circuit (ASIC) systems are also being developed.The Massive Computation and Resiliency Internet of Things (IoT) project is exploring the use of advanced commercial compute devices to perform relevant mathematical and data storage/access functions at high performance-to-power ratios as well as efficient approaches for secure multi-party computation on Big Data data-sets. Other efforts continue to focus on novel machine learning techniques. The Dynamic Deep Learning (DDL) project is refining architectural optimization approaches while addressing its implementation on constrained low-power embedded systems. The Computer-on-Watch project is focusing on early warnings applications based on adaptive deep learning algorithms. The new Adaptable, Interpretable Machine (AIM) learning project is providing analysts and decision makers with explanation and provenance of results obtained by machine learning techniques. This project is also developing new technologies to enhance system performance over time through user-feedback machine-learning techniques. The Open-source Data Initiative project continues to be upgraded to provide the needed foundation for future algorithm developments. ***FY 2018 Plans:*** The Internet of Things (IoT) project will prototype secure cloud computing techniques for protecting military systems deployed in networked architectures. Advanced machine learning techniques will continue to be developed through Dynamic Deep Learning (DDL), Computer on Watch, Adaptable, Interpretable Machine (AIM), and open-source intelligence projects. Machine learning efforts will expand to national security environments where tagged training data are sparse. These techniques will help the war-fighter make better decisions based on current knowledge. New real-time processing approaches such as the graph processor effort will reduce size, weight, and power to allow advanced analytics to be deployed to the tactical edge. Transition of the graph processor technology to operational use will be pursued. In addition to approaches for larger data-center applications, the portfolio will address high-performance computing architectures for size, weight, and-power–efficient data exploitation and cognitive decision support systems located at the tactical edge, including small UAVs and local ground stations.			
Title: Cyber Security ***Description:*** This area conducts research, development, evaluation, and deployment of prototype components and systems designed to improve the security of computer networks, hosts, and applications, thereby assuring the resilience of Department of Defense (DoD) missions against cyber-attack and exploitation. A particular focus is the overlap between the DoD mission areas and the cyber domain. Efforts include cyber analysis; creation and demonstration of robust architectures that can operate through cyber-attacks; development of prototypes that demonstrate the practicality and value of new techniques for cryptography, cyber sensing, automated threat analysis and course of action selection, anti-tamper systems, and malicious code detection;	5.113	3.879	4.326

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018

demonstrations of the impact of cyber on traditional kinetic systems; quantitative, repeatable evaluation of these prototypes; and, where appropriate, deployment of prototype technology to national-level exercises and DoD and intelligence community operations.

FY 2016 Accomplishments:

In FY 2016, the Cyber Security project area had accomplishment in a number of key areas: (1) Reverse-engineering tools were further developed to permit deep analysis of data flow through software applications and were tested for widespread use by the community. These tools permit analysis of software running on a variety of different processor architectures (e.g., x86, ARM and PowerPC); (2) A related project leveraged this capability to create software vulnerabilities on-demand in support of research in discovery and remediation; (3) A prototype, net-centric, enterprise-wide cyber situational awareness platform was designed and developed. On this platform, advanced graph analytics, contextual search, and georeferenced visualization techniques were demonstrated on Lincoln Laboratory operational data. Elements from this prototype were used operationally to defend the Laboratory's networks and were deployed at several regional combatant commands; (4) Multiparty computation research resulted in a significant speed-up through the use of sparse matrix representations, fixed point arithmetic, and new analysis techniques for data provenance;(5) An enhanced private cloud testbed demonstrated new secure operation capabilities for use on DoD systems; (6) Tests on a real-time flight simulator application demonstrated secure computing by decrypting a minimum amount of data and operating instructions. Finally, (7) a project prototyped insertion of hardware vulnerabilities in chip-level system components, to aid in the development of detection techniques.

FY 2017 Plans:

Cyber Security projects in FY 2017 continue research into developing a broad range of tools in hardware and software to help discover new threats, add robustness to current architectures, and understand ways to improve this development cycle. Work is on-going to develop hardware that emulates cyber threats to the supply chain. These emulated threats support DoD cyber testing and training activities. Research into software that enhances security robustness include the development of efficient protocols to permit computation on encrypted data stored in a public cloud, and the development of architectures, applications and tools to permit secure and resilient cloud computing, along with development of a testbed to assess the level of security achieved. Efforts to better understand vulnerabilities also form another significant branch of the FY 2016 research goals. The current development of metrics and methodologies for evaluating software security by analyzing the exploitability of software vulnerabilities and their exposure to attackers is complemented by the effort to automatically create subtle vulnerabilities within pieces of test software, supporting researchers who seek to build and evaluate software vulnerability detection systems. Several new efforts have been launched which focus on emerging areas of interest, including cyber decision automation using modeling and simulation, exploring the security implications of the Internet of Things in order to create cyber security design guidelines and recommendations for future small satellites, and developing effective indicators for insider threat behavior by analyzing sponsor-provided data.

FY 2018 Plans:

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Rapid response to the evolving cyber threats and new technology trends on the horizon along with Lincoln Laboratory's DoD cyber expertise will continue to guide future plans in Cyber Security. New research will be initiated that use and extend proven interaction models to evaluate network segmentation strategies that provide maximal advantage to defenders. The focus on developing secure systems that may be composed from foreign manufactured components will continue, particularly those which are part of the Internet of Things. Big Data analytics in support of cyber situational understanding and effective, timely decision making will play a key role in future applied research. Finally, strategies to mitigate adversary ability to limit US cyber/ electronic warfare (EW) capabilities will continue to be developed and tested.			
Title: Biomedical Sciences and Technology	3.320	4.373	4.812
Description: This project area focuses on developing expertise and technologies to advance research and development in the biosciences, with the goals of developing technologies (1) to enhance warfighter health and performance and (2) to prevent or predict injury through individualized biological monitoring, analysis, and interventions. Collaborative relationships with local academic and medical institutions are enabling Lincoln Laboratory to make significant contributions in areas that aid warfighter health and well-being, and leverage emerging research trends, such as quantum sensors. ***FY 2016 Accomplishments:*** There were several accomplishments in Biomedical Sciences and Technology in FY 2016, including: (1) The Non-Contact Ultrasound System for Volumetric Imaging project (NCLUS) successfully adapted hardware to enable (a) 3D imaging around a residual limb and (b) location of small metal pieces, such as shrapnel, within tissue; (2) The Artificial Gut (ArtGut) project developed both an ArtGut prototype to enable rapid microbiome experiments as well as a microfluidic device that can characterize complex microbial samples. (3) In collaboration with United States Army Institute of Surgical Research (USAISR) and the Broad Institute of MIT and Harvard, a new effort started to identify molecular-level functions associated with muscle recovery/repair after volumetric muscle loss. The goal is to direct healing tissue along the correct trajectory. Among the many accomplishments, the first mapping of the messenger RNA molecules involved in muscle loss was built; (4) A complementary effort, the 3D multi-material Bio printer project, made progress addressing gaps in current technologies to enable printing of complex biological materials such as cartilage; (5) The Functional Brain Network Analysis project collected data on neural connectivity by collecting electroencephalogram (EEG) and eye-tracking data simultaneously during task learning. Initial results were analyzed to identify key features associated with a high performing neural state; (6) The Microelectronics Interfacing Neural Devices (MIND) project designed the world's smallest (0.2 mm x 0.1 mm), single-channel, fully-wireless neural sensor. Fabrication of this device was begun (and is being completed in FY2017); (7) A cellular-resolution brain-mapping project was begun that utilizes data gathered from a novel micro-scale brain mapping method (CLARITY) to build a big-data management framework for brain imagery. This enables the development of automated neuron-tracing algorithms and initial prototypes of these algorithms were completed. Finally, (8) the neuroscience algorithms projects also developed the first neuro-biophysical vocal track model to assist in determining the biological basis of vocal changes associated with changes in neurocognitive status; this project involved a collaboration with United States Army Research Institute of Environmental Medicine (USARIEM) to collect experimental data and			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
begin the development of a model of how the brain handles competing demands for cognitive resources such as walking, talking, and memory. ***FY 2017 Plans:*** In FY 2017, ongoing projects include: (1) The ArtGut program is completing a functional ArtGut prototype system for use at Lincoln that can be transitioned to collaborators for future projects. The project is developing a demonstration of in-vitro sustained cultures of defined microbial communities. The project FY 2017 goals are to compare the metabolic activity of these microbial communities to more traditional benchtop culture results as well as to model predictions; (2) The NCLUS effort is completing development of full 3D imaging capability to support the fabrication of prosthetics for amputees; (3) A related project is focusing on automated bio image analysis; (4) The volumetric-muscle-loss project is culminating this year with in vitro demonstrations of directed cell differentiation to restore muscle function; (5) The MIND project is fabricating a neural sensor so small it can be inserted into the brain without damaging neurons; (6) Ultra-sensitive magnetic field measurement technology from the Quantum System Sciences project area is being used to build a better magnetoencephalograph for brain imaging; (7) The brain-mapping project is developing improved algorithms for neuron-tracing, leveraging software algorithms used in ballistic missile defense and other image-tracking applications. Finally (8) the neurocognitive project is modeling sensorimotor control to better understand experiments conducted in the newly-opened immersive virtual reality dome at Lincoln Laboratory. ***FY 2018 Plans:*** Biomedical Sciences and Technology will see increasing emphasis on multimodal data collection and analysis in diverse application areas (e.g. cognitive and neuroscience, microbiome-related, tissue healing), in keeping with emergent science trends and anticipated DoD needs. Many of these efforts will augment the Brain Research through Advancing Innovative Neurotechnologies (BRAIN) initiative being led by DARPA and the NIH. The increased understanding will also aid in treatment of soldiers with traumatic brain and other battlefield injuries. This project area will continue to develop concepts and technologies in medical sensing, imaging, and diagnostics, cognitive analytics, and cellular and molecular engineering. Multimodal approaches to understanding physiological and psychological status will continue. Novel tool and platform development focused on accelerating and improving biotechnology research will also continue. Medical image processing and rehabilitation tools will be explored by leveraging existing Laboratory expertise in image processing, signal analysis, and decision support algorithms.			
Title: Autonomous Systems ***Description:*** This project area performs applied research in autonomous robotics to address current and anticipated DOD mission needs. A principal goal is to enable unmanned systems to perform useful tasks in uncertain environments as trusted, capable agents without continuous human operator control. Projects span the development of a full range of autonomy algorithms and technologies. Technology areas include perception and world modeling, planning, human-robot interaction, manipulation, learning and adaptation, and robotic platforms. ***FY 2016 Accomplishments:***	3.377	3.501	3.904

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602234D8Z / *Lincoln Laboratory*	**Project (Number/Name)** P534 / *Lincoln Laboratory*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
In FY 2016, this project area had several accomplishments, including: (1) A multi-function digital vision sensor was prototyped for real-time, autonomous, low-altitude optical navigation. Algorithms that use limited on-sensor computation and are rapid enough for real-time feedback were implemented. A closed loop simulation of high-speed obstacle avoidance with an emulated sensor was demonstrated. The sensor is now being integrated with a micro-camera; (2) Another effort developed, implemented, and tested algorithms for data-driven UAV path planning. This research used an open-source robotics library and a custom node to communicate with a serious gaming engine, which is also used by the Army; (3) Software libraries to enable intelligent path planning in DRAKE (a collection of tools for analyzing the dynamics of our robots and building control systems for them in MATLAB and C++) were implemented and tested by manipulating dynamic known objects on an industrial robot arm; (4) Interception of at-speed surface ships using newly developed autonomy software performed well in at-sea testing, which validated both the software and the ocean flow models. As an outgrowth, dolphin bio sonar techniques and strategies were investigated for use on an Unmanned Underwater Vehicle (UUV) platform for mine clearing of bottom and buried mines. This effort completed the real-time autonomous mission simulator tools for biomimetic sonar area search and made progress on the field test setup. The mission simulator was used to establish performance metrics for area clearance; (5) A project that used a multi-stage linear ionization array for silent airborne propulsion was initiated, and progress was made on aerodynamic modeling and propulsion system prototyping. Control of a high-efficiency glider air-frame was designed, fabricated, and flight tested. Optical imaging of gases to measure acoustic pressure visualized the ionic wind and informed the thruster design; (6) A new research project was begun that developed algorithms for decentralized coordination for teams of autonomous systems started. Advanced methods to improve performance for large observation spaces were developed and new techniques to account for adversarial opposition were created.			
FY 2017 Plans: Autonomous System projects are continuing in the hardware and algorithm development areas and are expanding to include key efforts to address autonomy in the face of uncertainty. A demonstration is being developed for a digital vision sensor for fast autonomous airborne navigation in a dynamic flight test. Coordination algorithms for multi-agent Unmanned Air Vehicles (UAVs) using decentralized planning algorithms are being developed and tested with real-world communication constraints. Development of size, weight and power (SWaP) constrained adaptive communication algorithms is continuing, with the goal of enabling large-scale multi-robot teams. A biomimetic sonar project is developing autonomous object detection, localization and classification. Simulations, experimental studies of ionized flow field and aerodynamic interactions, and field testing are taking place to improve silent UAV performance. Work to exploit common structures to describe environments with reduced parameter sets and optimize perception algorithms for low computation sparse sensing and explore the separation of sensing and computation to enable truly autonomous micro UAVs has begin. Development and extension of Petablox, which is a specification language that enables users to specify autonomous systems properties, for use in verification of tightly integrated autonomous systems has begin, and is being combined and compared with newly enhanced DRAKE verification algorithms utilizing complex dexterous manipulation testing.			
FY 2018 Plans:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602234D8Z / *Lincoln Laboratory*	**Project (Number/Name)** P534 / *Lincoln Laboratory*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Continuing the focus of teaming in complex environments, research will continue to improve current autonomous system capabilities for air, land, sea and cross-domain problem sets with the overall goal to develop more advanced autonomy, in-situ adaptation, and learning in unstable, complex environments to reduce risk to war-fighters. These improvements will encompass both hardware advancements, such as the on-going silent propulsion system, as well as algorithm improvements for swarm and multi-agent coordination, and verification and validation of complex autonomy that interacts with humans and the physical world.			
Title: Quantum System Sciences ***Description:*** This project are is developing methods for sensing, communicating, and processing information using quantum mechanical systems that manipulate information in ways that are not possible in classical systems. A number of different physical quantum systems and applications are being pursued with a focus on approaches that can be scaled to address national security challenges. A major goal of this project area is to establish a robust scientific foundation upon which future application-oriented and large-scale development programs will thrive. ***FY 2016 Accomplishments:*** During FY 2016, the work in this project area was divided among quantum computing, including experimental efforts, simulations, algorithm projects, quantum communication, and quantum sensing. In the quantum computing area, Lincoln Laboratory made significant improvements in integrated electronics for trapped ions, co-trapping Calcium and Strontium ions for the first time, which is critical to scalable approaches to ion manipulation and measurement. Advances were also made in three-dimensional integration of superconducting qubits and the design of a chip with five coupled qubits. These experimental efforts were supplemented with advances in simulation of correlated noise/errors to understand its impact on quantum error correction and advances in algorithms for loading large, sparse matrix data into qubits to enable an exponential speedup for an important class of linear algebra algorithms. The FY 2016 quantum communication work included the characterization of a high-rate source and receiver of continuous-variable quantum optical states operating in the ultra-high-bandwidth, low brightness regime. The quantum communication project modified a high-speed secure communication protocol capable of achieving greater than 1-Gbps secure rates over 40-km fiber spans. This represents a 1000x increase in rate over current state-of-the-art quantum key distribution systems. Finally, improvements in the dynamic range and vector measurement capabilities were demonstrated for magnetic sensors based on nitrogen-vacancy atomic defects in diamond. ***FY 2017 Plans:*** Multi-qubit operations are being explored in both the trapped ion system, using the two ion species, and in the superconducting qubit system, using the recently fabricated chips and a new approach to 3D integration for enabling qubit coupling in a scalable array format. The work on simulation tools is being expanded, particularly in support of simulating the trapped ions, and the feasibility of implementing the quantum computing algorithm for exponential speedup of linear algebra is being evaluated in terms of the number of gates for problem sizes that cannot be addressed by classical supercomputing. The quantum communication entanglement distribution effort is being expanded to a three-node multi-span architecture that includes an investigation into photonic qubit quantum memory architectures based on defect-centers and ion traps. The sensitivity of the magnetometer using	4.772	4.537	5.060

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
nitrogen-vacancy defect states in diamond is being further improved by using more optimized diamond samples and advanced pulse sequences. ***FY 2018 Plans:*** Quantum communications will target the development of quantum network system architectures and technologies capable of supporting short-haul quantum computing integration and long-haul quantum state transmission over long distances. Advances in trapped ion and superconducting qubits will continue to be aimed at integrating the control and measurement in a third dimension to enable the development of larger arrays for exploring noise correlations and proper error correction techniques. Also, in addition to continued advances in superconducting qubits, trapped ions, quantum networks and quantum magnetometry, additional efforts will be made to advance techniques for mitigating noise. Finally, more emphasis will be placed on approaches to couple together these modalities, such as quantum state transfer between a trapped ion and photon and leveraging the ions for quantum sensing and quantum clocks.			
Title: Novel and Engineered Materials ***Description:*** This project area develops materials and processes that make a transformative impact on enduring national challenges. Areas of strategic focus are material property customization and material enablers for ultra-low- size weight and power (SWaP) systems. ***FY 2016 Accomplishments:*** Important advances were made in the additive manufacturing of both structural and functional materials. Compared to natural materials, these novel materials have the capability to offer unique features such as having high strength while also being light weight or having complex responses to radio frequency signals. A particle ejection testbed targeting the fabrication of metal-ceramic microlattices has been completed. Low-loss, two-material, multi-frequency and variable-dielectric devices were also demonstrated as part of a collaboration with Harvard University. A continuing effort investigated the applicability of transition metal dichalcogenide (TMD) materials for flash memory and room-temperature solid-state qubits (logical units of quantum calculation), and achieved first-ever wafer-scale growth of monolayer tungsten disulfide (WS2). Finally, novel multi-material fibers have been demonstrated with controlled emissivity. ***FY 2017 Plans:*** Materials discovery using additive manufacturing continues in FY 2017, and is being expanded with the addition of a new effort to develop electronics-quality printable metal for non-planar substrates. The transition metal dichalcogenide (TMD) project continues to focus on growth of wafer-scale, device-quality materials. The project isdetermining electrical and optical properties relevant to computation. Advanced project work in designing and drawing of composite fibers is focused on developing novel sensing capability in textile form. Additionally, Lincoln Laboratory has launched an expanded effort in phase-change tunable metamaterials to enable ultra-low-SWaP imaging. ***FY 2018 Plans:***	2.796	2.556	3.049

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Lincoln Laboratory will continue to leverage additive manufacturing for materials discovery and property customization, and continue to explore novel dimensionalities (1D fibers, monolayer materials) to develop novel structural and functional properties for low-SWaP systems. Optical metamaterials and phase change materials activity will grow in importance, as the need increases for advanced, multifunctional sensing capabilities, such as hyperspectral and polarimetric imaging, super-resolution, and computational imaging in smaller and smaller form factors.			
Title: Integrated Systems ***Description:*** This project uses multiple new technologies to solve an important national need. Systems selected for funding have an applied research component related to the integration process. The goal is to demonstrate DoD-relevant systems that use novel architectures, recently developed component technologies, and new analytic methods. The intent is to support early work on systems that cut across the conventional categories. ***FY 2016 Accomplishments:*** This is a new effort in FY 2017. ***FY 2017 Plans:*** Integrated Systems projects are focusing in three main areas. One effort is developing an integrate Processing, Exploitation, and Dissemination (PED) capability at the tactical edge, by using cloud computing and robust, hierarchical communications technology. This project is designing a Cloud architecture for PED, which would be available at forward-deployed bases. Another project is an Autonomous and Reconfigurable Maritime Networking Demonstration. This project builds on a recent underwater communication demonstration from the Optical Systems and Technology area. In FY 2017, active pointing and tracking of the terminals technology is being for adaptive communications between moving undersea objects. The third effort is focused on risk reduction research and architectural design for a 3D imaging laser radar system to be deployed on a low earth orbit (LEO) satellite. This ladar has the potential to observe structures under foliage with global coverage. ***FY 2018 Plans:*** The FY 2017 Tactical Edge PED effort will do system simulation of a Cloud architecture in a resource-limited environment to disseminate the most valuable information. The underwater communications effort will do in-water testing of a communication network between multiple moving platforms. If risk is reduced enough, the LEO 3D ladar effort will start design and planning for a satellite program. Additional efforts in the micro-air vehicles and and small unmanned surface sea vehicles will be initiated that advance new technologies for autonomous systems capabilities for both of these domains.	0.000	2.159	2.410
Title: Missile Defeat-X Lab ***Description:*** X-LAB in support of Missile Defeat conducts experiments with the goal of demonstrating a multi-INT threat defeat framework using a rapid insertion of new data sources, new analytics and pluggable libraries of analytics and visualization tools	4.300	0.000	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602234D8Z / *Lincoln Laboratory*	**Project (Number/Name)** P534 / *Lincoln Laboratory*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
from developer community (Universities, Industry, Government Labs, FFRDCs). The X-LAB project works towards fusion across unclassified and classified data for the Joint Staff organization and its TCPED demonstrations. ***FY 2016 Accomplishments:*** In FY 2016, X-Lab developed an architecture at multiple classification levels (U, S, TS) that allowed inputs at all levels fusing data at the TS-Level. Developed algorithms to assess/analyze multiple datasets. Demonstrations are scheduled for December 2016 and in support of a follow on joint staff demonstration in January 2017. At which point the project will be assessed for further development and integration. ***FY 2017 Plans:*** In FY 2017, Missile Defeat will be executing out of PE 0604132D8Z.			
Accomplishments/Planned Programs Subtotals	44.886	39.576	44.275

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 2	R-1 Program Element (Number/Name) PE 0602234D8Z / *Lincoln Laboratory*	Project (Number/Name) P535 / *Technical Intelligence*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P535: *Technical Intelligence*	9.274	8.631	8.693	5.473	-	5.473	6.717	6.778	6.876	7.023	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Technical Intelligence Program provides global science and technology (S&T) awareness and context in order to assist Defense decision-makers plan for an uncertain future. The program uses intelligence-based and open-source information to characterize today's global S&T environment, exploiting novel technology watch and horizon scanning (TW/HS) tools to identify nascent and disruptive technologies that will shape tomorrow's future. The program complements this with tailored technical assessments that identify the military relevance, research opportunities, and policy recommendations for emerging and disruptive technologies.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Technical Intelligence	8.631	8.693	5.473

Description: The Technical Intelligence Program provides global science and technology (S&T) awareness and context in order to assist Defense decision-makers plan for an uncertain future. The program uses intelligence-based and open-source information to characterize today's global S&T environment, exploiting novel technology watch and horizon scanning (TW/HS) tools to identify nascent and disruptive technologies that will shape tomorrow's future. The program complements this with tailored technical assessments that identify the military relevance, research opportunities, and policy recommendations for emerging and disruptive technologies.

FY 2016 Accomplishments:

In FY 2016, the Technical Intelligence program is funding efforts characterizing today's global S&T environment, exploiting novel TW/HS tools to identify nascent and disruptive technologies that will shape tomorrow's future, and developing tailored technical assessments that identify the military relevance, research opportunities, and policy recommendations of emerging and disruptive technologies. Specifically:

- JASON Program: Supporting focused technical assessments on defense relevant problems. The potential topic areas include: Artificial Intelligence, defending against cooperating UAVs, and micro-satellite.
- Technology Watch and Horizon Scanning (TW/HS) Tool Exploitation: Funding efforts on exploiting data analysis and TW/HS tools, to identify existing and unrecognized patterns, and to provide non-obvious relationships using open source information. The program is investigating improvements in taxonomy generation, query generation, and metrics and validation of TW/HS algorithms through partnerships with ARL and ONR. It has initiated an the transitioning technology from IARPA to the DoD developed through IARPA's Foresight and Understanding from Scientific Exposition (FUSE) program, which was a 5-year program that invested $60M-$80M into tools for TW/HS. This program is also on year 2 of a 3 year partnership with AFOSR on studying the science of emergence that is funding research at Northeastern University and University of Chicago.
- Technical Assessment Program: Working on multiple technical assessment activities supporting the community of interest topic areas, including an Assessment of the field of TW/HS, Integrated Photonics, Multifunctional Structural Materials, Artificial Intelligence, Internet of Things and Synthetic Biology, and may include additional topics such as cognitive neuroscience, and

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602234D8Z / *Lincoln Laboratory*	**Project (Number/Name)** P535 / *Technical Intelligence*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018

optics and directed energy. This program funded an analysis of the vulnerability of UAV's sense-and-avoid systems to herding behavior conducted at AFRL and Air Force University that was as a follow-on from the FY15 Autonomy assessment.

FY 2017 Plans:

In FY 2017, the Technical Intelligence program will continue to support efforts characterizing today's global S&T environment, exploiting novel TW/HS tools to identify nascent and disruptive technologies that will shape tomorrow's future, and developing tailored technical assessments that identify the military relevance, research opportunities, and policy recommendations of emerging and disruptive technologies. Specifically:

- JASON Program: Will support focused technical assessments on defense relevant problems. The potential topic areas include: advanced electronics, autonomy, electronic warfare and protection, energy and power technologies, engineered resilient systems, space, sensor and processing systems, and human systems.
- Technology Watch and Horizon Scanning (TW/HS) Tool Exploitation: Will continue to sponsor efforts on exploiting data analysis and TW/HS tools with the goal of having an operational TW/HS toolkit available to DoD researchers and scientists. The program will identify outreach opportunities to inform and train DoD S&T organizations in the usage of analytical tools and methodologies to support "in-house" decision making and expand organizational knowledge into emerging technology areas of strategic interest.
- Technical Assessment Program: Will sponsor multiple technical assessment activities that support the community of interest topic areas, which may include advanced computing, cognitive decision-support tools, and non-traditional sensing.

FY 2018 Plans:

In FY 2018, the Technical Intelligence program will continue to support efforts characterizing today's global S&T environment, exploiting novel TW/HS tools to identify nascent and disruptive technologies that will shape tomorrow's future, and developing tailored technical assessments that identify the military relevance, research opportunities, and policy recommendations of emerging and disruptive technologies. Specifically:

- JASON Program: Will no longer be supported by this PE
- Technology Watch and Horizon Scanning (TW/HS) Tool Exploitation: Will continue to support the operational TW/HS toolkit, TechSight, which is available to DoD researchers and scientists, and focus on expanding it to provide quicker data analytics for TW/HS to support decision making. The program will identify outreach opportunities to inform and train DoD S&T organizations in the usage of analytical tools and methodologies to support "in-house" decision making and expand organizational knowledge into emerging technology areas of strategic interest.
- Technical Assessment Program: Will sponsor multiple technical assessment activities that support the community of interest topic areas and more emphasis will be placed on conducting impact assessments of emerging technologies.
- Intel Support to S&T: Will provide a bridge between the intelligence community (IC) and the S&T community to support development efforts and to produce an annual S&T Intelligence Needs Plan providing the IC a formal understanding of intelligence requirements for the S&T community.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602234D8Z / *Lincoln Laboratory*	**Project (Number/Name)** P535 / *Technical Intelligence*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Wargaming: Will provide the ability to integrate emerging threats from kill chain analysis and potentially disruptive technologies from horizon scanning efforts to the DoD Wargaming community for the improved development of realistic threats in future scenarios and the inclusion of AT&L equities in the wargaming community.			
Accomplishments/Planned Programs Subtotals	8.631	8.693	5.473

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 2: *Applied Research*	**R-1 Program Element (Number/Name)** PE 0602251D8Z / *Applied Research for the Advancement of S&T Priorities*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	-	46.750	42.206	49.226	-	49.226	53.060	53.662	54.770	55.895	Continuing	Continuing
P227: *Applied Research for the Advancement of S&T Priorities*	-	46.750	42.206	49.226	-	49.226	53.060	53.662	54.770	55.895	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Applied Research for the Advancement of Science and Technology (S&T) Priorities program element (PE) enables the early launch of S&T applied research projects to shape Components' investments. The PE focuses on the design, development, and improvement of prototypes and new processes to achieve general mission requirements and to decipher promising research solutions for military needs. Additionally, this PE enables concept exploration efforts and studies of alternative concepts. The research projects are part of the Department of Defense (DoD) S&T priorities and designated focus areas that will include non-system specific technology efforts and feasibility assessments and are formulated and managed by teams of subject matter experts drawn from the Office of the Secretary of Defense, the Military Services, and the Defense Agencies. The PE also provides support to the S&T Communities of Interest (CoI).

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	48.131	42.206	49.271	-	49.271
Current President's Budget	46.750	42.206	49.226	-	49.226
Total Adjustments	-1.381	0.000	-0.045	-	-0.045
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.381	-			
• Other Adjustments	-	-	-0.045	-	-0.045

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 2	R-1 Program Element (Number/Name) PE 0602251D8Z / *Applied Research for the Advancement of S&T Priorities*	Project (Number/Name) P227 / *Applied Research for the Advancement of S&T Priorities*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P227: *Applied Research for the Advancement of S&T Priorities*	-	46.750	42.206	49.226	-	49.226	53.060	53.662	54.770	55.895	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Applied Research for the Advancement of Science and Technology (S&T) Priorities program element (PE) enables the early launch of S&T applied research projects to shape Components' investments. The PE is oriented toward the design, development, and improvement of prototypes and new processes to meet general mission area requirements and to translate promising research into solutions for military needs. Efforts are situated within the DoD S&T priorities and focus areas and will include feasibility evaluations and non-system specific technology efforts. Investigations conducted in this PE facilitate concept exploration efforts and studies of alternative concepts. Efforts are formulated and managed by teams of subject matter experts drawn from the Office of the Secretary of Defense, the Military Services, and the Defense Agencies. The PE also provides support to the S&T Communities of Interest (CoI).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Applied Research for the Advancement of S&T Priorities	29.831	30.000	42.000

Description: The Applied Research for the Advancement of S&T Priorities PE focuses on fostering Joint-Service research areas of common elements of cross-cutting S&T efforts. This enables the early launch of applied research projects to shape Components' investments and facilitates concept exploration efforts and studies of alternative concepts. The cross-cutting S&T efforts include the DoD S&T Priorities, such as Electronic Warfare, Human Systems, Autonomy, and Cyber, as well other focus areas, such as Advanced Materials, Biomedical, Weapons, Quantum, and Command, Control, Communications, Computers and Intelligence.

FY 2016 Accomplishments:
Continued concept exploration efforts that focus on the S&T priority areas. The accomplishments include:

Autonomy ($15.500 million):
– Enabling superior tactical-level cooperation between warfighters and machines
– Translating military goals into specific plans for using human and machine assets
– Scaling how information is handled to ensure fast, accurate top-level decisions
– Scaling to manage very large numbers of assets, without overloading humans
– Complex planning and re-planning of human and machine assets under duress
– Rapid insertion of support capabilities into disaster areas
– Rapid recovery of basic infrastructure in disaster areas
– Increasing robustness to enable broader use of autonomy

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602251D8Z / *Applied Research for the Advancement of S&T Priorities*	**Project (Number/Name)** P227 / *Applied Research for the Advancement of S&T Priorities*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Quantum Science and Engineering Program (QSEP) ($13.300 million): − Established solid state lab for studying entanglement and optical control of spins in Silicon Carbide (SiC)-based quantum bits and memories − Established ion trap clean room facility and bake-out station for ultra-high vacuum preparation and ion trap installation; established basic trapped-ion lab infrastructure − Developed fiber-based entanglement distribution testbed and characterized entanglement swapping − Integrated single quantum dots (QDs) into mechanical resonators; measured the sensitivity of optical and spin transitions to motion-induced strain, finding the hole spin to have a higher sensitivity than electron spins − Produced optical lattice in an atomic cloud − Completed initial test for Aluminum Nitride (AlN) devices and demonstrated high power handling in infrared Synthetic Biology for Military Environments (SBME) ($1.000 million): − Launched a tri-Service effort to expand and integrate existing capabilities in synthetic biology − Outlined plans for building a comprehensive DoD pipeline wherein synthetic biology-based innovation can be supported from conception to testing in a relevant environment; targeted capabilities include gene network modeling and simulation, genome editing, and circuit optimization and characterization			
FY 2017 Plans: Continue concept exploration efforts that focus on the S&T priority areas. The challenge areas within the priorities include: Quantum Science and Engineering Program (QSEP) ($15.000 million): − Plan to entangle electron and nuclear spin ensembles and setup Silicon Carbide chemical vapor deposition reactor to grow low-strain, high purity samples for use as quantum memories − Plan to demo e-beam pumped lasing in Ultraviolet (UV) for Vertical External Cavity Surface Emitting Laser (VECSEL) structure − Plan to finalize cavity design with integrated thermal management − Plan to fabricate photonic cavities with integrated defect qubits; measure the spin and optical properties, including enhancement of photon emission − Plan to measure memory time, readout efficiency, and second order correlation in optical lattice − Establish trapped ion capability and prepare ultra-high vacuum chambers for quantum node tests; trap ions in two independent ultra-high vacuum chamber for remote entanglement demo − Optimize Aluminum Nitride devices for singlemode operation; design/simulate experiment for out-coupling of Ytterbium (Yb) ion − Conduct Initial quantum frequency conversion (QFC) experiments; demonstrate initial coupling; conduct loss measurements/ characterization/testing			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602251D8Z / *Applied Research for the Advancement of S&T Priorities*	**Project (Number/Name)** P227 / *Applied Research for the Advancement of S&T Priorities*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Synthetic Biology for Military Environments (SBME) ($14.000 million): - Continue efforts to establish a biological open system architecture and "chassis" relevant to military environments and to create a cell-free system for gene network optimization - Plan to develop Genetic manipulation tools for the nine chassis candidates, and the Genetic parts will be identified computationally and validated experimentally; the final selections will be made using potential applications and the maturity of genetic and characterization tools Initiation of new Applied Research for the Advancement of S&T Priority Project ($1.000 million) ***FY 2018 Plans:*** Continue concept exploration efforts that focus on the S&T priority areas. The challenge areas within the priorities include: Quantum Science and Engineering Program (QSEP) ($15.000 million): − Demonstrate spin-photon entanglement and grow isotopically purified Silicon Carbide quantum memories with enhanced performance − Demonstrate breadboard UV VECSEL laser and entanglement teleportation over telecom fiber − Continue efforts on scalable, integrated quantum memory nodes with emphasis on photons at telecom wavelengths; demonstrate quantum repeater with four memory system − Improve quantum dots material properties to enhance indistinguishably of photons; improve sensitivity using a system of coupled quantum dots for enhanced strain coupling − Plan to analyze ion-photon interface to swap entanglement for long-distance communication; demonstrate remote entanglement − Conduct experiment for out-coupling − Conduct single and dual stage quantum frequency conversion; conduct quantum frequency conversion experiments for photon-based entangled state creation and manipulation Synthetic Biology for Military Environments (SBME) ($15.000 million): − Continue efforts to establish a biological open system architecture and "chassis" relevant to military environments and to create a cell-free system for gene network optimization − Develop transcriptomic, proteomic and metabolomic tools; the tools will be applied to identify chassis network architectures, measure compensatory changes, and determine circuit yields − Design complex circuit, and initiate the synthesis, incorporation, and testing of the circuit − Initiate the validation and optimization of the circuits in both cell-based and cell-free platforms − Explore ruggedization of the cell-free platform to improve stability for storage and field use			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602251D8Z / *Applied Research for the Advancement of S&T Priorities*	**Project (Number/Name)** P227 / *Applied Research for the Advancement of S&T Priorities*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
− Continue iterations of in silico predictions, test bed optimization and in vivo validation; these testing scenarios will be used to establish “calibration transfer” between systems − Complete baseline measurements of the simple circuits in chassis organisms and extend the circuit designs to produce modulating output Continuation of FY 2017 Applied Research for the Advancement of S&T Priority Project ($12.000 million)			
Title: S&T Communities of Interest	16.919	12.206	7.226
Description: The S&T Communities of Interest effort facilitates cooperation and collaboration among Components; it optimizes the development of critical S&T efforts across the DoD enterprise. The efforts include the development of technology roadmaps and the integration of technology planning. The Communities of Interest select/examine critical technology areas to address gaps or opportunities. ***FY 2016 Accomplishments:*** Continued to provide technical support to the Communities of Interest. Concluded projects initiated in FY 2015, and initiated a new set of projects to address gaps identified by the Communities of Interest. The completed projects include: – Adaptive Technologies for Language Training – Foundations for Context-Aware Info Retrieval for Proactive Decision Support – Biomarkers & Acute Radiation Sickness – DoD-wide Cloud-Based Collaborative Silicon Microelectronics Design – Hypersonic Flight Experiments – Smoke Screen in Cyberspace – Unmanned Air Vehicle Countermeasures (SQUAD) The new projects include: − Development of a Prototype Cryogenic Optical Interconnect Demonstrator − Electromagnetic Battle Management in Heterogonous Disconnected Electromagnetic Environment − Joint-Service Universal Materials Data Fusion and Visualization Structures ***FY 2017 Plans:*** Continued to provide technical support to the Communities of Interest. Conclude projects initiated in FY 2016, and select a new set of projects to address gaps identified by the Communities of Interest.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602251D8Z / *Applied Research for the Advancement of S&T Priorities*	**Project (Number/Name)** P227 / *Applied Research for the Advancement of S&T Priorities*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
The completed projects include: − Development of a Prototype Cryogenic Optical Interconnect Demonstrator − Electromagnetic Battle Management in Heterogonous Disconnected Electromagnetic Environment − Joint-Service Universal Materials Data Fusion and Visualization Structures The Communities of Interest will select a set of new two-year projects in FY 2017. ***FY 2018 Plans:*** Continue to provide technical support to Communities of Interest. Conclude projects initiated in FY 2017, and select a new set of projects to address gaps identified by the Communities of Interest.			
Accomplishments/Planned Programs Subtotals	46.750	42.206	49.226

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Project performance metrics specific to each effort are identified in the project plans established by the program leads and the Communities of Interest. Individual project success will be monitored through these metrics.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 2: *Applied Research*	**R-1 Program Element (Number/Name)** PE 0602668D8Z / *Cyber Security Research*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	-	15.378	12.183	14.775	-	14.775	15.075	15.249	15.552	15.877	Continuing	Continuing
P003: *Cyber Applied Research*	-	15.378	12.183	14.775	-	14.775	15.075	15.249	15.552	15.877	Continuing	Continuing

A. Mission Description and Budget Item Justification

Our military forces require resilient and reliable networks, information, and weapons systems to conduct effective operations. However, the number and sophistication of threats in cyberspace are rapidly growing, making it critical to improve the cyber security of all Department of Defense (DoD) systems to counter those threats and assure our missions. The Cyber Applied Research program focuses on innovative and sustained research in both cyber security and computer network operations to: develop new concepts to harden key network and computer components, design new and resilient cyber infrastructures, increase the military's ability to disrupt, fight and survive nation-state actors' cyber-attacks, measure the state of health in cyber security, explore and exploit new ideas in cyber warfare for agile cyber operations and mission assurance, along with the ability to protect tactical networks, weapons systems and platforms.

This program is unique in that it integrates both the defensive and offensive Cyber research from each of the Services to develop interoperable, defense-wide technology options targeted to meet Combatant Command (CCMD) needs and requirements. More specifically, by increasing cross-laboratory collaboration, this program is able to take Service-specific technologies and expand their applications to the Joint force.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	13.701	12.183	15.043	-	15.043
Current President's Budget	15.378	12.183	14.775	-	14.775
Total Adjustments	1.677	0.000	-0.268	-	-0.268
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	1.923	-			
• SBIR/STTR Transfer	-0.246	-			
• Other Adjustments	-	-	-0.268	-	-0.268

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense											Date: May 2017	
Appropriation/Budget Activity 0400 / 2					R-1 Program Element (Number/Name) PE 0602668D8Z / *Cyber Security Research*				Project (Number/Name) P003 / *Cyber Applied Research*			
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
P003: *Cyber Applied Research*	-	15.378	12.183	14.775	-	14.775	15.075	15.249	15.552	15.877	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program was initiated in FY 2011 to address specific technical problems that were not being fully addressed by the Services' and NSA's existing Cyber S&T investments. Recently, S&T gaps were enumerated and described in several studies, including the 2015 DoD Cyber Strategy, the 2016 Commission Enhancing National Cybersecurity and the 2017 Defense Science Board Research Enterprise Assessment. The Cyber Applied Research program builds upon existing basic and applied research results. The program expands research in cyber command-and-control to provide Warfighters and commanders with tools and technologies to enable cyber situational awareness and protection of tactical networks, weapons systems and platforms. Current technical thrusts include: Foundations of Trust, Resilient Infrastructure, Assuring Effective Missions, Cyber Modeling, Simulation & Experimentation, and Embedded, Mobile & Tactical Environments.

As adversaries develop more sophisticated technology, tactics, and become more skilled and better funded, the Cyber S&T Community must remain agile, vigilant, and evermore creative in response. To bolster this program and address future threats, starting in FY 2017 a new strategic vision was directed at enhancing the DoD's tactical edge in the rapidly evolving cyber domain where many aspects still remain unexplored. Judiciously investigating these aspects by investing in the research thrust areas identified below can provide a distinct advantage in future cyber conflicts:

• Behavioral Cyber Sciences: The interaction between computers and human behavior. Moving beyond signals (ones and zeroes) towards understanding human behavior. New insights from behavioral sciences will increase the effectiveness of tools, the cyber workforce, and cyber solutions at DoD scale. Behavioral cyber sciences seeks to uncover details about how humans (to include operators, users, adversaries, and/or defenders) react to cyber actions and how those reactions can be understood from a behavioral science standpoint and leveraged to create more effective actions and outcome.

• Self-securing weapons, systems, and networks: Thriving in a contested cyber environment. New sciences and mechanisms for autonomous cybersecurity will help keep pace with the growing complexity of weapon systems and help the DoD operators react more quickly to cyber-attacks.

• Foundations of precision cyber operations: Precision bombing campaigns for the cyber domain. Accurate and timely predictions of cyber effects will help the DoD leadership achieve the desired effects of cyber operations and help manage risks associated with collateral damage.

• Mathematical Foundations of Cyber Security: New tools to address new problems. Advances in mathematical foundations of cyber S&T will cut across focus areas and produce new methods to design, secure, and reason about complex cyber systems.

Advances in these new cyber S&T focus thrust areas will help to promote strong foundations and disruptive innovations that will create surprises, shape the fight, and ensure a decisive advantage. The research areas will be critical to the development of innovative and sustainable research that takes cyber security beyond the incremental escalation of attack and defense.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602668D8Z / *Cyber Security Research*	**Project (Number/Name)** P003 / *Cyber Applied Research*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Foundations of Trust	1.563	1.000	-
Description: Develop approaches and methods to establish known degrees of assurance that devices, networks, and cyber missions perform as expected, despite attack or error. This technical area encompasses all aspects of the assessment, establishment, propagation, maintenance, and composition of trust relationships between devices, networks, and people. Achieving a trustworthy cyberspace is a critical challenge as corporations, agencies, national infrastructure, and individuals have been victims of cyber-attacks, which exploit weaknesses in technical infrastructures as well as in human behavior. This effort builds upon long term foundational/basic research in algorithms, models, probability theory, reliability, statistical theory and analysis, system structures, and secure computing, developing and enabling trustworthy cyber systems. ***FY 2016 Accomplishments:*** This program funded research on "Scanning Electron Microscope (SEM) Image Processing" to improve image processing computation by identifying and categorizing steps to improve Graphics Processing Unit (GPU) acceleration to improve our trust in digital electronics. This effort completed the compilation of a library of GPU tools. "Pointillist" a project executed by John Hopkins University Applied Physics Laboratory (JHU/APL), developed a graph analytic engine to monitor network traffic in real-time. The features of Pointillist allow hunt teams to visualize and identify adversarial network traffic faster. The work developed an infrastructure that tailored user interfaces with automated software-driven processes and supported easy configuration of incoming data streams. The interactive visualization tool improved interoperability to increase ease-of-adoption and decrease training time for analysts working on specialized missions such as Cyber Protection Team Hunt sub-teams. This helped improve trust and provide real-time situational awareness (SA) of cyber enabled assets. ***FY 2017 Plans:*** Complete research on the "SEM Image Processing" effort's improved automated image processing technology by developing algorithms and methods to accelerate GPU analysis. The research focuses on developing sets of advanced modules via a process called fusion that enhances capabilities of a meta-learning framework. Fusion combines many data structure extractors into one structure extractor.			
Title: Resilient Infrastructure	1.055	1.500	-
Description: Resilient Infrastructure entails the ability to withstand cyber attacks, and to sustain or recover critical functions. This provides the ability to continue to perform functions and provide services at required levels during an attack. The objective in this area is to develop integrated architectures that are optimized for their ability to absorb (cyber) shock and recover in a timely fashion to a known secure state with well-defined performance characteristics. Resilient algorithms and protocols increase the repertoire of resiliency mechanisms available to the infrastructure and architecture. Research is needed to develop resiliency at lower levels with specific algorithms and protocols to support higher-level resilient architectures.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602668D8Z / *Cyber Security Research*	**Project (Number/Name)** P003 / *Cyber Applied Research*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
FY 2016 Accomplishments: The "Network Pump-II" project, executed by Naval Research Laboratory (NRL), explored the challenges of optimizing enterprise-based data sharing requirements for the tactical war-fighter and intelligence missions. The project developed a cost effective, high throughput, government-off-the-shelf cross domain solution that was demonstrated at various venues including the Universal Gateway (UGW)/Pump-II Limited Technology Experiment. The impact of research under "Pump-II" provided the war-fighter with improved sensitive data correlation and intelligent data decision capabilities. A number of transitions are under way with the Naval Air Systems Command, Triton Unmanned Aircraft System Program Office for Pump-II with Secret and Below Interoperability certification and the Office of Naval Research Integrated Topside and Multi-Link Common Data Link System with Top Secret and Below Interoperability certifications. The "Tactical Platform Resiliency" project executed by the Office of Naval Research (ONR) improved the design and robustness of various fault tolerant tools used to harden critical control systems. The effort also designed and developed capabilities to monitor and autonomously remove malicious code and commands and data from compromised networks. The "Control Flow Integrity Monitoring" project executed by JHU/APL developed methods of detecting "return-oriented" programming attacks using record-and-replay technology. This technology enabled the rapid detection of some zero-day attacks that otherwise bypass all modern defenses. This eliminated the effectiveness of a large class of exploits. A second JHU/APL executed project, "System Cloaking Defense through Deception," demonstrated ways to present decoys to adversaries and detect their presence and activities. A major impact of the project raised attacker workloads, confused, delayed, and disrupted an adversary's ability to execute exploitation operations. System cloaking is being considered for transition to a number of organizations namely ONR, Army Cyber (ARCYBER), Marine Force Cyber (MARFORCYBER) and Department of Homeland Security (DHS). ***FY 2017 Plans:*** In FY 2017, ONR efforts under the "Tactical Platform Resiliency" project will develop methods and techniques for furnishing resiliency on critical real-time control systems against cyber-attacks. Additionally, ONR will experiment with and evaluate resilience techniques through its Small Business Innovative Research (SBIR) performers. Projects that were designed to quickly transition to operational partners will continue maturing capabilities, inhibiting advanced threats, improving technology maturity, and exploring transition opportunities.			
Title: Assuring Effective Missions	5.000	4.375	0.300
Description: The objective of Assuring Effective Missions presents technology challenges in the areas of Cyber Mission Control and Effects at Scale. Within this thrust, we aim to develop the ability to assess and control the cyber situation within a military mission context. Cyber Mission Control covers the ability to orchestrate cyber systems to achieve an overarching mission goal by			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602668D8Z / *Cyber Security Research*	**Project (Number/Name)** P003 / *Cyber Applied Research*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
developing tools and techniques that enable models of cyber operational behaviors (cyber and kinetic) to determine the correct course of action in the cyber domain. Effects at Scale encompass full spectrum challenges that intersect with cyber becoming a new full-fledged domain of warfare. This program funds an international research collaboration effort under the Mission Assurance Research Collaboration (MARC) project arrangement. The overall research focus of MARC is to enhance mission assurance through data enrichment, deep learning and natural language processing. MARC aims to provide dynamic mission mapping capability by enabling the timely identification and characterization of cyber terrain, missions and their interdependencies. ***FY 2016 Accomplishments:*** This program funded a project led by the U.S. Army Communications-Electronics Research, Development and Engineering Center (CERDEC) called "Defensible Offensive Cyber Operations (OCO) Architecture and Cyber Situational Awareness", which developed a cross-service cloud-based defense architecture system that allows the sharing of SA capabilities to enable near-real time decision making and battle damage assessment. The interoperable reference architecture provides an ability to detect, maneuver and restore impacted capabilities "to survive and operate through the fight" for existing and future OCO architectures. Additionally, the OCO architecture supports USCYBERCOMMAND's priority number one and two gaps for cyber infrastructure defense and SA. The Mission Assurance Research Collaboration (MARC) program arrangement was formally initiated as a bilateral research effort between the U.S. and Australia. Program planning and experimental design was completed during this fiscal year. Additionally, the research team made improvements to the mission mapping algorithm and established a bilateral collaborative environment. ***FY 2017 Plans:*** During FY 2017, the "Defensible OCO Architecture and Cyber Situational Awareness" project will test the prototype cloud-based defense architecture. Upon successful completion of testing, the existing cyber situational awareness tools will be integrated and implemented into the OCO architecture. MARC will aim to complete instrumentation during TALISMAN SABER 17 exercises. Additional research objectives include proof-of-concept and testing of a machine finger-printing algorithm. Final research papers on deep learning, natural language processing, entity extraction/characterization and workflow discovery will also be produced. ***FY 2018 Plans:*** MARC activities will focus on revising its mission assurance architecture and designing the MARC experiment for TALISMAN SABER 19.			
Title: Cyber Modeling, Simulation & Experimentation (MSE)	2.360	1.908	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602668D8Z / *Cyber Security Research*	**Project (Number/Name)** P003 / *Cyber Applied Research*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Description: Develop modeling and simulation capabilities that are able to sufficiently simulate the cyber environment in which the DoD operates and enable a more robust assessment and validation of cyber technology development. There are two technical challenges associated with cyber MSE: 1) Cyber Modeling and Simulation, and 2) Cyber Measurement. Cyber Modeling and Simulation seeks to develop tools and techniques that enable analytical modeling and multi-scale simulation of complex cyber systems. Cyber Measurement develops cyber experimentation and test range technology to conduct controlled, repeatable experiments, providing the ability to track the progress of cyber research investments in a quantitative fashion. This area explores new analytical methodologies, models, and experimental data sets to establish metrics to measure a system's state of security, apply the scientific method to establish the foundations of a framework in which cyber security research can be conducted, to test hypotheses with measurable and repeatable results, and the quantitative experimentation and assessment for new cyber technologies. These new methodologies will enable the exploration of modeling and simulation tools and techniques that can drive innovation in research. Additionally, these methodologies will aid in integrated experimentation by simulating the cyber environment with sufficient fidelity and integrating cyber modeling and simulation with the traditional modeling and simulation related to the kinetic domain. ***FY 2016 Accomplishments:*** In FY 2016, the "Metrics, Instrumentation and Emulation for Cyberspace Operations, Electronic Warfare (EW) and Communications/Networking" developed a selected set of vignettes and scenarios to understand the complex interactions between red and blue networks and to derive metrics that can be used to design better cyberspace, EW, and communications systems in support of information dominance. The performer successfully integrated Cyber, EW, and Communications/ Networking into a common test environment that was based on well-defined vignettes. From this scenario, metrics were developed that accurately evaluated the performance of Cyber, EW and communications in an anti-access area denial (A2AD) environment. ***FY 2017 Plans:*** The "Metrics, Instrumentation and Emulation for Cyberspace Operations, Electronic Warfare and Communications/Networking" project will develop and fine-tune joint metrics that will be utilized in dynamic and causal workflows. The dynamic scenarios will be used to migrate to a distributed test-bed to support more nodes and the development of analytical tools.			
Title: Embedded, Mobile & Tactical Environments (EMT)	5.400	2.400	-
Description: Increase the focus of cyber S&T on DoD cyber systems that rely on technology beyond wired networking and standard computing platforms. The objective in the area of embedded and tactical systems is to develop tools and techniques that assure the secure operation of microprocessors within our weapons systems and platforms; enable security in real-time systems; and establish security in disadvantaged, intermittent, and low-bandwidth environments. This research also seeks to expand and cultivate military-grade techniques for securing and operating enterprise commodity mobile devices, such as smartphones, tablets, and their associated infrastructures. With the constant evolution of these devices and their respective			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602668D8Z / *Cyber Security Research*	**Project (Number/Name)** P003 / *Cyber Applied Research*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
infrastructures it is of the utmost importance to provide a secure environment where these devices can be effectively utilized, monitored and tracked. ***FY 2016 Accomplishments:*** In FY 2016, the "Resilient and Assured Unmanned Aerial System (UAS) Systems and Operations" project identified and improved APTs sensing technologies, increasing overall avionics system cyber resiliency. These characteristics helped researchers develop techniques to mitigate mission-deviant behavior directed by APTs. The enhanced capabilities provided operators/mission commanders with previously unavailable near real-time actionable, clear and useful cyber dependent information. The project has demonstrated proof-of-concept technologies that provide situational awareness of the platform's cyber health to UAS pilots/ operators and mission commanders. ***FY 2017 Plans:*** The "Resilient and Assured UAS and Operations" project effort during FY 2017 will demonstrate the prototype mission computer that will encompass technologies developed in prior years. The Testbed for Resilient UAS Engineering will undergo refinement and an assessment of attestation techniques. A joint DARPA/AFRL demonstration is in the planning stage. Potential transition opportunities include Air Force Life Cycle Management Center, NRL, Naval Air Systems Command, and CERDEC for experimentation.			
Title: Behavioral Cyber Sciences	-	0.400	3.700
Description: The point where hardware, software, and humans interact has become a jumping off point for a new area of research – behavioral cyber science. Cyber operations should be seen in the context of a larger socio-behavioral-technical domain. Research in behavioral cyber science seeks to advance the understanding and technical rigor of modeling and predicting human responses to cyber activities and to discover ways to inject this understanding into the human aspects of cyber operations, cyber defense systems, planning, and training. Future research must broaden the scope beyond the impacts of cyber actions on equipment, and also include the impact that these cyber actions will have on broader human behavior. Just as an adversary's behavior may be better understood using behavioral cyber science, behavioral science can be utilized to help understand ways to improve the actions of cyber defenders and the performance of the cyber workforce. Data gleaned from observing effects of various cyber operations on users' productivity, performance, and security will help the cyber workforce design better techniques and processes for use in cyber defense. ***FY 2017 Plans:*** Plan for a new research effort under Behavioral Cyber Sciences that will identify and validate the proposed hypotheses. Research will identify sensor data that correlates strongly to human responses. ***FY 2018 Plans:***			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Begin execution of Joint research effort aimed at addressing scientific challenges, to broaden the scope of cyber activities through an understanding of human behavioral sciences and its responses to cyber effects. Research will focus on human performance for cyber, developing techniques to measure effectiveness of cyber tools and cyber mission planning based on behavior of network defenders; human responses to cyber effects, identifying and documenting human responses to cyber defense and offense activities; and evidence-based validation, which identifies behavioral responses to network activity that correlate with information on network security and readiness.			
Title: Self-securing Weapons, Systems, and Networks ***Description:*** The pervasive nature of software-reliant systems in today's modern military creates new opportunities for sophisticated adversaries. The vast majority of DoD weapons systems, platforms, and networks rely on software to operate. Software can often be disrupted remotely, which necessitates a new kind of security to protect against cyber-attacks. Defending the software- and network-based aspects of critical weapon systems is challenging for a number of reasons, chief among which is the advanced nature of the adversary in the cyber realm. We can expect future cyber adversaries to be well-funded, well-informed, and agile. Building weapon systems, platforms, and networks that can defend themselves in real time will be vital in protecting ourselves against this adversary. We need systems that can autonomously monitor and manage their own health and security posture through advanced sensing and perception, reasoning, and planning. Such systems could identify and classify threats much more quickly than a human operator, and therefore, able to neutralize the threat more quickly and effectively. However, researchers must be cognizant of the potential unintended consequences of turning security over to autonomous systems. Verification techniques must be developed to ensure that autonomous and dynamic system changes maintain correct mission-focused capabilities without introducing unintended vulnerabilities. Conversely, developing techniques to track and audit actions taken by autonomous systems is crucial to ensure that direct control can be reasserted, potentially reversing some actions, if necessary. ***FY 2018 Plans:*** Begin execution of Joint research effort aimed at developing novel adaptive techniques to model adversary options and predict the security of future system configurations, even under unknown attacks; develop cyber immunology so that systems can monitor health and develop identification/classification mechanisms for cyber threats; develop autonomy methods and self-healing techniques couple with rigorous experimentation; develop experimental approaches to prove robust and unique metrics; and use advanced modeling and simulation to develop and validate cyber security metrics.	-	-	5.775
Title: Foundations of Precision Cyber Operations ***Description:*** When compared to traditional methods of kinetic warfare, cyber conflict is still relatively new and untested. Cyber operators often have incomplete information about their target prior to completing an action. The lack of a complete picture makes it difficult to predict the precise outcomes or collateral damage caused by a cyber operation. In this type of uncertain environment, military leaders may be acting with an undue sense of caution in using cyber capabilities. Improved technology and techniques for	-	0.600	3.000

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
quantifying cyber effects, estimating their cost and effectiveness, predicting consequences, and ensuring precise effects will help both to limit collateral damage and to ensure that a chosen action has the intended effect upon the adversary. Highly precise and predictable cyber effects can also achieve mission goals despite the presence of both incomplete and maliciously-created false information. ***FY 2017 Plans:*** Plan for a new research effort under Foundations of Precision Cyber Operations that will improve accuracy and precision of cyber effects to achieve cyber mission impacts comparable to precision bombing campaigns for the cyber domain. Initiate research efforts to develop techniques and methods to build stealthy protocols and develop high fidelity models of industrial control systems capable of rapidly representing realistic responses at the physical layer as events occur. ***FY 2018 Plans:*** Begin execution of Joint research effort aimed at developing greater precision and accuracy of cyber effects to achieve targeted cyber mission impacts. Research will focus on developing modeling techniques, based on limited data, capable of predicting the range of possibilities that unfold due to a planned cyber effect; developing methods to collect technical information from in-accessible cyber systems, while employing covert deceptive techniques; developing methods to identify key pieces of missing information to advance situational awareness; developing abductive reasoning techniques; developing intelligent systems that can reason and provide actionable guidance despite the presence of both incomplete and maliciously-created false information; developing methods for autonomous cyber operations to provide enhanced control and execution that allow cyber operators to timely and accurately respond to events.			
Title: Mathematical Foundations of Cyber Security ***Description:*** Mathematics is intrinsically linked to all branches of science and technology. Cyber security research is no exception. Broadly, there is a need for an array of modeling techniques, both informal and formal, backed by various rigorous mathematical theories, to capture and support the richness of the cyber domain. This area of research is needed to help characterize the cyber domain and cyber security, maintain the integrity of data, harden systems, and analyze potential solutions. Continued research in mathematical theory beyond the “basic research” level is crucial to maintain and increase the security of cyber systems. ***FY 2018 Plans:*** This funds the execution of Joint research effort aimed at developing and enhancing foundational work underpinning cyber technology in the areas of advanced mathematics. Possible research areas include mathematical logic and formal methods; network science; information theory; decision sciences; risk analysis; and modeling and simulation.	-	-	2.000
Accomplishments/Planned Programs Subtotals	15.378	12.183	14.775

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

- Number of publications in refereed journals and peer reviewed reports or conference proceedings
- Number of external research collaborations and interactions with the broader cyber community
- Transition of tools, techniques and methodologies for use in DoD, Federal or commercial entities
- Improved technology readiness levels
- Affordability

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 2: *Applied Research*	**R-1 Program Element (Number/Name)** PE 0602751D8Z / *Software Engineering Institute (SEI) Applied Research*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	-	7.945	8.420	8.955	-	8.955	9.365	9.664	9.558	9.762	Continuing	Continuing
P278: *Software Engineering Institute (SEI) Applied Research*	-	7.945	8.420	8.955	-	8.955	9.365	9.664	9.558	9.762	Continuing	Continuing

A. Mission Description and Budget Item Justification

Software is a key to meeting the Department of Defense's (DoD) increasing demand for high-quality, affordable, and timely national defense systems. With growing global parity in software engineering, the DoD must maintain leadership to avoid strategic surprise. To assist the DoD in retaining a long-term differential advantage over potential adversaries, the Software Engineering Institute (SEI) Applied Research program element (PE) develops and evaluates the feasibility and practicality of software and computer science concepts, with the potential to improve future DoD systems. The SEI's program of work is coordinated across the DoD through Reliance 21, the overarching framework of the DoD's Science & Technology (S&T) joint planning and coordination process. This PE benefits every Community of Interest due to the ubiquitous nature of software, but particularly benefits: Command, Control, Communications, Computers, and Intelligence (C4I) which includes a computing and software sub-panel; Autonomy; Cyber; and Engineered Resilient Systems.

Work conducted under this PE will enable resilient mission assurance in heterogeneous and contested environments through the verification and validation of system performance and architecture. The program will also assist the DoD in retaining a long-term differential advantage in the areas of software-intensive systems and cybersecurity by enhancing assurance, exploiting automation, and understanding human-computer interaction.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	8.807	8.420	9.343	-	9.343
Current President's Budget	7.945	8.420	8.955	-	8.955
Total Adjustments	-0.862	0.000	-0.388	-	-0.388
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.564	-			
• SBIR/STTR Transfer	-0.298	-			
• Other Adjustments	-	-	-0.388	-	-0.388

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 2	R-1 Program Element (Number/Name) PE 0602751D8Z / *Software Engineering Institute (SEI) Applied Research*	Project (Number/Name) P278 / *Software Engineering Institute (SEI) Applied Research*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P278: *Software Engineering Institute (SEI) Applied Research*	-	7.945	8.420	8.955	-	8.955	9.365	9.664	9.558	9.762	Continuing	Continuing

A. Mission Description and Budget Item Justification

Software is a key to meeting the Department of Defense's (DoD's) increasing demand for high-quality, affordable, and timely national defense systems. With growing global parity in software engineering, the DoD must maintain leadership to avoid strategic surprise. To assist the DoD in retaining a long-term differential advantage over potential adversaries, the Software Engineering Institute (SEI) Applied Research PE seeks to establish a program of applied research that will develop and evaluate the feasibility and practicality of software and computer science concepts with the potential to improve current and future DoD systems.

Work conducted under this PE will enable resilient mission assurance in heterogeneous and contested environments through the verification and validation of system performance and architecture. The program will also assist the DoD in retaining a long-term differential advantage in the areas of software-intensive systems and cybersecurity by enhancing assurance, exploiting automation, and understanding human-computer interaction.

The SEI Applied Research PE has two main research thrusts with known military applications: 1) Software Engineering, Systems Verification and Validation, and Mission Assurance (formerly Mission Assurance) and 2) Information Assurance and Cyber Security.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: SEI Applied Research in the Area of Software Engineering, Systems Verification and Validation, and Mission Assurance (formerly Mission Assurance)	5.245	5.557	5.781
Description: This thrust seeks to develop verification techniques for requirements identification, systems of systems architectures, and virtual integration of components. Additionally, research in this area will enable requirements verification for software assurance, analysis and control of unverified code, and automated repair of damaged code. Software production and code analysis methods developed through this program will also improve the accuracy of behavior prediction of complex software system in untested environments. Increasingly numerous lines of code will require a commensurate increase in sophistication of verification and validation mechanisms.			
FY 2016 Accomplishments: • Created techniques to assist analysts in determining anomalies and outliers in data analytics processing. These techniques are best applied to software system acquisition and tactical intelligence, surveillance, and reconnaissance (ISR). • Produced guidance, quantitative methods, and software tools for expressing requirements and assessing the performance, scalability, and security behavior of systems.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Researched, developed, and piloted techniques to enhance and assure acquisition-related aspects of software-reliant systems. These efforts were focused on cost-effectiveness and lifecycle assurance. ***FY 2017 Plans:*** • Develop tools and techniques to validate software's operational reliability through cost-effective model checking. • Develop machine learning and static analysis tools and techniques to identify and characterize technical debt in software systems. Additionally, develop documentation templates and software technical debt management methods. ***FY 2018 Plans:*** • Create tools for formal verification of time-sensitive behavior in safety-critical systems. • Develop early stage statistical model checking tools and techniques for to validate the reliability and robustness of safety-critical systems. • Create and prototype containment technology which allows software systems to continue to function when partially compromised.			
Title: SEI Applied Research in the areas of Information Assurance (IA) and Cyber Security	2.700	2.863	3.174
Description: Information assurance ensures the integrity of information and data produced by software. Software developed from an unknown supply chain may include intentionally or unintentionally introduced vulnerabilities. This thrust seeks to develop scalable automated methods to locate, understand, and mitigate the effects of these vulnerabilities. Automated tools developed through this thrust will be used to discover vulnerabilities in system software (including binary only) and to generate proofs. Additionally, they will be used to model and simulate operational environments to support software and cyber tactics, techniques, and procedures (TTP) testing. Warfighting in the cyber domain often operates at sub-second timescales and across multiple domains of authority. Methods used to accomplish many tasks (e.g., malware analysis, coordinating multiple agents) demand large amounts of time, attention, and special skills and are not scalable. This thrust seeks to develop and increase the use of automation to simplify the completion of these tasks. Example activities include automation of moving target defenses, code artifact reverse engineering, analysis of network flows at enterprise scale, and development and assessment of workforce skills. ***FY 2016 Accomplishments:*** • Reviewed DoD information technology gaps and challenges as expressed by the RDA Task Force, Defense Science Board, and Cyber Strategy plans to restructure SEI's mid- and long-term software and cyber R&D portfolio. • Studied and developed techniques and tools for automated detection and mitigation of cyber vulnerabilities in available source code.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602751D8Z / *Software Engineering Institute (SEI) Applied Research*	**Project (Number/Name)** P278 / *Software Engineering Institute (SEI) Applied Research*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Studied and developed techniques and tools for automated detection and reduction of cyber vulnerabilities in existing software artifacts where source code is available. • Enhanced the scalability and automation of cyber and software forensic analysis tools. • Developed methods and tools for repeatable and automated assessment of cyber workforce performance in DoD cyber training. • Work in this thrust area was transitioned to the Air Force and the Intelligence Community. ***FY 2017 Plans:*** • Create and transition new, scalable techniques, algorithms, and tools for understanding the behavior of programs in binary form, including malware and other software of unknown provenance. • Automate the security evaluation of network-facing applications without requiring source code. • Research and create tools and techniques for automatic detection and semi-automatic mitigation of potential security vulnerabilities introduced by configuration and software development errors. ***FY 2018 Plans:*** • Develop and transition tools to increase resilience facing malicious intent to manipulate data or information. This includes improvement in data analytics development and deployment, including scalability, data bias control and mitigation. • Research and create tools and techniques for automatic detection and semi-automatic mitigation of potential security vulnerabilities introduced by configuration and software development errors. Includes developing design methodologies and tools that prevent vulnerabilities from being introduced into software systems.			
Accomplishments/Planned Programs Subtotals	7.945	8.420	8.955

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• BA 3, PE# 0603781D8Z: *Software Engineering Institute (SEI)*	15.173	14.264	15.441	-	15.441	15.909	16.130	16.447	-	Continuing	Continuing

Remarks

The SEI Applied Research PE represents a pivot toward more fundamental research that enables the DoD to address longer-term challenges in software technology and engineering. The SEI Applied Research PE bolsters the organic research at the SEI Federally Funded Research and Development Center (FFRDC), enables stronger collaborations between the SEI FFRDC and academia, attracts top researchers to the SEI, gives the DoD access to top experts in information science, and generally enhances the DoD's ability to benefit from the military applications of research in software and computer science.

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602751D8Z / *Software Engineering Institute (SEI) Applied Research*	**Project (Number/Name)** P278 / *Software Engineering Institute (SEI) Applied Research*

E. Performance Metrics

- Transition of tools, methods, and practices for use in DoD technology development programs and programs of record.
- Transition of tools, methods, and practices to the Defense Industrial Base to support DoD technology development programs and programs of record.
- Number of citations in peer reviewed journals and reports.
- Number of external research collaborations and interactions with the broader software and computer science community.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603000D8Z / *Joint Munitions Advanced Technology*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	76.684	25.452	23.902	25.627	-	25.627	25.779	26.001	26.421	26.977	Continuing	Continuing
P002: *Insensitive Munitions Advanced Technology*	63.267	18.867	17.756	19.039	-	19.039	19.152	19.323	19.640	20.028	Continuing	Continuing
P301: *Enabling Fuze Advanced Technology*	13.417	6.585	6.146	6.588	-	6.588	6.627	6.678	6.781	6.949	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program addresses advanced technology development associated with improving the lethality, reliability, safety, and survivability of munitions and weapon systems. The goal is to develop and demonstrate joint enabling technologies that can be used by the Program Executive Offices (PEO) as they develop their specific weapon programs. The program invests in and demonstrates technologies from a Joint Service perspective, thus maximizing efficiencies, ensuring the development of technology with the broadest applicability while avoiding duplication of efforts.

Munition Area Technology Groups (MATGs) and Fuze Area Technology Groups (FATGs) have been established for each munition and capability area and are tasked with: 1) coordinating, establishing, and maintaining 2018 and 2023 year technology development plans and roadmaps, 2) coordinating biannual meetings to review technical and programmatic details of each funded and proposed effort, 3) developing and submitting Technology Transition Agreements in coordination with appropriate PEO for insertion in their Insensitive Munition (IM) Strategic Plans / Fuze Technology Development Plan, and 4) interfacing with other MATGs / FATGs and IM / fuze science and technology projects as appropriate. The Joint Insensitive Munitions Technical Program (JIMTP) and Joint Fuze Technical Program (JFTP) will utilize a Technical Advisory Committee (TAC) (consisting of senior Department of Defense (DoD) and Department of Energy (DOE) laboratory representatives and senior Munitions PEO representatives) to provide program oversight, policy, direction, and priorities during its annual meeting.

The IM effort will demonstrate enabling technologies needed to develop weapons in compliance with IM requirements established in United States Code, Title 10, Chapter 141, Section 2389 and DoD Instruction 5000.1. This effort will take promising technologies demonstrated at the laboratory scale and transition them into demonstration programs utilizing generic hardware based on priority munitions identified in the PEO IM Strategic Plans. Mature and demonstrated IM technology can be transitioned, thereby decreasing their program costs and schedule risk and facilitating spin-offs to other non-compliant munitions within their portfolios.

The JIMTP investments focus on five Munition Areas: 1) High Performance Rocket Propulsion, 2) Minimum Signature Rocket Propulsion, 3) Blast and Fragmentation Warheads, 4) Anti-Armor Warheads, and 5) Gun Propulsion. MATGs, under tri-service leadership, have developed technology roadmaps for each Munition Area which are used to guide investments based on goals consistent with the PEO IM Strategic Plans. These IM technologies, alone or in combination, will be incorporated in hardware, simulating real-world munitions, to demonstrate their utility and feasibility as part of Technology Transition Agreements with PEOs.

The Enabling Fuze Advanced Technology effort will also demonstrate fuze enabling technologies needed to develop weapons that address priority capability areas identified in the Guidance for Development (GDF) of the Force, the Secretary of Defense Memorandum, DoD Policy on Cluster Munitions and Unintended Harm

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603000D8Z *I Joint Munitions Advanced Technology*

to Civilians, and shortfalls in current weapon systems. This effort will take promising technologies demonstrated at the laboratory scale and transition them into demonstration weapons and programs based on priority capabilities and technology needs identified and validated by the PEOs and the Heads of the Service Science and Technology (S&T) communities. In this way, promising multi-point initiation architectures, high reliability fuze architectures, survivable components, modular fuze packaging, and components produced based on ease of manufacturing can be integrated into munitions applications and its ability to address required capability needs will be validated. Mature fuze technologies will be transitioned to Weapon PEO's and/or Industry, thereby decreasing program costs and schedule risk while facilitating technology into potentially broader range of munitions applications.

The JFTP investments focus on four specific capability areas that have been identified by the Department's strategic guidance and current shortfalls in weapon systems and as validated by the PEOs and the Service S&T communities. The capability areas are: 1) Hard Target Survivable Fuzing, 2) Tailorable Effects Weapon Fuzing, 3) High Reliability Fuzing, and 4) Enabling Fuze Technologies and Common Architecture. The Fuzing technologies will be incorporated in weapon applications to demonstrate their maturity and utility as part of Technology Transition Agreements with PEOs.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	25.864	23.902	25.650	-	25.650
Current President's Budget	25.452	23.902	25.627	-	25.627
Total Adjustments	-0.412	0.000	-0.023	-	-0.023
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.412	-			
• Other Adjustments	-	-	-0.023	-	-0.023

Change Summary Explanation

FY 2018 internal realignment reflects funding for higher Departmental priorities and requirements.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603000D8Z / *Joint Munitions Advanced Technology*	Project (Number/Name) P002 / *Insensitive Munitions Advanced Technology*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P002: *Insensitive Munitions Advanced Technology*	63.267	18.867	17.756	19.039	-	19.039	19.152	19.323	19.640	20.028	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Insensitive Munitions (IM) effort addresses advanced technology development associated with improving the lethality, reliability, safety, and survivability of munitions and weapon systems. The goal is to develop and demonstrate joint enabling technologies that can be used by program managers as they develop their specific weapon programs. The program invests in and demonstrates technologies from a Joint Service perspective, thus ensuring the development of technology with the broadest applicability while avoiding duplication of efforts – providing efficiencies and cost savings for the Department.

This effort will demonstrate enabling technologies needed to develop weapons in compliance with IM requirements established in United States Code, Title 10, Chapter 141, Section 2389 and DoD Instruction 5000.1 and 5000.02. This effort will take promising technologies demonstrated at the laboratory scale and transition them into demonstration programs utilizing generic hardware based on priority munitions identified in the Program Executive Office (PEO) IM Strategic Plans. Mature demonstrated IM technology can be transitioned, thereby decreasing their program costs and schedule risk and facilitating spin-offs to other non-compliant munitions within their portfolios.

The Joint Insensitive Munitions Technology Program (JIMTP) investments focus on five Munition Areas: 1) High Performance Rocket Propulsion, 2) Minimum Signature Rocket Propulsion, 3) Blast and Fragmentation Warheads, 4) Anti-Armor Warheads, and 5) Gun Propulsion. Munition Area Technology Groups (MATG), under tri-service leadership, have developed technology roadmaps for each Munition Area which is used to guide investments based on goals consistent with the DoD IM Strategic Plan. These IM technologies, alone or in combination, will be incorporated in hardware, simulating real-world munitions, to demonstrate their utility and feasibility as part of Technology Transition Agreements with PEOs.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: High Performance Rocket Propulsion (HPP)	3.896	3.684	3.761
Description: HPP focus on the development and demonstration of technologies to improve the IM response of HPP systems, rocket motors with Ammonium Perchlorate and with or without a metal fuel, for rockets and missiles launched from air, ground, and sea platforms. These technologies, when applied to rocket motors, improve IM response to one or more threats, while not degrading the response to other IM threats and, at minimum, maintaining munition performance. Technologies include, but are not limited to, rocket propellant ingredients, including synthesis, characterization and scale-up; reduced smoke or smoky propellants, including formulation, characterization and scale-up; rocket motor case design; materials for active and passive thermal mitigation; shock mitigation materials and techniques; passive and active coatings; active and passive venting techniques for motor cases or containers; ignition systems; sensors; and thrust mitigation techniques. Operating conditions may be controlled or widely varying in both temperature and vibration. The 2018 and 2023 year goals of the HPP MATG are concentrated on			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603000D8Z / *Joint Munitions Advanced Technology*	**Project (Number/Name)** P002 / *Insensitive Munitions Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
solving the IM response of missile propulsions systems due to Fragment Impacts and Slow Cook Off for the majority of High Performance Propulsion rocket motors, and solving the Fast Cook Off response of very large High Performance Propulsion motors. ***FY 2016 Accomplishments:*** - Conducted slow and fast cook-off demonstration tests of 50 to 70 pound motors containing an extinguishable rocket propellant. - Demonstrated fast cook-off sensor mitigation performance and transition to programs of record. - Conducted tests of slow cook-off mitigation device components for HPP rocket motor. - Conducted full scale test of slow cook-off mitigation sensor and IM tests with integrated sensor in various motor configurations. - Produced prototype hardware and prepare to integrate several IM technologies into a rocket motor. - Conducted proof of concept testing on three IM mitigation techniques for HPP motors. Scaled up formulation to 5 gallon mixes for initial testing. ***FY 2017 Plans:*** - Conduct full scale testing to ensure that mitigation design and integration is technically sound. - Scale up HPP motor propellant to 50 gallon batches to conduct full scale motor IM testing. Verify the rocket motor meets the specified ballistic and IM performance requirements. - Demonstrate an integrated solution for a 7” rocket motor using plateau burning propellant as well as cased venting solutions for Slow Cook Off (SCO) mitigation. ***FY 2018 Plans:*** - Solving the IM response of missile propulsions systems due to Fragment Impacts and Slow Cook Off for the majority of High Performance Propulsion rocket motors. - Solving the Fast Cook Off response of very large High Performance Propulsion motors.			
Title: Minimum Signature Rocket Propulsion (MSP) ***Description:*** MSP focuses on the development and demonstration of technologies to improve the IM response of MSP systems. The development and demonstration of minimum signature (MS) rocket technologies, when applied to munition systems, will improve munition IM response to one or more threats, while not degrading the response to other IM threats and, at minimum, maintaining munition performance. Technologies include, but are not limited to, MS rocket propellant formulations; ingredients for MS propellant formulations, including synthesis, characterization and scale-up; case and packaging design; active and passive venting techniques; rocket motor case design; ignition systems; and thrust mitigation techniques. Of particular interest are technologies toward higher burning rate MS propellants with state-of-the-art energy and reduced shock sensitivity. The 2018 and 2023 year goals of the MSP MATG are concentrated on solving the IM response of missile propulsion systems due to Fragment Impact, Slow Cook Off, and Shaped Charge Jet (SCJ) threats.	2.271	2.055	2.431

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
FY 2016 Accomplishments: - Manufactured motor cases and complete propellant formulation down-select. Conducted case characterization testing, load motors and conduct static firing of motors with mitigation devices. - Completed detailed motor design and manufacture motors. Conducted static motor tests, and fragment impact and slow cook-off tests on representative composite motor cases. - Defined shipping container requirements and designed, manufactured, and demonstrated ballistic protection panel in representative container for air launched rocket motor. Conducted characterization tests for new IM rocket motor propellant. - Designed rocket motor case for hand held rocket motor incorporating IM features. ***FY 2017 Plans:*** - Conduct IM tests on full scale rocket motors with down-selected propellant formulation and mitigation devices. - Conduct full scale fragment impact and slow cook-off tests on composite case motors for low-cost anti-artillery rounds. - Demonstrate a new, less sensitive rocket motor for the Shoulder-launched Multipurpose Assault Weapon (SMAW) system. - Use modeling to predict response of motor to IM threat, conduct preliminary testing with new container, and with baseline and new propellant. - Fabricate shoulder launched rocket motor cases from down selected designs, conduct safety testing, and assemble motors for testing. ***FY 2018 Plans:*** - Solving the IM response of missile propulsion systems due to Fragment Impact, Slow Cook Off, and Shaped Charge Jet (SCJ) threats.			
Title: Blast and Fragmentation Warheads (BFW)	7.325	7.063	7.558
Description: BFW focus on the development and demonstration of technologies to improve the IM response of BFW munitions. The development and demonstration of explosive ingredients, explosives, and warhead and fuze technologies, when applied to munitions, improve IM response to one or more threats, while not degrading the response to other IM threats and, at minimum, maintaining munition performance. Technologies include, but are not limited to, new ingredient synthesis and characterization, initial formulation development, scale-up, warhead/charge configuration, venting techniques for both munitions and their containers, protection / packaging materials and systems, shock mitigation liners, initiation devices, techniques, and technologies. Applications vary but include high performance warhead fills, booster explosives, bulk demolition charges, and bulk fills for blast and/or fragmentation charges. Munition operating conditions may be controlled or have widely varying environmental conditions, such as temperature and vibration, and other factors such as cost, availability, and reliability may be critically important depending on the intended munition application. The 2018 and 2023 year goals of the BFW MATG are concentrated on solving the IM response of blast fragment warheads to the Sympathetic Detonation, Fast Cook Off, and Shaped Charge Jet (SCJ) threats.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
FY 2016 Accomplishments: - Scaled up novel bomb formulation to 150 gallon mix quantity, and filled full-scale assets for sympathetic reaction testing to validate performance. - Conducted SCJ and fragment impact testing on unique munition fill material in representative hardware. - Validated cook-off mitigation technologies in components, manufactured proven components, integrated components in final warhead for environmental and performance testing. - Conducted studies on vent areas, designed and fabricated hardware, and conducted component testing on warhead. - Conducted evaluation study and began IM testing of main fill replacement explosive formulation. - Designed and conducted small scale tests to support modeling of unique venting mechanism for large scale warheads. ***FY 2017 Plans:*** - Produce engineering drawings for final component designs that have been evaluated and optimized for the warhead for full scale slow cook-off testing. - Conduct lethality and effectiveness testing on main fill replacement explosive in preparation for IM tests in the pre formed fragment Artillery round. - Integrate and conduct cook off testing on the CAT torpedo that could improve the slow cook off response of the MK54 as well. ***FY 2018 Plans:*** - Solving the IM response of blast fragment warheads to the Sympathetic Detonation, Fast Cook Off, and Shaped Charge Jet (SCJ) threats.			
Title: Anti-Armor Warheads (AAW)	3.518	3.301	3.515
Description: AAW focuses on the development and demonstration of explosive ingredients, explosives, and warhead and fuze technologies for improving Insensitive Munitions (IM) of AAW munitions. The development of explosive ingredients, explosives, and warhead and fuze technologies, when applied to munitions, improve IM response to one or more threats, while not degrading the response to other IM threats and, at minimum, maintaining munition performance. Technologies include, but are not limited to, new ingredient synthesis and characterization, initial formulation development, scale-up, warhead/charge configuration, venting techniques for both munitions and their containers, protection/packaging materials and systems, shock mitigation liners, and initiation devices, techniques, and technologies. Applications vary, but include high performance warhead fills, booster explosives, and all other technology to mitigate the violent response of AAW munitions to IM threats. Munition operating conditions may be controlled or have widely varying environmental conditions, such as temperature and vibration, and other factors such as cost, availability, and reliability may be critically important depending on the intended munition application. The 2018 and 2023 year goals of the AAW MATG are concentrated on solving the IM response of anti-armor warheads to the			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Fragment Impact, Sympathetic Reaction, and Shaped Charge Jet threats for larger munitions and the Fragment Impact, Slow Cook-off, and Sympathetic Reaction / Shaped Charge Jet threats for Medium Caliber Munitions. ***FY 2016 Accomplishments:*** - Performed modeling and simulation of venting and other mitigation technologies for unique munition system. Conducted propellant formulation, development, and down-select, and begin IM testing. - Used live fire testing and modeling to establish baseline performance data for a multi-munition warhead. Use modeling and simulation to predict the likelihood of sympathetic detonation beginning with individual warheads, then combining them in representative configurations. - Conducted baseline warhead fast and slow cook-off testing and venting characterization studies on small warhead. ***FY 2017 Plans:*** - Improve the sensitivity of the XM-25 medium caliber warhead that can transition to other 30mm and 40mm rounds. - Optimize unique shield design and conduct validation testing; optimize venting feature designs and test; and conduct cook-off testing which validates component level SCO mitigation technologies. - Improve the shock response of the 120mm direct fire tank round with the integration of PIMS liners, melt out fuzes and novel explosives materials. ***FY 2018 Plans:*** - Solving the IM response of anti-armor warheads to the Fragment Impact, Sympathetic Reaction, and Shaped Charge Jet threats for larger munitions and the Fragment Impact, Slow Cook-off, and Sympathetic Reaction / Shaped Charge Jet threats for Medium Caliber Munitions.			
Title: Gun Propulsion (GP) ***Description:*** GP focuses on the development and demonstration of technologies in the area of GP systems. The development and demonstration of gun propulsion technologies, when applied to munition systems, will improve munition Insensitive Munitions (IM) response to one or more threats, while not degrading the response to other IM threats and, at minimum, maintaining munition performance. Technologies include, but are not limited to, gun propellant formulations, ingredients for gun propellant formulations (including synthesis, characterization and scale-up), cartridge case and packaging design, active and passive venting techniques, reduced sensitivity primer propellant and primer systems, and robust primers for insensitive propellants. Applications vary, but include both large and medium caliber munitions, as well as propelling charges for mortars and shoulder launched munitions. Operating requirements vary, and other factors such as barrel life and operation over varying environmental conditions may be critically important depending on the intended munition application. The 2018 and 2023 year goals of the GP MATG are concentrated on solving the IM response of gun propulsion munitions to Fragment Impact and Slow Cook Off threats.	1.857	1.653	1.774

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Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603000D8Z / *Joint Munitions Advanced Technology*	**Project (Number/Name)** P002 / *Insensitive Munitions Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
FY 2016 Accomplishments: - Conducted performance, environmental, and IM testing on propulsion system for use in shoulder fired weapon systems. - Conducted static pressure, environmental, and small scale fragment impact testing of new large caliber munition item. ***FY 2017 Plans:*** - Integrate propulsion and warhead IM solutions into single system for IM testing for use in shoulder fired weapon systems for new enclosure fire capability. - Conduct full scale IM testing on the 120mm rifled mortar cartridge to improve the cook off response and impact threats into the propelling charge. ***FY 2018 Plans:*** - Solving the IM response of gun propulsion munitions to Fragment Impact and Slow Cook Off threats.			
Accomplishments/Planned Programs Subtotals	18.867	17.756	19.039

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 0602000D8Z P000: *BA2 Insensitive Munitions*	12.828	11.993	12.910	-	12.910	13.048	13.156	13.367	13.658	Continuing	Continuing

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

1) Transition of technologies developed by the program are tracked and documented by technology maturity.
2) MATG Technology Roadmaps are prepared, evaluated, and analyzed by JIMTP management and technical staff.
3) Chairman's Annual Assessments for each MATG are critically reviewed by the Technical Advisory Committee (TAC) to determine progress, transition plans, and relevance of each project.
4) Project progress toward goals and milestones is assessed at each MATG meeting.
5) Annual technical reports and papers are tracked and documented for the Program.
6) External Peer Reviews of Projects are conducted as part of Joint Army/Navy/NASA/Air Force meetings.
7) Technology Transition Agreements are in place with Munition programs.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603000D8Z / *Joint Munitions Advanced Technology*	Project (Number/Name) P301 / *Enabling Fuze Advanced Technology*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P301: *Enabling Fuze Advanced Technology*	13.417	6.585	6.146	6.588	-	6.588	6.627	6.678	6.781	6.949	Continuing	Continuing

A. Mission Description and Budget Item Justification

This effort will demonstrate fuze enabling technologies needed to develop weapons that address priority capability areas identified in the Guidance for Development of the Force, the Secretary of Defense Memorandum, DoD Policy on Cluster Munitions and Unintended Harm to Civilians, and shortfalls in current weapon systems. This effort will take promising technologies integrated and tested to technology maturity and demonstrate the technologies to technological maturity utilizing weapon hardware based on priority capabilities and technology needs identified and validated by the Program Executive Officers (PEOs) and the Heads of the Service Science and Technology (S&T) communities. Mature demonstrated fuze technology will be transitioned, thereby decreasing their program costs and schedule risk and facilitating spin-offs to other munitions within their portfolios. Under the Joint Fuze Technology Program (JFTP), investments are focused on specific capability areas that have been identified by Department strategic guidance and current shortfalls in weapon systems and validated by the PEOs and Heads of the Service S&T communities. These four capability areas are: 1) Hard Target Survivable Fuzing, 2) Tailorable Effects (TE) Weapon Fuzing, 3) High Reliability Fuzing, and 4) Enabling Fuze Technologies and Common Architecture.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Hard Target Fuzing	1.535	1.311	1.417
Description: The Hard Target Fuzing challenges are grouped into three Technology Areas. First, improved modeling and simulation capabilities provide the validated computational tools necessary for hard target applications. Second, basic phenomenology and understanding of the Fuze Environment is the science-based endeavor of providing the test equipment, instrumentation, and analysis techniques for experimentation and data gathering necessary for next generation fuzing. Third, hard target survivable fuze components are developed to increase the effectiveness of facility denial munitions by improving the prediction tools and testing methodologies to evaluate the survivability and functionality of legacy and future fuzes. Development of these technologies will enable next generation boosted and hypersonic penetrators to execute missions against hardened and deeply buried targets.			
FY 2016 Accomplishments: - Developed modeling & simulation tools to enable prediction within 10 percent of experimental results for peak acceleration and duration at the fuze level in free fall penetrating weapons.			
FY 2017 Plans:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603000D8Z / *Joint Munitions Advanced Technology*	**Project (Number/Name)** P301 / *Enabling Fuze Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Complete assessment of advanced DoD and DOE computational codes to accurately predict the response of the fuze that will increase the fidelity of modeling and simulating fuze survivability and function in extreme high G weapon penetrating environments. ***FY 2018 Plans:*** - Develop fully programmable miniature data recorders that can survive extreme hard target fuzing environments. - Develop improve layer discrimination and void detection hardware and algorithms to more accurately and reliably detect and classify complex hardened targets.			
Title: Tailorable Effects Fuzing ***Description:*** Develop fuzing for tailorable effects weapons that encompasses the ability to selectively vary the output of the weapon (Dial-a-Yield) and/or the ability to generate selectable effects (directed blast, fragmentation). Develop initiation and multi-point technologies; electronic safe and arm based multi-point initiators for tunable output – scalable yield warheads; MicroElectro-Mechanical Systems (MEMS) based multi-point initiators for tunable output/scalable yield warheads; and smart fuzing for tailorable effects weapons. These technologies will enable weapons that can effectively defeat a variety of targets while minimizing unintentional collateral effects. ***FY 2016 Accomplishments:*** - Conducted weapon demonstration testing of multi-mode, multipoint sequential timing fuze designs against representative target sets. ***FY 2017 Plans:*** - Complete industry collaborative development of integrated switch and trigger technologies into commercial available Exploding Foil Initiators (EFI), in a variety of package sizes for use in DoD Electronic Safe Arm Devices (ESAD). - Tailorable Command/ Arm System for Distributed Fuzing Systems technology targeted for application in Non-Disruptive Umbilical Solutions for Dual-Purpose Improved Conventional Munitions (DPICM) Replacement (USMC); Joint Multi-Effects Warhead System (Navy); Long-Range Precision Fires Program (Army). ***FY 2018 Plans:*** - Develop technologies for efficient/novel generation of firing energy for multi-point fuze systems. - Develop fuzing components precision timing between initiation of multi-points and of energetic reactions.	1.618	1.572	1.684
Title: High Reliability Fuzing ***Description:*** Develop high reliability fuzing architectures, fuzing components, and unexploded ordnance (UXO) reduction features. This program's fuzing technologies are critical to enable the next generation of cluster munitions to achieve the required greater than 99 percent reliability. Evolving DoD emphasis on increased weapon system reliability is driving the need to consider	1.794	1.702	1.814

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603000D8Z / *Joint Munitions Advanced Technology*	**Project (Number/Name)** P301 / *Enabling Fuze Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
new and novel approaches for achieving increased fuze reliability while maintaining or enhancing fuze design safety. DoD policy, higher weapon reliability expectations and harsher weapon system operational requirements are dictating the need for higher fuze reliability than available using current technologies. ***FY 2016 Accomplishments:*** - Applied physics based Hugh James Initiation Criteria reliability map to evaluate the performance of Navy and Army MEMS detonators though characterizing shock initiation and material properties of booster material. - Developed MEMS sure-latching micro-connectors and actuators that function reliably in 100,000-G adverse environments Increase Range Anti-Personnel (IRAP) 40mm grenade and Cluster Munition Replacement (CMR) sub-munition fuzes. ***FY 2017 Plans:*** - Conduct laboratory and projectile dispense testing of fuze communication and interface technologies High Reliability DPICM to increase reliability with minimal disruption to the dispense event. - Develop high reliability fuzing architecture and enabling component technologies for DPICM replacement cluster weapons. ***FY 2018 Plans:*** - Develop quantification margin and performance methodologies to enable accurate reliability assessment of fuzing explosive trains. - Demonstrate area-effects weapon fuzing subsystem and system-level prototypes and systems in both laboratory and field environments.			
Title: Enabling Fuze Technologies	1.638	1.561	1.673
Description: Develop common/modular fuze architectures; innovative fuze component technologies; sensors; next generation fuze setting capability, tools, and modeling; and fuzing power sources. These fuzing technologies will provide smaller, more cost effective solutions while meeting or exceeding the performance of existing technologies. Development of these technologies will enable future weapon applications to be more mission adaptive and smaller along with improve target detection capabilities. ***FY 2016 Accomplishments:*** - Completed projectile testing of advanced, exploitation resistant proximity sensors against representative target sets. - Began development of free-fall bomb retard and impact sensors with decreased sensor failure/rejection rate from 30 percent for legacy g-sensors to less than five percent for MEMS sensors. ***FY 2017 Plans:*** - Develop miniaturized, low power, target detection devices to support increased precision and burst-point accuracy in Area Attack Weapons including future submunitions and enhanced unitary warhead weapons.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603000D8Z / *Joint Munitions Advanced Technology*	**Project (Number/Name)** P301 / *Enabling Fuze Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Develop miniaturized, low power, target detection devices for increased target discrimination and precision, target clutter rejection capability and selectable height-of-burst. Application is for area-effect and cluster weapons.			
FY 2018 Plans: - Demonstrate miniaturized, low power, target detection device technologies in area-effect weapon simulated target environment testing. - Develop miniature thermal battery technology to yield fast rise time and high power density required for small munitions.			
Accomplishments/Planned Programs Subtotals	6.585	6.146	6.588

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 0602000D8Z P204: *BA2 Enabling Fuze Technology*	6.270	5.752	6.248	-	6.248	6.319	6.405	6.531	-	Continuing	Continuing

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

1) Transition of technologies developed by the Program are tracked and documented by technology maturity.
2) Fuze Area Technology Groups (FATG) Technology Roadmaps are prepared, evaluated, and analyzed by Joint Fuze Technology Program (JFTP) management and technical staff.
3) Chairman's Annual Assessments for each FATG are critically reviewed by the Technical Advisory Committee (TAC) to determine progress, transition plans, and relevance of each project.
4) Project progress toward goals and milestones is assessed at each FATG meeting.
5) Annual technical reports and papers are tracked and documented for the Program.
6) Technology Transition Agreements are in place with Munition programs.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603122D8Z / *Combating Terrorism Technology Support*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	380.126	146.115	73.002	76.230	25.000	101.230	79.902	80.112	81.368	83.392	Continuing	Continuing
484: *Combating Terrorism Technology Support (CTTS)*	380.126	146.115	73.002	76.230	25.000	101.230	79.902	80.112	81.368	83.392	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Combating Terrorism Technical Support (CTTS) program identifies capabilities to combat terrorism and irregular adversaries and delivers these capabilities to U.S., interagency, and international users through rapid research and development, advanced studies, and technical innovation. CTTS is expanding its partnerships with other Defense rapid development and acquisition organizations to leverage their expertise as it tries to expedite and transition new and innovative capabilities for Defense and Interagency users.

CTTS major area of emphasis during FY16 and FY17 will be projects to Countering-ISIL. Projects are distributed among 10 mission categories, in line with the interagency Technical Support Working Group (TSWG): Advanced Analytics and Capabilities; Chemical, Biological, Radiological, Nuclear, and Explosives; Improvised Device Defeat; Investigative Support and Forensics; Personnel Protection, Physical Security; Surveillance, Collection, and Operations Support; Tactical Operations Support; Training Technology Development; and a new working group, Irregular Warfare and Evolving Threats.

Specific CTTS areas of emphasis in FY16 and FY17 include Counter-tunnel, Countering-UAVs, Countering-Violent Extremism, and Improving Digital Operations at the tactical level. The CTTS program is a diverse, advanced technology development effort that capitalizes on interagency and international participation to demonstrate the utility and effectiveness of technology when applied to combating terrorism requirements. It includes technology capability development, proof-of-principle demonstrations in field applications, and coordination to transition from development to operational use. CTTS manages approximately 450 individual projects in support of Defense, federal, state, local, and International customers and partners.

The CTTS program justified in the R-2 exhibit identifies the projects fully or partially funded by Congressional appropriations for the CTTS program. However, the Combating Terrorism Technical Support (CTTS) also develops technology and provides support using external funds provided by other DoD and other Federal Departments and International partnerships. These projects and support activities are not necessarily reflected in this justification R-2; but the number of activities do reflect positively on the trust and competence that CTTSO has earned throughout the Department and interagency to rapidly conduct critical RDT&E and provide innovative products.

In FY16, CTTS focused on DoD requirements that supported military forces and interagency operators in demanding or hostile environments such as Iraq, Syria, Afghanistan, and Africa and in the domestic environment by leading the Department in rapidly developing and delivering leading edge products such as CORIAN and MARS-K counter small UAS systems currently deployed to Iraq; tactical tethered ISR vehicles; applications for operational and intelligence collection and analysis of Publically Available Information (PAI) now a Program of Record for USSOCOM; cyber training COSMO and COG that are now Program of Record for the Special Warfare Center and School; an underwater remote operating vehicle (UROV); miniature handheld spectrometers; ruggedized CB protective clothing; systems integration and environment testing of the HALO Maritime Barrier System; and enhancement of the SUNet, off-GIG encrypted communications and data sharing system.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603122D8Z *I Combating Terrorism Technology Support*

At the tactical level, CTTS will increasingly address technology requirements requested from USSOCOM's field components as they increase their regional operations tempo in Iraq, Syria, and Africa. CTTS will address weight reduction of small arms and ammunition; and secure communications for small units deployed to austere and hostile environments; and mobile counter small UAS systems. Another area of continued emphasis will be the protection of U.S. personnel, to include State Department personnel in embassy and consulate locations overseas that need increased security. Additionally, in response to congressional direction, CTTS will continue its partnership with Israel to address their tunnel threat and ensure the joint ventures are beneficial U.S. counter-tunnel activities.

CTTS will continue to actively support the Department's Homeland Defense mission for advanced technology and capabilities that will (1) enhance security along the U.S. Southwest Border and (2) proactively address improvised devices and other chemical, biological, nuclear and radiological threats in a domestic environment. Additionally, CTTS will assist federal; state and local law enforcement in improving their capabilities investigate and mitigate acts of terrorism in CONUS.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	148.030	73.002	77.325	0.000	77.325
Current President's Budget	146.115	73.002	76.230	25.000	101.230
Total Adjustments	-1.915	0.000	-1.095	25.000	23.905
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Internal Adjustments	-1.915	-	-1.095	25.000	23.905

Change Summary Explanation

FY 2017 realignments and other reductions were in support of Departmental efficiencies and economic assumptions.
FY 2018 Service Requirement Review Board - As part of the Department of Defense reform agenda, the incremental reduction accounts for consolidation and reduction of service contracts.
FY 2018 The Department added additional OCO funds to support the Anti-Tunnel project under Physical Security

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Advanced Analytic Capabilities (AAC)	8.378	5.019	5.377	-	5.377
Description: The Advanced Analytic Capabilities (AAC) Subgroup's objective is to develop and deploy integrated analytic capabilities; enabling Commanders, Warfighters, and Mission Partners to share information					

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603122D8Z / *Combating Terrorism Technology Support*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
and make better/faster decisions at the Strategic, Operational, and Tactical levels. AAC projects improve sense-making, decision-making, and data management across a range of mission areas. ***FY 2016 Accomplishments:*** Completed the development of an enhanced Critical Thinking Tool that supports the application of evidence-based reasoning for intelligence questions and captures analytic problem-solving approaches. Completed technical integration, operational evaluations, and transition of an Interagency analytic and situational awareness platform. Completed initial prototype design for field evaluation with user communities of the Model-Enabled Analysis, Design, and Execution (MEADE) system to improve decision-making and resource optimization. Completed the development of a target and asset management system incorporating Intelligence, Meteorological, and Oceanographic information as well as adversary behavior that allows for the most efficient allocation of limited resources against an uncertain target set. Completed the development of a platform to support the quick reference and visualization of groups, group relationships, and evolving group dynamics that enable analysts and field operators to quickly identify potential opportunities and risks in evolving operating environments. Completed the development of a visual information system for intelligence and operations networks that is easy to use at the lowest echelon of user and provides a mission planning tool that accounts for terrain and threats. Completed the development of user centric campaign design and planning interface that provides operational users the ability to quickly design, launch, and adjust an active and passive structured data collection and analysis campaign at the operational edge. Continued development, assessment, and accreditation of a secure multi-intelligence collection and distributed processing and sensor fusion platform with an open Application Programming Interface architecture. Initiated development of Operate to Know Concept of Operations (CONOPS) and tools necessary to create a continuous receive-respond and collect-pulse connection between intelligence and operations to investigate, test, and understand the environment in order to take decisive action. Initiated development of a prototype system that exploits videos, images, and social media. Initiated development of a machine learning lab to predict location of relevant networks. Initiated development of anticipatory analytic tools that will enable military analysts, government analysts, and decision makers to anticipate force activity consequences, discern potential outcomes, and compare/contrast multiple courses of action simultaneously. ***FY 2017 Plans:*** Complete development, assessments, and support transition of a secure multi-intelligence collection and distributed processing and sensor fusion platform with an open Application Programming Interface architecture. Complete development of a machine learning lab to predict location of relevant assets. Continue prototyping					

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603122D8Z / *Combating Terrorism Technology Support*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
of Model-enabled Analysis, Design, and Execution (MEADE) to include the Military Decision-making Process (MDMP). Continue development, integration, evaluation, and field testing required to apply Operate to Know CONOPS and tools necessary to create a continuous receive-respond and collect-pulse connection between intelligence and operations to investigate, test, and understand the environment in order to take decisive action to field operations. Continue development of anticipatory analytic tools that will enable military analysts, government analysts, and decision makers to anticipate force activity consequences; discern potential outcomes; and compare/contrast multiple courses of action simultaneously. Continue development of a prototype system that exploits video, images, and social media based on analyst's task and creates entity, site, and event dossiers by creating advanced tagging, filtering, and fusion. Initiate development of a Tactical Micro Cloud Server (T-MCS) that will be a secure, rugged, man-packable or fixed mount data server that connects to tactical network devices. Initiate development of analytic methodologies to detect, locate, classify, and geo-spatially portray tunnels or tunneling activity by assessing the threat as a network. Initiate research and development of new capabilities for mission planning and battle management using advanced geographic information systems (GIS) tools on Android based platforms; specifically, the capability to augment geographic information in the field. Initiate development of an ability to extract images from the field and make them useable for digital processing using Optical Character Recognition (OCR) processing so that the images can be used in commercial Arabic translation software. Initiate drone based analytics for in-field mission planning support.					
FY 2018 Base Plans: Complete enhancement of the Model Enabled Analysis, Design, and Execution (MEADE) system by identifying and assessing indirect strategies as well as developing response options against associated types of Gray Zone conflicts. Continue development, integration, evaluation, and field testing required to apply Operate to Know CONOPS and tools necessary to create a continuous receive-respond and collect-pulse connection between intelligence and operations to investigate, test, and understand the environment in order to take decisive actions during field operations. Continue development of a Tactical Micro Cloud Server (T-MCS) that will be a secure, rugged, man-packable or fixed mount data server that connects to tactical network devices. Complete development of analytic tools that will enable military analysts, government analysts, and decision makers to anticipate force activity consequences; discern potential outcomes; and compare/contrast multiple courses of action simultaneously. Complete development of a prototype system that exploits social media based on analyst's task and creates entity, site, and event dossiers by creating advanced tagging, filtering, and fusion of social media collection. Continue development and start deploying of analytic methodologies tool to detect, locate, classify, and geo-spatially portray tunnels or tunneling activity by assessing the threat as a network. Continue development and evaluation of new capabilities for mission planning and battle management using					

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603122D8Z / *Combating Terrorism Technology Support*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
advanced geographic information systems (GIS) tools on Android based platforms; specifically, the capability to augment geographic information in the field. Continue development of an ability to extract images from the field and make them useable for digital processing using Optical Character Recognition(OCR)processing so that the images can be used in commercial Arabic translation software. Continue drone based analytics for in-field mission planning support. Initiate Cognitive Sensing capabilities that will develop an understanding of an operational area, the local dynamics, and identify the disruptive trends that could affect that environment.					
Title: CHEMICAL, BIOLOGICAL, RADIOLOGICAL, NUCLEAR, AND EXPLOSIVES (CBRNE)	17.063	11.049	10.562	-	10.562
Description: The CBRNE subgroup's objective is to improve defense capabilities to meet tomorrow's CBRNE threats. To meet this objective, the subgroup focuses on rapid research, development, test and evaluation on threat characterization; materials attribution; personal protective equipment; detection of CBRNE materials at trace and bulk levels at point, proximity and stand-off distances; development of information resources and decision support tools to assist response elements with risk-based decision making; and consequence management for post-event activities. ***FY 2016 Accomplishments:*** Continued development of a next generation chemical and biological (CB) glove and initiated development of additional glove sizes. Completed field evaluations and National Fire Protection Association (NFPA) 1994 Class 3 certification testing of a next generation CB sock. Completed incorporation of analytical and sampling procedures for the non-destructive evaluation of CB protective clothing for key contaminants in the field into a decision support matrix. Completed development of a powder material with imbedded chemical detection and decontamination properties. Completed development of a radio-frequency identification (RFID) detection technology for explosives, solid oxidizers, and fumigants in packages and cargo. Completed development of a miniature, hand-portable mass spectrometer for the detection of chemical and explosive threats. Completed development of an apparatus suitable for studying biological threat aerosols under environmentally realistic conditions to update source terms for hazard prediction models. Completed development of a water filtration system capable of producing potable water for 20-50 operators in austere conditions. Completed a study on the deposition and transport of chemical warfare agents (CWAs) in organs post mortem to support science based decision making procedures when handling/preparing bodies that have been exposed to CWAs. Completed the systematic evaluation of gas forming reactions that could be used in improvised chemical devices. Completed development of a low cost, handheld Raman system for the detection of explosives and chemical threats. Completed development of a microfluidic paper-based analytical device for in-field screening of organic explosives. Completed transition of a colorimetric fabric technology to a commercialization partner. Completed					

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603122D8Z / *Combating Terrorism Technology Support*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
development of a standardized, evidence-based fire literacy program to address shortcomings of current approaches in current fire safety and survival training. Completed development of a flexible, versatile, and easily transportable platform for detection of small amounts of explosive materials hidden inside portable electronic devices using a combination of passive and active technologies. Completed development of decontamination protocols to preserve forensic evidence while allowing chemical and biological analysis to be performed. Continued test and evaluation of an unobtrusive colorimetric detection system for the detection of CWAs. Completed development of decision support tools to provide on-scene responders with evidence-based information to support decision making for emergency medical response to chemical events, chemical detection, radiological response, firefighting guidance, and countering improvised explosive threats. Continued testing and evaluation of a novel, miniaturized chemiresistor wearable sensor which enables detection of low concentrations of chemicals in an urban environment. Continued testing and evaluation of a novel bio-sensor based upon pyroelectric transducer technology for the detection of biological warfare agents. Continued development of a database and advanced analytical tools for the analysis of improvised CB agent production methods. Continued evaluation of potential methods of production of threat materials, and identify key indicators and warnings for response personnel. Continued development and initiated field evaluations of a ruggedized garment which provides NFPA 1994 Class 3 and NFPA 1992 protection. Continued development of new algorithms that increase the specificity and improve the overall utility of commercial Raman explosive detection systems. Continued development of a flexible, versatile, and easily transportable platform for detection of small amounts of explosive materials hidden inside of portable electronic devices using a combination of passive and active technologies. Continued development and evaluation of a modular computer/web-based training package for hand-held explosive detection technologies. Continued development of a scalable vacuum evidentiary collection device for the collection and preservation of known or suspected biological agent powders. Continued updating source terms for urban dispersion models to improve the ability to characterize deposition patterns in realistic radiological device dispersal (RDD) events. Continued best practices for clean-up procedures for contaminated areas after an RDD event. Continued demonstrating, measuring, and understanding the mechanisms of improvements in defeat or disablement of CB threats using weapons that employ structurally reactive materials (SRM). Continued field evaluations of a new CB protective mask capable of interoperability with tactical equipment for use in tactical environments. Continued testing and evaluation of optimized sampling media for the collection of trace explosive materials. Continued testing and evaluation of next generation sensors for use in trace, bulk, proximity, and stand-off detection of explosives-based threats. Continued evaluation of enhanced sampling materials and systems for CBRNE threats. Continued development of a risk-based decision support model for skin decontamination in the case of dermal exposures to CWAs. Continued support of the Quadrilateral Group on Chemical, Biological, and Radiological (CBR) Counterterrorism. Continued					

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603122D8Z / *Combating Terrorism Technology Support*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
development of a National Institute for Occupational Safety and Health (NIOSH) certified 15-min chemical, biological, radiological, and nuclear (CBRN) protection escape hood capable of fitting in the pocket of a suit jacket that also passes the flammability, heat resistance and carbon monoxide (CO) protection requirements for a combination CBRN/CO capability. Continued development of wireless communications that provide the ability to communicate without breaching the CBRN suit integrity or requiring an electrical pass-through. Continued development of a ruggedized one-piece garment which provides NFPA 1994 Class 2 protection from exposure to the harmful effects of all traditional CB warfare agents and toxic industrial chemicals (TICs) listed in NFPA 1994 while allowing for communication and interoperability with tactical equipment. Continued testing new methods to more effectively and efficiently collect nanogram quantities of commercial, military, and homemade explosives that are present near improvised explosive devices. Initiated development of new hardware and software solutions for a broad range of popular handheld detectors, enabling the real-time connectivity of handheld detectors from remote sites to a central location utilizing the First Responder Sensor Protocol. Initiated CBRN respirator testing against additional TICs representative of the current threats encountered. Initiated development of multiple use biological personal protective equipment which provides NFPA 1999, Standards on Protective Clothing for Emergency Medical Operations, protection, and NFPA 1994, Standard on Protective Ensembles for First Responders to CBRN Terrorism Incidents, Class 4 protection. Initiated development of a hazmat technician level, skills-based training program to prepare hazmat operators to use risk-based selection mechanisms to determine the appropriate level of personal protective equipment. Initiated development of a hazmat technician level, skills-based training program to prepare hazmat operators to use evidence-based selection mechanisms to develop and/or choose the appropriate mass decontamination protocols for a given situation. Initiated development of assessment tools and criteria to properly rank and qualify commercial cooling systems to use with CBRNE personal protective equipment (PPE). Initiated development of a small, low-cost, disposable sampler, containment vessel, and adapter to be used in sampling of broad spectrum chemical residues on operational surfaces. Initiated development of next generation evidence packaging for the safe transport of CBRN materials. Initiated an international assessment of a novel genomic sequencing standard for forensic deoxyribonucleic acid (DNA) metagenomics. Initiated a study on a next generation sequencing technology for potential applications in field deployed laboratories. Initiated development of a test bed for the evaluation of cargo for contraband including special nuclear materials, explosives, drugs, and other potential materials of interest, utilizing muon tomography and electron stopping. Initiated development of a research and development test bed for the evaluation of high volume explosive sampling devices with a focus on cargo/container screening.					
FY 2017 Plans:					

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Complete development of four additional sizes of a next generation CB Glove and initiate NFPA 1994 Class 3 certification testing. Complete development of an unobtrusive, colorimetric system for the detection of CWAs and TICs of concern. Complete development and commercialize a novel, miniaturized chemiresistor wearable sensor which enables detection of low concentrations of chemicals in an urban environment. Complete development of a novel bio-sensor based upon pyroelectric transducer technology for the detection of biological warfare agents. Complete development of an advanced analytical database for the analysis of improvised CB agent production methods. Complete evaluation of potential methods of production of threat materials, and identify key indicators and warnings for response personnel. Complete field evaluations and certify a ruggedized garment which provides NFPA 1994 Class 3 and NFPA 1992 protection. Complete development of new algorithms that increase the specificity and improve the overall utility of commercial Raman explosive detection systems. Complete development of a flexible, versatile, and easily transportable platform for detection of small amounts of explosive materials hidden inside of portable electronic devices using a combination of passive and active technologies. Complete development of a modular computer/web-based training package for hand-held explosive detection technologies. Complete development of a scalable vacuum evidentiary collection device for the collection and preservation of known or suspected biological agent powders. Complete source term development for urban dispersion models to improve the ability to characterize deposition patterns in realistic RDD events. Complete best practices for clean-up procedures for contaminated areas after an RDD event. Complete evaluation of SRMs. Continue to conduct verification and validation testing of a new CB protective mask capable of interoperability with tactical equipment for use in tactical environments. Continue testing and evaluation of optimized sampling media for the collection of trace explosive materials. Continue testing and evaluation of next generation sensors for use in trace, bulk, proximity, and stand-off detection of explosives-based threats. Continue evaluation of enhanced sampling materials and systems for CBRNE threats. Complete development of a risk-based decision support model for skin decontamination in the case of dermal exposures to CWAs. Complete NIOSH certification of a 15-min CBRN protection escape hood capable of fitting in the pocket of a suit jacket that also passes the flammability, heat resistance and CO protection requirements for a combination CBRN/CO capability. Complete field testing of wireless communications that provide the ability to communicate without breaching the CBRN suit integrity or requiring an electrical pass-through. Complete NFPA 1994 Class 2 certification testing of a ruggedized one-piece garment which provides protection from exposure to the harmful effects of all traditional CB warfare agents and TICs listed in NFPA 1994 while allowing for communication and interoperability with tactical equipment. Complete development of new hardware and software solutions for a broad range of popular handheld detectors, enabling the real-time connectivity of handheld detectors from remote sites to a central location utilizing the First Responder Sensor Protocol. Continue support of the Quadrilateral Group on CBR Counterterrorism. Continue testing new methods to more effectively and efficiently					

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
collect nanogram quantities of commercial, military, and homemade explosives that are present near improvised explosive devices. Continue CBRN respirator testing against additional TICs representative of the current threats encountered. Continue development of multiple use biological PPE which provides NFPA 1999, Standards on Protective Clothing for Emergency Medical Operations, protection, and NFPA 1994, Standard on Protective Ensembles for First Responders to CBRN Terrorism Incidents, Class 4 protection. Complete development of a hazmat technician level, skills-based training program to prepare hazmat operators to use risk-based selection mechanisms to determine the appropriate level of personal protective equipment. Complete development of a hazmat technician level, skills-based training program to prepare hazmat operators to use evidence-based selection mechanisms to develop and/or choose the appropriate mass decontamination protocols for a given situation. Complete development of assessment tools and criteria to properly rank and qualify commercial cooling systems to use with CBRNE PPE. Continue development of a small, low-cost, disposable sampler, containment vessel, and adapter to be used in sampling of broad spectrum chemical residues on operational surfaces. Complete development of next generation evidence packaging for the safe transport of CBRN materials. Continue assessment of novel genomic sequencing standards for forensics DNA metagenomics. Continue development of a next generation sequencing technology for potential applications in field deployed laboratories. Continue development of a test bed for the evaluation of cargo for contraband including special nuclear materials, explosives, drugs, and other potential materials of interest, utilizing muon tomography and electron stopping. Continue development of a research and development test bed for the evaluation of high volume explosive sampling devices with a focus on cargo/container screening. Initiate an effort to develop an integrated light-weight inhalation hazard detection system capable of signaling a combination unit respirator (CUR) switching-mechanism to change operating modes of a CUR between filtered air and supplied air. Initiate development of a low profile tactical self-contained breathing apparatus (SCBA) to allow for working in confined spaces, tunnels, and similar access denied environments while providing high quality breathing air. Initiate development of an explosive trace detector with a limit of detection less than ten picograms for military and common homemade explosives. Initiate an effort to modify currently fielded ion mobility spectroscopy systems to expand the list of threats detectable to include compounds from emerging military explosives and compounds used in gun powder formulations. ***FY 2018 Base Plans:*** Complete NFPA 1994 Class 3 certification testing of a next generation CB Glove. Complete NIOSH certification of a new CB protective mask capable of interoperability with tactical equipment for use in tactical environments. Continue testing and evaluation of optimized sampling media for the collection of trace explosive materials. Continue support of the Quadrilateral Group on CBR Counterterrorism. Continue testing new methods to more					

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
effectively and efficiently collect nanogram quantities of commercial, military, and homemade explosives that are present near improvised explosive devices. Continue testing and evaluation of a next generation sensors for use in trace, bulk, proximity, and stand-off detection of explosives-based threats. Complete CBRN respirator testing against additional TICs representative of the current threats encountered. Complete certification of multiple use biological PPE to NFPA 1999, Standards on Protective Clothing for Emergency Medical Operations, protection, and NFPA 1994, Standard on Protective Ensembles for First Responders to CBRN Terrorism Incidents, Class 4. Continue evaluation of enhanced sampling materials and systems for CBRNE threats. Complete development of a small, low-cost, disposable sampler, containment vessel, and adapter to be used in sampling of broad spectrum chemical residues on operational surfaces. Complete assessment of novel genomic sequencing standards for forensics DNA metagenomics. Complete development of a next generation sequencing technology for potential applications in field deployed laboratories. Complete development of a test bed for the evaluation of cargo for contraband including special nuclear materials, explosives, drugs, and other potential materials of interest, utilizing muon tomography and electron stopping. Complete development of a research and development test bed for the evaluation of high volume explosive sampling devices with a focus on cargo/container screening. Continue development of an integrated light-weight inhalation hazard detection system capable of signaling a CUR switching-mechanism to change operating modes of a CUR between filtered air and supplied air. Continue development of a low profile tactical SCBA to allow for working in confined spaces, tunnels, and similar access denied environments while providing high quality breathing air. Continue development of an explosive trace detector with a limit of detection less than ten picograms for military and common homemade explosives. Continue modification of currently fielded ion mobility spectroscopy systems to expand the list of threats detectable to include compounds from emerging military explosives and compounds used in gun powder formulations. Initiate development of a low-cost detect-to-warn wearable sensing technology to alert and protect first responders and the warfighter of the presence of specific, high-interest toxic industrial chemical (TIC) and chemical warfare agent (CWA) vapors. Initiate development of a low-cost detect-to-identify wearable sensing technology to inform chemical-specialist first responders and warfighters of the presence of a broad range of TIC and CWA vapors. Initiate development of a hyperspectral rapid, large area survey instrument that guides activities ranging from contaminant avoidance to decontamination.					
Title: IMPROVISED DEVICE DEFEAT (IDD)	6.868	4.422	5.786	-	5.786
Description: The IDD/EC Subgroup's objective is to deliver capabilities to defeat or neutralize the continuum of terrorist improvised weapons and explosive devices. IDD/EC improves the operational capabilities of the bomb disposal community, consisting of military EOD, and federal, state, and local bomb squads, by developing and delivering advanced tools and technologies, and decision support information to defeat improvised terrorist					

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total

devices. The IDD/EC Subgroup identifies and prioritizes multi-agency end-user requirements in collaboration with military units, and federal, state, and local agencies. IDD/EC actively works with vendors and end-users to deliver advanced prototype systems that provide greater efficiency and increased safety for Bomb Technicians who investigate, access, evaluate, and if needed, render safe or dispose of suspect devices. All development efforts undertaken are in support Presidential Policy Directive 17 (PPD-17), Countering Improvised Explosive Devices, and the National Bomb Squad Commanders Advisory Board (NBSCAB) National Strategic Plan.

FY 2016 Accomplishments:
Completed development and delivery of prototypes for operational testing and evaluation of a submersible remotely operated vehicle to counter water-borne IEDs. Completed analysis of alternatives for the development of a capability to robotically conduct on-site desensitization and disposal of sensitive homemade explosives (HMEs) by mixing small quantities of the target HME with a flammable liquid followed by incineration. Completed development of a mobile device application for delivery of trend analyses of worldwide incidents involving improvised explosive device that provides technical data accessible to bomb technician. Completed development of a decision support tool that covers the full range of issues involved in vehicle-borne improvised explosive device (VBIED) response by bomb disposal personnel. Completed analysis of the use of additive manufacturing to build and conceal explosive devices. Completed exploitation of improvised electric detonators and igniter components. Complete development of an environmentally hardened, remotely delivered and operated pan-and-tilt render safe capability for IED disruption. Continue development of a compact, high-power next generation X-ray generator for EOD use. Continue development of a system that can employ data analytics to X-ray images at the scene of a suspect package, hoax device, or IED incident to instantly and automatically identify bomb or IED components by matching database exemplars. Continue development of a device defeat application that allows bomb technicians to select disruption tools based on automated X-ray diagnostics. Continue development of a low cost, disposable Radio Frequency (RF) initiation system for firing commercial blasting caps. Continue development of a lightweight IED protective suit and ballistic helmet to allow increased freedom of movement during counter-IED operations. Initiate development of scalable 3D Computer Assisted Design (CAD) models on non-patented bomb squad render safe tools.
Initiate an East Coast-based technology requirement gathering capability exercise (TRG CAPEX) to develop and test advanced skills to maneuver hazardous duty robots in challenging, real-world scenarios. Initiate develop of common standards of characterization, analysis and facsimile devices methods for Radio Controlled Improvised Explosive Devices. Initiate development and testing of highly intelligent and power efficient advanced communications ECM techniques that are fully capable of defeating the environmentally adaptive communications capabilities embedded in most advanced wireless systems and networks. Initiate development

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
of common test standards and assessment methods for the full spectrum of EOD disruptors to facilitate the exchange of reliable data. Initiate research, information sharing, and joint peer review of methods for Electromagnetic and Electrostatic Discharge mechanisms for counter-IED applications in support of Directed Energy neutralize capabilities. Initiate development of an HME neutralization field reference for use by Military EOD and Public Safety Bomb Technicians.					
FY 2017 Plans: Complete development and delivery of a compact, high-power next generation X-ray generator for EOD use. Complete development of a system that can employ X-ray image analytics at the scene of a bomb or IED incident to instantly and automatically identify bomb or IED components from a database of exemplars. Continue development of a device defeat application that allows bomb technicians to select disruption tools based on automated X-ray diagnostics. Complete development of a low cost, disposable Radio Frequency (RF) firing system for firing commercial blasting caps. Continue development of a lightweight IED protective suit and ballistic helmet to allow increased freedom of movement during counter-IED operations. Continue development of a scalable 3D Computer Assisted Design (CAD) models on non-patented bomb squad render safe tools. Continue an East Coast-based technology requirement gathering capability exercise (TRG CAPEX) to develop and test advanced skills to maneuver hazardous duty robots in challenging, real-world scenarios. Complete develop of common standards of characterization, analysis and facsimile devices methods for Radio Controlled Improvised Explosive Devices. Continue development and testing of highly intelligent and power efficient advanced communications ECM techniques that are fully capable of defeating the environmentally adaptive communications capabilities embedded in most advanced wireless systems and networks. Continue development of common test standards and assessment methods for the full spectrum of EOD disruptors to facilitate the exchange of reliable data. Continue research, information sharing, and joint peer review of methods for Electromagnetic and Electrostatic Discharge mechanisms for counter-IED applications in support of Directed Energy neutralize capabilities. Continue development of an HME neutralization field reference for use by Military EOD and Public Safety Bomb Technicians. Initiate and complete development of an IED Instant Notification System. Initiate development of enhanced capabilities for a submersible remotely operated vehicle to counter water borne IEDs based on operational capability assessment. Initiate development of a hands-free Bomb Suit Heads up Display. Initiate development of a Multi-Fit Inflatable Bomb Suit Helmet Liner capable of being retrofitted to the Med-Eng EOD 9, EOD 9A, and SRS 5 model helmets. Initiate development of a 3D X-ray Imaging System to interrogate a suspected improvised explosive device (IED) and locate critical components.					
FY 2018 Base Plans:					

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Complete development of a device defeat application that allows bomb technicians to select disruption tools based on automated X-ray diagnostics. Complete development of a low cost, disposable RF firing system for firing commercial blasting caps. Complete development of a lightweight IED protective suit and ballistic helmet to allow increased freedom of movement during counter-IED operations. Continue development of scalable 3D Computer Assisted Design (CAD) models on non-patented bomb squad render safe tools. Continue an East Coast-based technology requirement gathering capability exercise (TRG CAPEX) to develop and test advanced skills to maneuver hazardous duty robots in challenging, real-world scenarios. Complete development and testing of highly intelligent and power efficient advanced communications ECM techniques that are fully capable of defeating the environmentally adaptive communications capabilities embedded in most advanced wireless systems and networks. Complete development of common test standards and assessment methods for the full spectrum of EOD disruptors to facilitate the exchange of reliable data. Complete research, information sharing, and joint peer review of methods for Electromagnetic and Electrostatic Discharge mechanisms for counter-IED applications in support of Directed Energy neutralize capabilities. Complete development of an HME neutralization field reference for use by Military EOD and Public Safety Bomb Technicians. Continue development of enhanced capabilities for a submersible remotely operated vehicle to counter water borne IEDs based on operational capability assessment. Continue development of a hands-free Bomb Suit Heads up Display. Continue development of a Multi-Fit Inflatable Bomb Suit Helmet Liner capable of being retrofitted to the Med-Eng EOD 9, EOD 9A, and SRS 5 model helmets. Continue development of a 3D X-ray Imaging System to interrogate a suspected improvised explosive device (IED) and locate critical components. Initiate development of a humanoid-type robotic platform for use IED Defeat operations in urban environments. Initiate development of a small, high definition, live streaming camera that displays images onto a hand-held or bomb suit worn screen, or Heads-Up Display. Initiate development of an enhanced spatial awareness capability for robotic platforms that can maintain 360-degree awareness of the platforms surrounding environment. Initiate development of a mixed-reality visualization system for command post/up-range support that will allow bomb technicians and support personnel to see what is transpiring down-range, and assist the bomb technician with on-scene analysis. Conduct a workshop that integrates Explosive Ordnance Disposal (EOD) and Public Safety Bomb Technicians (PSBT) with engineers and roboticists to collaboratively design and develop new capabilities for VBIED response. Initiate development of a Remotely Operated Vehicle (ROV) vision enhancement capability for operations in turbid waters. Initiate development of an arm and claw for the Sea Wasp underwater ROV that has four (4) very specific, user-defined degrees of freedom.					
Title: INVESTIGATIVE AND FORENSICS SCIENCE	5.515	4.472	4.983	-	4.983

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total

Description: The IFS subgroup's objective is to advance combating terrorism capabilities in investigative and forensic science. IFS supports joint, interagency, and other partners who apply investigative and forensic science methods, means, or practices to forensic intelligence or investigations. To meet this objective, the subgroup focuses on rapid research, development, test and evaluation of new and advanced technology, equipment, forensic techniques, and investigative tools, as well as development of information resources and on support tools for risk-based decision making and rapid exploitation of evidence. Projects emphasize rapid and field deoxyribonucleic acid (DNA) analysis, identification of insider threat within agencies, pre-blast and post-blast forensic examination, electronic evidence data acquisition and analysis, sensitive site exploitation, forensic intelligence, and criminalistics.

FY 2016 Accomplishments:
Completed development of a comprehensive forensic procedure to separate mixed samples of DNA by using short tandem repeats in nuclear DNA. Completed development of an automatic tool that recognizes and identifies faces in uncontrolled files and images. Completed development of a remote identification card image system for the detection of suspected fraudulent ID cards at checkpoints. Completed development of a tool that automatically ingests and analyzes data from mobile device extraction tools and produces intelligence reports. Completed development of mobile device corpus to track, exploit, and store electronic evidence devices. Completed development of a methodology to identify and exploit organic and inorganic compounds found in ammonium nitrate and calcium ammonium nitrate samples for geographical sourcing. Initiated development of an advanced and improved system that analyzes, stores, and links data and traits from fraudulent identification and travel documents. Initiated development of forensically validated procedures using high resolution mass spectrometry to determine the geographic source of cultivation and processing of heroin and related opium substances. Initiated development of the best forensic methodologies to analyze 3-D printed firearms made with non-metallic materials. Initiated development of a forensic software application that performs searches, matches, and exclusions of vehicle images in still image or video databases. Initiated development of an integrated device for rapid collection and analysis of forensic and biometric data most frequently found at crime scenes and sensitive sites. Initiated development of training procedures to educate and motivate employees at a worksite to report observations indicating other workers may be a potential insider threat to commit espionage or workplace violence.

FY 2017 Plans:
Complete development of an advanced and improved system that analyzes, stores, and links data and traits from fraudulent identification and travel documents. Complete development of forensically validated procedures

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
using high resolution mass spectrometry to determine the geographic source of cultivation and processing of heroin and related opium substances. Complete development of the best forensic methodologies to analyze 3-D printed firearms made with non-metallic materials. Complete development of a forensic software application that performs searches, matches, and exclusions of vehicle images in still image or video databases. Complete development of an integrated device for rapid collection and analysis of forensic and biometric data most frequently found at crime scenes and sensitive sites. Complete development of training procedures to educate and motivate employees at a worksite to report observations indicating other workers may be a potential insider threat to commit espionage or workplace violence. Initiate development of a software tool that detects and extracts any type of handwritten content on digitized documents. Initiate development of an automated mobile latent fingerprint processing device that enables non-experts to develop searchable quality prints on all types of objects. Initiate development of a tool that will locate and collect digital data and information from cloud-based sites when the user name and password is known. ***FY 2018 Base Plans:*** Complete development of a software tool that detects and extracts any type of handwritten content on digitized documents. Complete development of an automated mobile latent fingerprint processing device that enables non-experts to develop searchable quality prints on all types of objects. Complete development of a tool that will locate and collect digital data and information from cloud-based sites when the user name and password is known. Initiate development of standard procedures in forensic speaker recognition. Initiate credibility assessment technology algorithm development. Initiate development of an unconstrained scalable facial recognition system. Initiate development of an annual security appraisal tool for insider threat. Initiate design and development of miniature cover body worn audio-video transmitters.					
Title: Irregular Warfare and Evolving Threats (IW/ET) ***Description:*** The IW/ET subgroup develops new concepts and capabilities for warfighters and inter-agency partners who are confronting the complexity of the current operational environment, while simultaneously looking outward rather than inward to appropriately size, shape and develop their forces. In accordance with the Quadrennial Defense Review's (QDR) emphasis on preparation to defeat adversaries and succeed in a wide range of contingencies, IW/ET will engage in operational assessment, concept development, and independent validation of unique prototype capabilities to identify, confront, and defeat evolving threats. ***FY 2016 Accomplishments:*** Completed an effort to bolster rewards programs by better understanding how to incentivize "street-level" community reporting that may provide indicators of instability and violence (for cents rather than thousands of	10.085	5.168	7.569	-	7.569

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
dollars). The potential exists to dramatically increase the volume, information security, and quality of reporting possible through crowdsourcing applications, particularly when combined with the micro-payment processing breakthrough afforded by blockchain technology. Developed and tested a methodology and application to enable automated and incentivized reporting by civilians in zones of conflict in exchange for micro-payments or tip-sized rewards. Completed the expansion and standardization of requirements for an automated and integrated open source secure analytical platform that fuses critical open source layers with data tools in order to conduct analysis and persistent monitoring to expedite operational planning products and enabled strategic, operational, and tactical users to remotely perform mission critical tasks that result in lower costs and improve system performance. Completed case-studies that provided applicable lessons from literature and expert practitioners on Lawfare and other analogous policy tools and provided recommendations for a framework outlining how the U.S. and its allies can effectively defend against and conduct offensive legal warfare. Completed an initial assessment and analysis of current authorities within the Department of Defense (DoD) and Department of State (DoS) that support building regional stability with U.S. partner nations in the face of a global blended threat and recommended an initial path forward to ensure U.S. investments in the stability paradigm are done in a more coordinated and impactful way. Completed the Network Enablement Capability (NEC) contract that transitioned the LEGACY exportable informant management capability to U.S. forces. Completed Project LEGACY, an exportable informant management capability that significantly improved Afghan National Security Forces counterinsurgency and military intelligence capabilities. Completed an effort to research and develop a classified report that makes use of the Open Source Enterprise's open source analytical expertise in order to support mission-enabling research and analysis capabilities for a CTTSO end user. Completed development of an analytical framework to provide analysts and planners tools and techniques for understanding the urban operational environment that can be used to support operational design, intelligence preparation of the operational environment, course of action (COA) development, COA analysis, COA selection, and plan/order production. Completed development of statistical models using near real time blockchain data to determine the probability that a Bitcoin transaction is associated with illicit activities. Completed deployment of a government off-the-shelf application that integrates and fuses social medial data for use in strategic and tactical operational planning and preparation of the battlefield. Continued the Behavioral Influence Assessment effort in partnership with the UK's Defense Science and Technology Laboratory (DSTL) to enable analysts to assess higher-order cascading influences and reactions to events, as well as determine the uncertainty that the event will produce the desired results over time. Continued the Peer-2-Peer effort to challenge university students from the U.S. and abroad to create an online community to counter a common enemy of violent extremists wherever they might exist through the design of a social or digital initiative to counter violent extremism. Continued the analysis and advancement of information operations (IO) as a valid and critical element of combined arms					

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by providing support to: planning and organizing integration of influence capabilities into cyber planning and execution, understanding and planning for the impact and implications of “now media,” and planning and organizing to conduct military deception, as well as the distillation and dissemination of best practices in the planning, execution, and assessment of IO. Continued development and operational deployment of the Nightingale effort, a prototype digital workflow management and content approval capability for members of the Counter Terrorism Strategic Communication community of practice who actively engage on social media platforms. Continued the design of a holistic common interagency analytical and planning approach that better identifies capabilities authorities and funding, links U.S., Allied and partner nation objectives and builds synergy when conducting partner nation capacity building missions. Continued an operational test of the NEC Clever Enabler project with Special Operations Command Africa. Final deliverable will be an exportable all source intelligence training curriculum for use with partner nations. Upon completion of the curriculum and a brief test, the contract will transition to U.S. Africa Command for continued use. Continued the development of a platform to collect and analyze photographs, videos, audio recordings, and general text-based information via precise crowd sourcing techniques and provide the capability to conduct facial, object and ISIL branded recognition. Continued to develop and deliver Secure Unclassified Network (SUNet) which provides a unique virtualization of a single hardware suite of servers and software that provide protected dynamic enclaves of capability for multi-agency users (law enforcement, interagency, coalition, and foreign nationals). Continued research and development of a low-cost, effective and efficient method of extending or creating local security, sustainable governance, and protection from terrorism in small and large urban environments through relevant doctrine, training, technology and innovative partnerships. Utilizing SUNet architecture, this effort facilitates dialogue and information sharing among entities involved in developing community resilience/resistance in the face of armed violence and creates a platform to test and evaluate tools and TTPs for use in the "ungoverned" or "under-governed" urban environment. Continued development of the Conflict Zone Tool Kit (CZTK) which resides on a secure, unclassified network and empowers analysts and operators with leading edge tools and expert instruction to enable near-real time situational awareness from host-nation perspective (‘green lens’) related to activities and actors of concern. This platform focuses exclusively on publicly available information accessible on the internet to enhance the ability of analysts and operators to develop and maintain a real time pulse of how terrorist groups make use of open source messaging to recruit, train, and fundraise. Continued the development and test of an exportable IO capability that legitimate governments’ can use to counter violent extremist messaging. Conducted testing and evaluation by delivering training and periodic evaluation through the use of mobile advise and assist training teams in Iraq. Initiated and completed development of a tool to monitor publicly available information, identify and archive trends, and disseminate and respond to real-time threats on a hand-held device in permissive and non-permissive environments using a mobile application that					

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total

provides real-time publicly available information and situational awareness around a mobile military unit. Initiated the Social Networking Terrain Analysis effort to develop a web-based software application framework that can visualize and monitor the online social network terrain using publicly available information and will be integrated into CZTK. Initiated a new effort implementing advanced information exchange tools and training to help build partner nation collaborative capacity. Initiated an effort to evaluate a new technology that 1) detects real-time cases of Da'esh's recruitment on social media and 2) in an automated fashion, engages and disrupts extremist recruitment and provide information on current and developing technology, as well as advice on opportunities and risks in developing a program to support this new capability. Initiated an effort that will address a gap in understanding the strategy and concepts of how to foster effective Counter Unconventional Warfare (UW) in the modern age and inform strategy and concepts focused on how a country prepares itself to conduct resistance against an occupying aggressor and what measures and actions a country can take prior to occupation. Cancelled the effort to develop an assessment methodology that will assist counterterrorism strategic messaging by enhancing the ability to use publicly available information to identify key influencers, derive linguistically and culturally accurate insights for message development, and then measure the impact and resonance of such messages. This project was not initiated in lieu of other more urgent requirements.

FY 2017 Plans:

Complete the Behavioral Influence Assessment effort in partnership with the UK's DSTL to enable analysts to assess higher-order cascading influences and reactions to events, as well as determine the uncertainty that the event will produce the desired results over time. Complete the Peer-2-Peer effort to challenge university students from the U.S. and abroad to create an online community to counter a common enemy of violent extremists wherever they might exist, and transition the effort to the Department of Homeland Security, U.S. State Department, and Facebook. Complete the analysis and advancement of IO as a valid and critical element of combined arms by supporting the development and dissemination of operational art of IO, the composition of information related capabilities, and training for IO throughout the U.S. Marine Corps. Complete development and operational deployment of the Nightingale effort to deploy digital workflow, approval, and archival processes in support of the counter-violent extremism mission. Complete the design of a holistic common interagency analytical and planning approach that better identifies capabilities authorities and funding, links U.S., Allied and partner nation objectives and builds synergy when conducting partner nation capacity building missions. Complete an operational test of the NEC Clever Enabler project with Special Operations Command Africa. Final deliverable will be an exportable all source intelligence training curriculum for use with partner nations. Upon completion of the curriculum and a brief test, the contract will transition to U.S. Africa Command for continued use. Complete the development of a platform to collect and analyze photographs, videos, audio

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
recordings, and general text-based information and provide the capability to conduct facial, object and ISIL branded recognition. Complete initial development and delivery of SUNet, which provides a unique virtualization of a single hardware suite of servers and software that will provide protected dynamic enclaves of capability for multi-agency users (law enforcement, interagency, coalition, and foreign nationals). Complete research and development of a low-cost, effective and efficient method of extending or creating local security, sustainable governance, and protection from terrorism in small and large urban environments through relevant doctrine, training, technology and innovative partnerships. Utilizing SUNet architecture, this effort facilitates dialogue and information sharing among entities involved in developing community resilience/resistance in the face of armed violence and creates a platform to test and evaluate tools and TTPs for use in the "ungoverned" or "under-governed" urban environment. Complete development of CZTK which resides on a secure, unclassified network and empowers analysts and operators with leading edge analytical tools and expert instruction, to enable near-real time situational awareness from host-nation perspective ('green lens'), related to activities and actors of concern. This platform focuses exclusively on publicly available information accessible on the internet to enhance the ability of analysts and operators to develop and maintain a real time pulse of how terrorist groups make use of open source messaging to recruit, train, and fundraise. Continue the development and test of an exportable IO capability that legitimate governments' can use to counter violent extremist messaging. Conduct testing and evaluation by delivering training and periodic evaluation through the use of mobile advise and assist training teams in three select countries. Complete development of the Social Networking Terrain Analysis effort, a web-based software application framework that can visualize and monitor online social network terrain using publicly available information and will be integrated into CZTK. Complete a new effort implementing advanced information exchange tools and training to help build partner nation collaborative capacity. Complete evaluation study on a new technology that 1) detects real-time cases of Da'esh's recruitment on social media and 2) in an automated fashion, engages and disrupts extremist recruitment and provide information on current and developing technology, as well as advice on opportunities and risks in developing a program to support this new capability. Complete an effort that will address a gap in understanding the strategy and concepts of how to foster effective Counter Unconventional Warfare (UW) in the modern age and inform strategy and concepts focused on how a country prepares itself to conduct resistance against an occupying aggressor and what measures and actions a country can take prior to occupation. Initiate an effort to define the information environment in 2025, outline potential capability gaps, and describe necessary actions in order to gain and maintain information dominance. In addition, this effort will explore information-related capabilities of defense agencies, emerging technologies, and will recommend implementation considerations based on current budget concerns. Initiate development of a capability to simultaneously engage populations across numerous modalities such as social media, web, voice, SMS, MMS, and paper-to-digital, in order to reach disconnected populations around the					

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
globe. This effort will enable wide-scale two-way communications in a variety of geopolitical environments, to include those areas with and without internet connectivity. Initiate a Remote Advise and Assist (RAA) project to examine conditions that would lead to successful RAA operations in a full spectrum environment and then develop and field advanced RAA prototypes in order to test the ability of advisors to continue mentoring partners remotely and be able to significantly enhance time with their partners when physical access is severely restricted. Initiate the development of a database containing relevant foreign criminal statutes/regulations translated into English and searchable against identified behaviors/activities to compare relevant foreign criminal statutes/regulations as well as the willingness/capability of partner nations to take action against identified threat networks and help operationalize law as another non-kinetic tool for commanders. Initiate the development of a tool to support decision makers managing digital operations with predictive advice as to how people will respond to a choice of different types of interventions and improved decision making not only for planning purposes but also for the development of capability underpinned by a behavioral science evidence base. Initiate an effort to manage, develop, enhance, integrate, test, deploy, and maintain a SUNet enterprise system that allows users the ability to detect, monitor, understand, and act in the information environment through mission specific enclaves (partitioned mission or function information cells).					
FY 2018 Base Plans: Complete the development and test of an exportable IO capability that legitimate governments' can use to counter violent extremist messaging. Conduct testing and evaluation by delivering training and periodic evaluation through the use of mobile advise and assist training teams. Upon completion, the U.S. Government (USG) will have an exportable IO model that can be used in select partner nations. Complete an effort to define the information environment in 2025, outline potential capability gaps, and describe necessary actions in order to gain and maintain information dominance. In addition, this effort will explore information-related capabilities of defense agencies, emerging technologies, and will recommend implementation considerations based on current budget concerns to help prepare the USG for evolving challenges in hybrid-warfare. Complete development of a capability to simultaneously engage populations across numerous modalities such as social media, web, voice, SMS, MMS, and paper-to-digital, in order to reach disconnected populations around the globe. This effort will enable wide-scale two-way communications in a variety of geopolitical environments, to include those areas with and without internet connectivity. Continue a RAA project to examine conditions that would lead to successful RAA operations in a full spectrum environment and then develop and field advanced RAA prototypes in order to test the ability of advisors to continue mentoring partners remotely and, be able to significantly enhance time with their partners when physical access is severely restricted. Continue the development of a database containing relevant foreign criminal statutes/regulations translated into English and searchable against identified behaviors/					

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
activities to compare relevant foreign criminal statutes/regulations as well as the willingness/capability of partner nations to take action against identified threat networks and operationalize law as another non-kinetic tool for commanders. Continue the development of a tool to support decision makers managing digital operations with predictive advice as to how people will respond to a choice of different types of interventions and improve decision making not only for planning purposes but also for the development of capability underpinned by a behavioral science evidence base. Continue an effort to manage, develop, enhance, integrate, test, deploy, and maintain a SUNet enterprise system that allows the user the ability to detect, monitor, understand, and act in the information environment through mission specific enclaves (partitioned mission or function information cells). Initiate new efforts to develop and deploy capabilities that support DoD, interagency and foreign partners and allies who are confronting ever evolving threat networks and complex global operational environments.					
Title: PERSONNEL PROTECTION ***Description:*** The Personnel Protection Subgroup's objective is to develop new equipment, reference tools, and standards to improve the protection of personnel. Projects focus on putting innovative tools such as automated information management systems, communication devices, tagging, tracking and locating devices, mobile surveillance systems, as well as personal and vehicle protection equipment in the hands of personnel. ***FY 2016 Accomplishments:*** Completed development of a tethered aerial platform for enhanced situational awareness and communication capabilities. Completed development of a concealable carrier system that, in conjunction with appropriately sized armor plates, will provide rifle threat protection. Completed development of automated exploitation algorithms for light detection and ranging data. Completed development of a miniaturized transmitter device that can accommodate a Tier 1 unmanned aerial vehicle (UAV) to transmit the UAV video feed over the cellular network for enhanced situational awareness. Completed characterization of ballistic clay to understand unconstrained boundary effects of built up regions of ballistic clay backing in armor testing. Continued development of a multi-radio device that combines multiple radios, GSM and Iridium communication capabilities into one device. Continued development of a wireless tactical communications headset. Continued development of counter unmanned aerial vehicle capabilities. Continued development of biomarker identification for brain injury using magnetic resonance imaging (MRI) and magnetic resonance spectroscopy (MRS) to monitor neurochemical biomarkers for post-traumatic stress disorder and mild traumatic brain injury. Continued development of a novel material for ballistic and blast protection that utilizes fiber optics to enable visibility with opaque armor. Continued a performance analysis of environmental, storage, duty, and geographic region parameters on the degradation and life cycle of body armor. Initiated development of an imminent danger notification system that immediately	17.862	8.552	8.626	-	8.626

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
alerts building occupants to a perceived or actual threat. Initiated development of an event pin detection system to mitigate the risk of adversaries, including insider threats, gaining unauthorized access to event sites. Initiated development of an enhanced vehicle tracking system to operate in urban and GPS denied areas. Initiated development of a system to detect magnetically attached explosive devices placed on vehicles and research and provide proof of concepts to detach the devices.					
FY 2017 Plans: Complete development of a wireless tactical communications headset. Complete development of counter unmanned aerial vehicle capabilities. Complete development of biomarker identification for brain injury using magnetic resonance imaging (MRI) and magnetic resonance spectroscopy (MRS) to monitor neurochemical biomarkers for post-traumatic stress disorder and mild traumatic brain injury. Complete development of a novel material for ballistic and blast protection that utilizes fiber optics to enable visibility with opaque armor. Complete a performance analysis of environmental, storage, duty, and geographic region parameters on the degradation and life cycle of body armor. Complete development of an imminent danger notification system that immediately alerts building occupants to a perceived or actual threat. Complete development of an event pin detection system to mitigate the risk of adversaries, including insider threats, gaining unauthorized access to event sites. Complete development of an enhanced vehicle tracking system to operate in urban and GPS denied areas. Complete development of a multi-radio device that combines multiple radios, GSM and Iridium communication capabilities into one device. Continue development of a system to detect magnetically attached explosive devices placed on vehicles and research and provide proof of concepts to detach the devices. Initiate and complete development of a small lightweight wearable device that securely transmits biometric and geolocation data to a common operating picture. Initiate development of a multifunctional head protection system that provides ballistic protection, and incorporates communication and data display capabilities. Initiate development of a standalone personal armor plated for high power, armor piercing projectile threats using advanced materials. Initiate development of a helmet system to protect against common high power rifle projectile threats. Initiate development of a test apparatus that serves to measure dynamic and static events during and after the course of a ballistic impact. Initiate development of a female body armor ballistic validation protocol through the development of a female backing system and female armor test protocol to ensure female body armor performs to the same standards as male body armor. Initiate development of a mobile sensor suite that can detect subsonic and supersonic rounds that are fired at a convoy and display it on a real time map to provide situational awareness to the operator. Initiate development of appropriately sized armor plates for use in a concealable carrier system to provide rifle threat protection.					
FY 2018 Base Plans:					

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Complete development of a system to detect magnetically attached explosive devices placed on vehicles and research and provide proof of concepts to detach the devices. Complete development of a stand standalone personal armor plated for high power, armor piercing projectile threats using advanced materials. Complete development of a helmet system to protect against common high power rifle projectile threats. Complete development of a mobile sensor suite that can detect subsonic and supersonic rounds that are fired at a convoy and display the round's origin, heading and range on a real time map to provide situational awareness to the operator. Complete development of appropriately sized armor plates for use in a concealable carrier system to provide rifle threat protection. Continue development of a multifunctional head protection system that provides ballistic protection, and incorporates communication and data display capabilities. Continue development of a test apparatus that serves to measure dynamic and static events during and after the course of a ballistic impact. Continue development of a female body armor ballistic validation protocol through the development of a female backing system and female armor test protocol to ensure female body armor performs to the same standards as male body armor. Initiate development of a wearable sensor that provides heart rate, body temperature, pulse oximetry, respiration, and GPS location. Initiate development of standalone armor plates to defeat the 7.62 X 39mm, 124 grain, mild steel core (MSC) projectile. Initiate development of a mechanism to wirelessly charge onboard power supplies for in-flight SUASs at a range of one (Threshold) to three (Objective) kilometers line-of-sight. Initiate development of a robust Electromyography (EMG) sensor system comprised of electrodes, sampling electronics and processing electronics capable of integration into a robotic/human augmentation platform. Initiate development of an air deployable unmanned aerial system that is capable of dashing ahead of the V-22 and providing at least 8.5 minutes of overhead intelligence, surveillance and reconnaissance (ISR) at the landing zone or drop zone prior to the force arrival. Initiate development of an updated Armored Passenger Vehicle (APV) Handbook with regards to the current management of government APV programs.					
Title: PHYSICAL SECURITY	43.583	7.155	7.732	25.000	32.732
Description: Rapidly develop and transition physical security/force protection capabilities and technologies to support forward deployed and domestic first responders, military, interagency, and international partners in the focus areas of Emerging Explosive Threats/Blast Effects and Mitigation; Maritime Security; Screening, Observation, Detection, and Protection; and, Subterranean Activities. Emphasize these technology development efforts primarily at U.S. embassies and consulates, forward operating bases, along the U.S. borders, at mass transportation and commerce nodes, in maritime port and littoral environments, and in support of large scale public venues.					
FY 2016 Accomplishments:					

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Completed development of a modular air-droppable force protection kit that includes mini-radar, trip wire sensor and electro-optical/IR camera sensor. Completed development of a software tool for an understanding of TNT equivalency that will provide operational forces necessary information for protecting personnel and infrastructure. Completed development of a rapidly deployable, temporary barrier system to protect fixed and expeditionary facilities in response to increased threat levels. Completed development of a high performance towed sled to provide increased payload and deployment options for existing combatant craft used by Naval Special Warfare (NSW). Completed development of US Navy life cycle cost benefit analysis by conducting intermediate system integration and environmental testing of the HALO Maritime Barrier System. Completed a joint test and evaluation of a portable system that can be used to quickly block target entrances/exits as well as doorways. Completed development of tactical arresting systems designed to stop vehicles over a short distance. Continued development of forced-entry, ballistic and blast resistant doors to support US facilities abroad. Continued development of an automatic target recognition system for on-the-move, standoff IED detection. Continued development of an Advanced Diver Data Display System final prototype for combat swimmers. Continued development of an advanced active diver thermal protection system for long exposure dives. Continued development and upgrade of a tactical compact aerostat surveillance system for ground and maritime intelligence, surveillance and reconnaissance, as well as communication between non-line-of-sight (NLOS) forces. Continued development of decision aids for first responders and military engineers by testing explosives effects in an urban environment, to include Historic Masonry and frangible front structures. Continued development of an in-tunnel unmanned aerial vehicle (UAV) that will provide the ability to safely conduct reconnaissance of discovered illicit tunnels and/or scheduled inspections of underground municipal infrastructures (UMIs) for evidence of interconnecting tunnel activity. Continued test program to determine the smallest booster size needed to initiate a detonation of Ammonium Nitrate Prill in shipping configuration. Continued development of materials and mechanisms for tactical delivery of novel non-lethal solutions for maritime vessel disablement. Continued development of a mobile application to enhance and host the Vehicle Explosion Analysis Software. Continued to test, characterize and model a novel propane tank Vehicle Borne Improvised Explosive Device (VBIED) threat. Continued development of a portable and ruggedized body scanner for personnel protection missions based on the existing automated identification technology (AIT) stationary body scanner system. Continued development and evaluation of two versions of a unique geophysical mapping capability. Continued development of a prototype communications system for special missions in specified environments. Continued development and evaluation of a scanning system which will be able to maneuver independently inside specified geophysical target areas and provide situational awareness. Continued development of a system for mapping particular geophysical phenomena. Continued development of a joint multi-disciplinary geophysical survey kit, comprised of distinct tools. Continued development of a system					

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
for detection of unique geophysical phenomena and testing and evaluation of the prototypes' performance in representative sites. Continued the design and characterization of a test site for testing emerging technologies for unique operational missions. Continued testing and evaluating the integration of proven land-based sensors into a novel platform for the purpose of conducting advanced geophysical surveys. Initiated development of a surveillance system with automated 360-degree long range scanning capability (optical radar) to protect the force in tactical combat outposts. Initiated development of a set of guidelines and certifications that can be used by public, private, academic, and government entities to support the qualification of engineers and architects capable of characterizing and mitigating explosive effects. Initiated testing on localized responses from facades to quantify the effects of responding components on blast propagation through a new series of controlled explosive tests. Initiated development of a mobile system for stand-off detection and mapping of specified geophysical phenomena. Initiated development and integration of an extended coverage system for novel border protection applications and test and evaluate the integrated system in different terrain/geophysical conditions. Initiated adaptation of existing sensors to detect underground geophysical phenomena from the surface.					
FY 2017 Plans: Complete development of forced-entry, ballistic and blast resistant doors to support US facilities abroad. Complete development of an automatic target recognition system for on-the-move, standoff IED detection. Complete development of an Advanced Diver Data Display System final prototype for combat swimmers. Complete development and upgrade of a tactical compact aerostat surveillance system for ground and maritime intelligence, surveillance and reconnaissance, as well as communication between non-line-of-sight (NLOS) forces. Complete development of an in-tunnel unmanned aerial vehicle (UAV) that will provide the ability to safely conduct reconnaissance of discovered illicit tunnels and/or scheduled inspections of underground municipal infrastructures (UMIs) for evidence of interconnecting tunnel activity. Complete development of a surveillance system with automated 360-degree long range scanning capability (optical radar) to protect the force in tactical combat outposts. Complete test program to determine the smallest booster size needed to initiate detonation of Ammonium Nitrate Prill in shipping configuration. Complete development of materials and mechanisms for tactical delivery of novel non-lethal solutions for maritime vessel disablement. Complete development of a mobile application to enhance and host the Vehicle Explosion Analysis Software. Complete testing, characterization and modeling of a novel propane tank Vehicle Borne Improvised Explosive Device (VBIED) threat. Complete development of a portable and ruggedized body scanner for personnel protection missions based on the existing AIT stationary body scanner system. Complete development of a system for mapping particular geophysical phenomena. Complete development and evaluation of a scanning system					

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
which will be able to maneuver independently inside specified geophysical target areas and provide situational awareness. Complete development of a joint multi-disciplinary geophysical survey kit, comprised of distinct tools. Complete development of a system for detection of unique geophysical phenomena, and testing and evaluation of the prototypes' performance in representative sites. Complete the design and characterization of a test site for testing emerging technologies for unique operational missions. Continue development of an advanced active diver thermal protection system for long exposure dives. Continue development of decision aids for first responders and military engineers by testing explosives effects in an urban environment, to include Historic Masonry and frangible front structures. Continue testing on localized responses from facades to quantify the effects of responding components on blast propagation through a new series of controlled explosive tests. Continue development and evaluation of two versions of a unique geophysical mapping capability. Continue development of a prototype communications system for special missions in specified environments. Continue testing and evaluating the integration of proven land-based sensors into a novel platform for the purpose of conducting advanced geophysical surveys. Continue development of a set of guidelines and certifications that can be used by public, private, academic, and government entities to support the qualification of engineers and architects capable of characterizing and mitigating explosive effects. Continue development of a mobile system for stand-off detection and mapping of specified geophysical phenomena. Continue development and integration of an extended coverage system for novel border protection applications and test and evaluate the integrated system in different terrain/geophysical conditions. Continue development of a prototype system and concept of operations to detect a particular geophysical phenomenon. Initiate development of improved, cost-effective High Power Radio Frequency (HPRF) sources for nonlethal vessel and vehicle stopping that achieve militarily useful effective ranges against fast moving targets. Initiate development of a fast-running ultra-high performance concrete slab model, WAC-U, and improve tools for design, protective use, and vulnerability assessments. Initiate development of a set of handcuffs that are able to withstand specific physical defeat techniques employed by a detained individual or individuals without the appropriate key, while maintaining the basic design and functionality of currently used handcuffs. Initiate development of a software tool associated with a comprehensive evaluation of horizontal directional drilling (HDD) equipment that can be used to focus intelligence collection and threat assessments. Initiate development of a Compact Wireless Surveillance System to safely conduct ground reconnaissance within specific geophysical environments with limited access points. Initiate development of a remote activation device for tactical arresting systems designed to stop vehicles over a short distance. Initiate the testing and evaluation of the use of binary explosives for unique applications in specific environments.					
FY 2018 Base Plans:					

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Complete development of an advanced active diver thermal protection system for long exposure dives. Complete development of a fast-running ultra-high performance concrete slab model, WAC-U, and improve tools for design, protective use, and vulnerability assessments. Complete testing on localized responses from facades to quantify the effects of responding components on blast propagation through a new series of controlled explosive tests. Complete development and evaluation of two versions of a unique geophysical mapping capability. Complete development of a prototype communications system for special missions in specified environments. Complete testing and evaluating the integration of proven land-based sensors into a novel platform for the purpose of conducting advanced geophysical surveys. Complete development of a set of guidelines and certifications that can be used by public, private, academic, and government entities to support the qualification of engineers and architects capable of characterizing and mitigating explosive effects. Complete development of a mobile system for stand-off detection and mapping of specified geophysical phenomena. Complete development and integration of an extended coverage system for novel border protection applications and test and evaluate the integrated system in different terrain/geophysical conditions. Complete development of a prototype system and concept of operations based on a particular geophysical phenomenon. Complete development of a set of handcuffs that are able to withstand specific physical defeat techniques employed by a detained individual or individuals without the appropriate key, while maintaining the basic design and functionality of currently used handcuffs. Complete development of a software tool associated with a comprehensive evaluation of horizontal directional drilling (HDD) equipment that can be used to focus intelligence collection and threat assessments. Complete development of a remote activation device for tactical arresting systems designed to stop vehicles over a short distance. Complete the testing and evaluation of the use of binary explosives for unique applications in specific environments. Continue development of decision aids for first responders and military engineers by testing explosives effects in an urban environment, to include Historic Masonry and frangible front structures. Continue development of improved, cost-effective High Power Radio Frequency (HPRF) sources for nonlethal vessel and vehicle stopping that achieve militarily useful effective ranges against fast moving targets. Continue development of a Compact Wireless Surveillance System to safely conduct ground reconnaissance within specific geophysical environments with limited access points. Initiate development of a roller door that is forced-entry (FE) resistant and capable of meeting the State Department 15-Minute FE performance criteria. Initiate development of an in-depth guide of best practices for rescuing tunnel collapse victims inside OSHA-compliant and non-compliant tunnels to enhance survivability. Initiate development of a novel ship-to-shore fuel transport system in an amphibious towable container that mitigates risk to personnel and fuel loss in the event of an attack. Initiate development of additional capability for existing					

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Incident Management Preparedness and Coordination Toolkit (IMPACT) software to provide additional flexibility in generating robust and comprehensive site surveys for security planners and first responders. ***FY 2018 OCO Plans:*** Program enhancements would expand new, and accelerate promising rapid RDT&E counter tunnel efforts to support current and emerging requirements articulated in the existing JEON, CBA, and Interagency requirements, while specifically leveraging our most technologically relevant and operational experienced partner through our joint CTTSO/Israel project work. The U.S./Israel FY18 efforts will primarily focus on the following four (4) lines of effort: 1) Operational Evaluation of Technologies: A capability that was already proven in terms of technology. Example: A lab demonstrator was built and a technology demonstrator is required in order to use in the field. 2) Enhanced Feasibility Study: The process in which a new concept or technological idea has to be demonstrated. At the end of the study, there will be some (limited) capability to operate the concept in the field (probably by experts) in the CENTCOM AOR. 3) Test site: Northern tunnel test site phased expansion to conduct- for U.S. and Israel to test emerging counter tunnel technologies. 4) Advanced R&D: Develop tactical and operational level technologies in support of DoD maneuver forces.					
Title: SURVEILLANCE, COLLECTION AND OPERATIONS SUPPORT ***Description:*** Identify high-priority user requirements and special technology initiatives focused primarily on countering terrorism through offensive operations. Enhance US intelligence capabilities to conduct retaliatory or preemptive operations and reduce the capabilities and support available to terrorists. ***FY 2016 Accomplishments:*** Supported the development and testing of an advanced Unmanned Aircraft System (UAS) environmental and functional system test capability to improve assessment of flight worthiness, test functionality and certify subsystems. Completed development of multimedia, exploitation human language technology tools for required languages and for insertion into operational settings to better combat ISIL. Completed development of customized force tracking capabilities to combat ISIL into existing fielded technologies and transition existing systems and tools. Completed integration of public databases into a single user interface application to protect privacy and personal information from ISIL operatives. Completed development of enhanced technology to assist analysts with biometric intelligence and reporting on ISIL personnel. Initiated the development of enhanced capabilities to facilitate Computer Network Operations against ISIL. Completed deployment of field technical surveillance capabilities against ISIL and enhanced custom force tagging, tracking and locating	13.233	10.651	10.148	-	10.148

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
capabilities. Completed the development of a software application capable of collecting performance and biographical data for selection and assignment of military personnel, complex modeling, and demand forecasting to assign the appropriate personnel to combat ISIL. Initiated the development of convergence solutions to support sustained operations by deployed elements combating ISIL through enhanced layered capabilities. Initiated the development of non-standard and specialized communications capabilities to combat ISIL and other highly technical adversaries. ***FY 2017 Plans:*** Continuing development and integration of Unmanned Aircraft Systems (UAS) and subsystems to improve the effectiveness and efficiency of communication relays to counter ISIL. Initiating new capabilities focused on Human Language Technology and multimedia exploitation in critical languages for operational use against ISIL at the strategic and tactical levels. Continuing development of enhanced capabilities to facilitate Computer Network Operations against ISIL. Continuing development of enhanced capabilities against vehicular signals of interest to counter ISIL. Continuing deployment of field technical surveillance capabilities against ISIL and enhanced custom force tagging, tracking and locating capabilities. Continuing the development of convergence solutions to support sustained operations by deployed elements combating ISIL through enhanced layered capabilities. Continuing the development of non-standard and specialized communications capabilities to combat ISIL and other highly technical adversaries. Initiate development of unique biometric capabilities to target ISIL. ***FY 2018 Base Plans:*** Complete development and integration of Unmanned Aircraft Systems (UAS) and subsystems to improve the effectiveness and efficiency of communication relays to counter ISIL. Continue new capabilities focused on Human Language Technology and multimedia exploitation in critical languages for operational use against ISIL at the strategic and tactical levels. Continue development of enhanced capabilities to facilitate Computer Network Operations against ISIL. Continue development of enhanced capabilities against vehicular signals of interest to counter ISIL. Continue deployment of field technical surveillance capabilities against ISIL and enhance custom force tagging, tracking and locating capabilities. Continue the development of convergence solutions to support sustained operations by deployed elements combating ISIL through enhanced layered capabilities. Continue the development of non-standard and specialized communications capabilities to combat ISIL and other highly technical adversaries. Continue development of unique biometric capabilities to target ISIL.					
Title: TACTICAL OPERATIONS SUPPORT	16.164	10.353	9.610	-	9.610

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
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C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total

Description: The Tactical Operations Support subgroup's mission is to execute rapid research and development projects that enhance capabilities of DoD and Interagency special operations tactical teams engaged in finding, fixing, and finishing terrorists. This includes support to state and local law enforcement agencies to combat domestic terrorism. The development focus is enabling small tactical units of dominance by providing state of the art overmatch capabilities in: Offensive Systems; Unconventional Warfare, Counter-Insurgency Support; Tactical Communications; Tactical Reconnaissance, Surveillance, and Target Acquisition Systems; Specialized Infiltration, Access and Exfiltration Systems; Survivability Systems.

FY 2016 Accomplishments:
Completed development and delivery of a sniper ballistic and downwind sensor system to increase first round hit capability. Completed development and delivery of a high-definition aerial Intelligence, Surveillance, and Reconnaissance (ISR) gimbal payload for specified air platforms that will enhance situational awareness and intelligence through higher fidelity imaging capabilities. Completed development and delivery of a man-portable aerial radar system that can detect unmanned aerial vehicles and ultralights at the tactical edge. Completed development and delivery of a tactical tethered aerial ISR capability via an indigenous, non-standard mobility platform that provides austere locations with rapid and improved organic situational awareness. Completed and delivered an air mobility vehicle analysis of alternatives and demonstration initiative to conduct training and an operational feasibility assessment for unconventional warfare. Completed development and delivery of a portable tactical micro marker system to enhance personnel recovery operations. Completed a test and evaluation of a new ground mobility vehicle for Special Operations Forces (SOF) that increases survivability and provides signature reduction. Completed development and delivery of an underwater vision enhancement device for ship hull inspections in turbid water and for maritime to land operations. Completed development and delivery of a mobile mesh network repeater system to expand the capabilities of the micro tactical ground robot system in subterranean environments. Completed development and delivery of a next generation small arms signature reduction suppressors for the MK18 CQBR and M4. Completed development and delivery of a lightweight intermediate caliber cartridge utilizing polymer material technologies to reduce combat load and enhance terminal ballistics. Completed development and delivery of a 5.56mm polymer round to reduce weight for standard issue rounds, enhancing combat effectiveness and reducing warfighter operational load and cost. Completed development and delivery of an enhanced military free fall navigation board that incorporates Android applications for greater command and control and mission planning/execution. Completed development and delivery of a Multi-Role Thermal Survivability System (MRTSS) to support tactical operators conducting aviation, ground mobility, and first responder combating terrorism (CbT) missions. Completed development,

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
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C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
delivery, and evaluation of a social media analysis tool for tactical operators. Completed development and delivery of a system that attaches to a smartphone that enables tactical operators to measure areas rapidly to gain a 3D model. Continued development and delivery of an acoustic tooth communicator system for low-visibility operations. Continued development and delivery of microSD chips that provide state-of-the-art high computing at very low power that can create dual personas, enabling secure communication on a smartphone device. Completed RDT&E and provided a prototype that will inform the future development of a solution for a man-portable optical camera system capable of being deployed in complex urban confined spaces, traversing 90 degree corners and obstacles to provide high fidelity situational awareness to law enforcement and SOF tactical teams. Continued development and delivery of a non-pyrotechnic diversionary device that will mitigate collateral damage in confined spaces. Continued development of a multispectral augmented visually enhanced reality imaging capability that provides a significant advantage for long range target acquisition in challenging environments. Continued development of a maritime canister launched small unmanned aerial system for amphibious and maritime operations requiring overhead aerial ISR capabilities. Continued development of a lethal miniature aerial munition system (LMAMS) with substantially improved maneuverability, attack angle, loiter time, and lethality with a full mission profile flight training variant. Continued development and delivery of an unclassified, open source digital operations technical course tailored to train tactical operators in a digital dojo environment to understand the cyber domain and to identify and mitigate cyber threats. Continued development and delivery of a tactical level training course that teaches enhanced operational preparation of the environment and force protection within the digital social media publically accessible information domain to execute 21st Century Special Warfare mission sets. Continued development of a next-generation small unmanned aircraft system stabilized gimbal that integrates laser target designation technologies. Initiated development of a state-of-the-art amplified speaker unit to work with a number of military and commercial radio devices. Initiated development of an increased field of view night vision device for Special Operations Forces (SOF). Initiated development of capabilities for next generation specialized access breaching capabilities involving explosives and hand-held devices. Initiated development of a capability to self-geolocate without causing an RF signature and without relying on GPS capabilities. Initiated development of a next generation Lightweight Medium Machine Gun (MMG) and ammunition to give operators a distinct advantage in both the extended and close-in fight and can transition rapidly from mounted operations to dismounted operations. Initiated development of a modular multi-ability rapidly reconfigurable hand launched small unmanned aircraft system with a common controller that is capable of being re-configured in the field for mission specific tasks. Initiated development of a night vision device with Israel that increases the capability of a tactical operator working in a subterranean environment. Initiated development of a night vision device for US operators only that increases the capability of working in a					

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
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C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
subterranean environment. Initiate development of a 7.62x51mm Subsonic round optimized to address powder sensitivity issues in order to improve consistency, range, and accuracy.					
FY 2017 Plans: Complete development and delivery of an acoustic tooth communicator system for low-visibility operations. Complete development and delivery of a tactical communications capability that provides small tactical teams the ability to utilize cutting edge software applications and smartphone hardware over an untrusted host-nation cellular/internet infrastructure that also includes integration with the Android Tactical Assault Kit (ATAK) and secure forward operational logistics. Complete development and delivery of a non-pyrotechnic diversionary device that will mitigate collateral damage in confined spaces. Complete development and delivery of a multispectral augmented visually enhanced reality imaging capability that provides a significant advantage for long range target acquisition in challenging environments. Complete development and delivery of a maritime canister launched small unmanned aerial system for amphibious and maritime operations requiring overhead aerial ISR capabilities. Complete development and delivery of a lethal miniature aerial munition system (LMAMS) with substantially improved maneuverability, attack angle, loiter time, and lethality with a full mission profile flight training variant. Complete development and delivery of an unclassified, open source digital operations technical course tailored to train tactical operators in a digital dojo environment to understand the cyber domain and to identify and mitigate cyber threats, while also providing tactical operators the ability to conduct sustainment training on a digital sandbox range. Complete development and delivery of a tactical level training course that teaches operationally relevant capabilities to execute digital force protection and operational security for Publically Available Information (PAI). Complete development and delivery of a next-generation small unmanned aircraft system stabilized gimbal that integrates laser target designation technologies. Complete development of a state-of-the-art amplified transceiver speaker unit to work with a number of military and commercial radio devices. Complete development of an increased field of view night vision device for Special Operations Forces (SOF). Continue development and delivery of capabilities for next generation specialized access breaching capabilities involving explosives and hand-held devices. Complete development of a capability to self-geolocate without causing an RF signature and without relying on GPS capabilities. Continue development of a next generation Lightweight Medium Machine Gun (MMG) and polymer .338 Norma Magnum ammunition to give operators a distinct advantage in both the extended and close-in fight and be able to transition rapidly from mounted operations to dismounted operations. Continue development and delivery of a modular multi-ability rapidly reconfigurable hand launched small unmanned aircraft system with a common controller that is capable of being re-configured in the field for mission specific tasks. Complete development of a 7.62x51mm Subsonic round optimized to address powder sensitivity issues in order to improve consistency, range, and					

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603122D8Z / *Combating Terrorism Technology Support*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
accuracy. Initiate development of an Air to Surface Employment Kit (A2SEEK), for the already developed Micro Weather Sensor (MWS), to be packaged into a complete system that will be air dropped out of military aircraft to support operators and C2 elements to receive sensed weather elements and formulate aviation reports in deep battlespace or denied areas. Initiate development of an augmented reality navigation system capability that fuses and overlays a tablet camera's live footage, navigation instructions, and targeting information for an operator to utilize while operating a vehicle. Initiate development of a man-portable (dismounted/static) and on-the-move (vehicle mounted) anti-drone system kit that is capable of detection, tracking, identification, and defeating a small Unmanned Aircraft System (sUAS). ***FY 2018 Base Plans:*** Complete development and delivery of capabilities for next generation specialized access breaching capabilities involving explosives and hand-held devices. Complete development of a next generation Lightweight Medium Machine Gun (MMG) and polymer .338 Norma Magnum ammunition to give operators a distinct advantage in both the extended and close-in fight and be able to transition rapidly from mounted operations to dismounted operations. Complete development and delivery of a modular multi-ability rapidly reconfigurable hand launched small unmanned aircraft system with a common controller that is capable of being re-configured in the field for mission specific tasks. Complete development of an Air to Surface Employment Kit (A2SEEK), for the already developed Micro Weather Sensor (MWS), to be packaged into a complete system that will be air dropped out of military aircraft to support operators and C2 elements to receive sensed weather elements and formulate aviation reports in deep battlespace or denied areas. Complete development of an augmented reality navigation system capability that fuses and overlays a tablet camera's live footage, navigation instructions, and targeting information for an operator to utilize while operating a vehicle. Continue development of a man-portable (dismounted/static) and on-the-move (vehicle mounted) anti-drone system kit that is capable of detection, tracking, identification, and defeating a small Unmanned Aircraft System (sUAS).					
Title: TRAINING TECHNOLOGY DEVELOPMENT ***Description:*** The TTD Subgroup's objective is to provide SOF, DoD, and the interagency community with agile, rapid response, R&D capabilities for optimizing performance in the operational environment and increasing readiness for tomorrow's threats. To meet this objective, the subgroup develops human centered technologies that are performance outcome focused in the areas of mobile learning solutions; human performance tools and techniques; immersive and adaptive learning environments; and advanced education and technical skill enhancement methods. TTD's innovative training capabilities are implemented globally to prepare for critical missions in any operational environment to identify, disrupt, and defeat terrorist threats.	7.364	6.161	5.837	-	5.837

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
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C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
FY 2016 Accomplishments: Completed development, implementation, and evaluation of a low visibility technology and training solution to enhance operator's capabilities for illuminating improvised explosive device networks in the maritime and littoral environment. Completed evaluation of a live-fire targetry simulation training system to develop and maintain long range shooting skill sets. Completed development and evaluation of a training and performance support tool for secure use of mobile devices in operational environments. Completed the analysis and development of a suite of augmented reality tools for mobile wearable platforms. Completed development of software models and a mobile application to train features and functions of over 25 foreign and SOF-Peculiar weapons. Completed the evaluation of a reactive shooter course incorporating wearable device human performance measures and training simulation. Completed an evaluation of tools and techniques used by Special Operations personnel to optimize and maintain their cognitive performance through a comprehensive literature review and controlled study. Completed testing of neurocognitive tasks that will measure deficiencies in neurophysiological function such as attention, memory, time estimation, response inhibition, and non-verbal reasoning to inform the development of a mobile training platform for optimizing and maintaining cognitive skills in the field. Continued the development of low-cost robotic targets that move autonomously on a live-fire training range to enhance marksmanship skills and decision making. Continued the development of a multi-week special warfare commercial communications course. Initiated the design and development of task force officer verification and refresher training for delivery on a mobile device. Initiated the implementation, evaluation, and refinement of a program and next generation technology designed to enhance visual acuity and improve operational visual task performance. Initiated the development of a virtual reality part task trainer for pre-mission tasks associated with AC-130 operations.					
FY 2017 Plans: Complete the development and delivery of four low-cost robotic targets that move autonomously on a live-fire training range to enhance marksmanship skills and decision making. Complete the development and evaluation of a multi-week special warfare commercial communications course. Complete the design and development of Task Force Officer verification and refresher training for delivery on a mobile device. Complete the implementation, evaluation, and refinement of a program and next generation technology designed to enhance visual acuity and improve operational visual task performance. Complete the design and development of training software for officers to accomplish immersive use of force decision-making training from a desktop computer or tablet. Continue the development of a virtual reality part task trainer for pre-mission tasks associated with AC-130 operations. Initiate the development of a virtual reality simulated city environment where students will be immersed into realistic training scenarios, such as surveillance, with representative quantities					

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
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C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
and behaviors of non-player characters including people and vehicles. Initiate the design and development of Remotely Operated Vehicle (ROV) training simulator incorporating the use of the ROV's cameras, sonar, and navigation software. Initiate the development and evaluation of an automated capability to diagnose shooter performance and problems based on data from an iron sight camera, trigger force sensors, hand grip pressure sensors, and an accelerometer. Initiate the development of a system for snipers to enhance marksmanship skills and receive ballistically accurate feedback in a role-player training environment where live-fire is not available or feasible. ***FY 2018 Base Plans:*** Complete the development and evaluation of a virtual reality training part task trainer for pre-mission tasks associated with AC-130 operations. Complete the development of a virtual reality simulated city environment where students will be immersed into realistic training scenarios, such as surveillance, with representative quantities and behaviors of non-player characters (NPCs) including people and vehicles. Complete the development of a Remotely Operated Vehicle (ROV) training simulator incorporating the use of the ROV's cameras, sonar, and navigation software. Complete the development and evaluation of an automated capability to diagnose shooter performance and problems based on data from an iron sight camera, trigger force sensors, hand grip pressure sensors, and an accelerometer. Continue the development and evaluation of a system for snipers to enhance marksmanship skills and receive ballistically accurate feedback in a role-player training environment where live-fire is not available or feasible.					
Accomplishments/Planned Programs Subtotals	146.115	73.002	76.230	25.000	101.230

D. Other Program Funding Summary ($ in Millions)

N/A

Remarks

N/A

E. Acquisition Strategy

N/A

F. Performance Metrics

N/A

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603133D8Z / *Foreign Comparative Testing*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	21.128	24.406	19.343	24.199	-	24.199	24.910	25.570	26.092	26.632	Continuing	Continuing
P313: *Foreign Comparative Testing*	21.128	24.406	19.343	24.199	-	24.199	24.910	25.570	26.092	26.632	Continuing	Continuing

Note

The Foreign Comparative Testing (FCT) Program Element (PE) 0603133D8Z focuses on Pre-Engineering and Manufacturing Development (Pre-EMD) and Proof of Principle prototypes derived from evaluation of foreign equipment that will provide the U.S. Armed Services, U.S. Special Operations Command (USSOCOM), and Defense agencies capabilities to counter emerging threats. FCT's broad reach across our allies and friendly foreign countries enables development of innovative, cost effective, and interoperable solutions for the Department of Defense (DoD), Multi-Service and Combatant Command (CCMD) priority requirements. FCT also increases competition, ensuring our personnel have access to the best technology available.

A. Mission Description and Budget Item Justification

The FCT program supports the warfighter by leveraging technologies and equipment developed by allied nations and coalition partners to counter emerging threats, thereby accelerating the DoD acquisition process and lowering development costs. FCT supports DoD best practices by incentivizing the use of prototyping and experimentation in advancing technological solutions to warfighter problems and acts as a hedge against threat developments. FCT enhances interoperability, facilitates international collaboration, increases competition in innovation, and enables more efficient and affordable transition of technologies into acquisition programs of record. Authorized by Title 10, U.S. Code, Section 2350a (g), the FCT program is managed by the Office of Secretary of Defense (OSD) Deputy Assistant Secretary of Defense Emerging Capability & Prototyping (DASD(EC&P)), Comparative Technology Office (CTO). FCT projects are sponsored by the Military Services and USSOCOM. Evaluation processes for project selection include a detailed review to confirm the proposed item addresses valid requirements and DoD priorities, a thorough market survey, and an emphasis on transitioning technologies into current or future programs of record.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
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B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	24.782	19.343	24.387	-	24.387
Current President's Budget	24.406	19.343	24.199	-	24.199
Total Adjustments	-0.376	0.000	-0.188	-	-0.188
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.376	-			
• Baseline adjustment for higher priorities and requirements	-	-	-0.188	-	-0.188

Change Summary Explanation

The FY 2017 to FY 2018 profile increase reflects funding for Department priorities supporting DoD best practices objectives to promote effective competition by improving DoD outreach for technology and products from global markets through risk reducing prototypes.

The FY 2018 baseline decrease of -$0.188 million reflects adjustments for higher DoD priorities.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603133D8Z / *Foreign Comparative Testing*	Project (Number/Name) P313 / *Foreign Comparative Testing*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P313: *Foreign Comparative Testing*	21.128	24.406	19.343	24.199	-	24.199	24.910	25.570	26.092	26.632	Continuing	Continuing

A. Mission Description and Budget Item Justification

The FCT program supports the warfighter by leveraging technologies and equipment from allied nations and coalition partners to counter emerging threats, thereby accelerating the DoD acquisition process and lowering development costs. FCT supports Better Buying Power 3.0 by incentivizing the use of prototyping and experimentation in advancing technological solutions to warfighter problems and acts as a hedge against threat developments. FCT enhances interoperability, facilitates international collaboration, increases competition in innovation, and enables more efficient and affordable transition of technologies into acquisition programs of record. Authorized by Title 10, U.S. Code, Section 2350a (g), the FCT program is managed by the Office of Secretary of Defense (OSD) Deputy Assistant Secretary of Defense Emerging Capability & Prototyping (DASD(EC&P)), Comparative Technology Office (CTO). FCT projects are sponsored by the DoD Services and USSOCOM. Evaluation processes for project selection include a detailed review to confirm the proposed item addresses valid requirements and DoD priorities, a thorough market survey, and an emphasis on transitioning technologies into current or future programs of record.

The FCT program is a catalyst for teaming and other business relationships between foreign and U.S. industries. Many successful FCT projects result in the licensed production of a qualified foreign item in the United States. Other nations recognize the long-term value of such practices for competing in the U.S. Defense market and the resultant strengthening of the "two-way street" in Defense procurement. The result often means the creation of jobs and contributions to local economies throughout the United States. To date, companies from 34 states benefited from FCT projects.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Lightweight M3A1 Recoilless Rifle (Army)	1.195	-	-
Description: The M3 Carl Gustaf 84 millimeter (mm) Recoilless Rifle is a reliable, battle-proven, reusable shoulder-fired weapon system first introduced to the Army by FCT in 1991. This M3A1 project will eliminate six pounds (28 percent) from the existing weapon by replacing the existing steel tube with a titanium alloy tube, along with other components (bolt, trigger, venturi, and ancillary parts) without changing the firing procedures, operations or ammunition. Since no operational characteristics will be changed, this low-risk approach will produce a lighter weight 84mm shoulder-fired weapon for less cost and time than normally required to test and qualify a new weapon system.			
FY 2016 Accomplishments: Conducted contractor's reliability test along with an M3A1 trainer and maintenance class to address the operation of the weapon, inspection process, repairs and spare parts. Aberdeen Test Center conducted the qualification testing of the M3A1 test hardware with base-line firings. The manufacturer conducted a tube burst test witnessed by Army Test and Evaluation Command and non-government engineers. FY 2016 funding will continue to be used in FY 2017 to: resolve accuracy issues at 500 meters and complete weapon accuracy testing; conduct air drop testing on the M3A1 at Yuma Proving Ground; receive M3A1 Final			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Safe Service Life from the Army's Benet laboratory; finalize M3A1 joint service test plan and schedule as per the Army Weapon Systems Safety Review Board (AWSSRB); go forward with a Milestone C decision in 3Q FY 2017; and complete close-out report.			
Title: Soldier Power with Inductive Recharge & Intelligent Textiles (SPIRIT) (Army) ***Description:*** The SPIRIT system incorporates e-textiles for power and data distribution, provides "plug-and-play" capability for various Soldier worn systems, and communicates control signals from an end-user-device. The proposed system addresses future capabilities for Small Unit Power Increment II/III as defined by Army Maneuver Center of Excellence for e-textiles and wireless charging as well as requirements for United States Marine Corps (USMC) Marine Enhancement Program. USMC is interested in the technology and will participate in project reviews. Specifically, the e-textile capability will provide the capability to distribute power and data without using cables and be able to wirelessly re-charge an attached battery thus reducing the soldier's load. ***FY 2016 Accomplishments:*** Phase 1 of project completed. Phase 1 consisted of: requests for official quotes from industry; evaluating official quotes; and initiating procurement of hardware for testing. Contract was written and awarded. Test articles were shipped to the contractor for upgrades. ***FY 2017 Plans:*** Phases 2-4 of the project will be completed. Phase 2 testing will consist of: power and data performance evaluation; support integration with current equipment for testing; perform government laboratory testing on an integrated system to inform future requirements and technology development; and mitigate system integration risks not previously identified. Perform Electro-Magnetic Interference testing of prototypes to ensure there is no degradation to nearby communications systems as well as evaluate detectability of the soldier with handheld radios connected to the e-textile vest. Phase 3 will support a Go/No-Go decision by evaluating test data to determine if the hardware is mature enough to warrant evaluation in a field environment. Phase 4 will be a demonstration of prototypes at the OSD Joint Infantry Company – Power event. Write test reports and FCT closeout report.	1.310	0.300	-
Title: Mobile Land Based Anti-Ship Fires (Army) ***Description:*** Integrate existing Norwegian Naval Strike Missile (NSM) and four-pod launcher onto a standard U.S. Army Palletized Load System (PLS) flat rack and demonstrate NSM launch and engagement of an over-the-horizon maritime target. This Heavy Expanded Mobility Tactical Truck (HEMTT) mounted system enables Army and Marine Corps forces to support joint force freedom of movement and action through the projection of power from land into the maritime domain. Currently, there is no mobile, land-based, over-the-horizon anti-ship warfare capability. The goal of this project is to evaluate an asset that might cover this capability gap.	0.300	1.000	1.200

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603133D8Z / *Foreign Comparative Testing*	**Project (Number/Name)** P313 / *Foreign Comparative Testing*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
FY 2016 Accomplishments: Received test articles and specialized testing equipment. Conducted benchmark testing. ***FY 2017 Plans:*** Conduct kickoff meeting to formally plan specific path forward. Negotiate hardware and cost sharing plan with the contractor and establish optimal contract vehicle. Complete Phase 1 Launcher/Pallet integration analysis, Phase 2 Advanced Field Artillery Tactical Data System (AFATDS) Modification/Integration, and Phase 3 AFATDS/Link 16 Integration. ***FY 2018 Plans:*** Demonstrate the system in operational scenarios. Document performance in each scenario. Complete final test report and FCT closeout. If successful, transition the HEMTT mounted NSM as an interim Mobile Land Based Anti-Ship Fires capability while the Army develops an organic capability, currently planned for Long Range Precision Fires Increment 2.			
Title: Integrated Fire Control System for Medium Anti-Armor Weapon Systems (MAAWS) (Army) ***Description:*** The Aimpoint Fire Control System (FCS) consists of an integrated, eye-safe, 1550 nanometer Laser range finder, a ballistic computer with the capability to store up to 50 different ballistic algorithms, and a parallax free optical channel with unlimited eye relief. System automatically compensates for the ballistic drop of projectiles, propellant temperature and terrain angle. A MAAWS equipped with the Aimpoint FCS will provide the warfighter with an enhanced accurate/rapid engagement capability that significantly improves first round probability of hit (day/night) with less collateral damage and increased survivability/ lethality due to improved suppression of enemy forces. ***FY 2016 Accomplishments:*** Received funding, ordered test articles and specialized testing equipment. Conducted test planning. ***FY 2017 Plans:*** Receive test articles and complete upgrade to software in the units to enable them to track moving targets. Complete Phase I (characterization testing): physical & optical characteristics, ballistic compensation and alignment, Laser range finder, power consumption and battery life. Go/no-go decision. ***FY 2018 Plans:*** Complete Phase II: adverse environment, life cycle and performance moving target testing. Go/no-go decision. Complete test report and FCT close-out report. If test is successful, a type classification and full materiel release effort will be pursued for the Army.	0.300	0.675	0.270
Title: E-band Communications (Air Force)	0.875	0.410	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603133D8Z / *Foreign Comparative Testing*	**Project (Number/Name)** P313 / *Foreign Comparative Testing*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Description: Provide increased situational awareness and military effectiveness for the warfighter. This project evaluates an E-band (71-86 gigahertz) radio system's capability to increase communications throughput by an order of magnitude or greater over deployed military systems. ***FY 2016 Accomplishments:*** Received test articles and specialized testing equipment. Conducted benchmark testing. ***FY 2017 Plans:*** Demonstrate the system in operational scenarios such as ground-ground, ship-ship, and ship-shore. Document performance in each scenario. Complete final test report and FCT closeout. If successful, potential for transition to future Air Force 71-86 gigahertz Satellite Communications Programs currently in development or other Service applications.			
Title: Rifle Accessory Control Unit (RACU) (Navy/USMC) ***Description:*** This project will assess and evaluate the capabilities of RACU, a one-handed, on-the-move, intuitive, programmable device that will allow operation of all rifle accessories and communication equipment through a central control point. The RACU will make it easier for Marine rifleman to manage multiple accessories and employ them faster. RACU will also help maintain the rifleman's focus and situational awareness. ***FY 2016 Accomplishments:*** Completed Phase I test plan and ordered test articles. Test articles are expected in early 2Q FY 2017. FY 2016 funding will continue to be used in FY 2017 to: complete Phase I Performance Testing 2Q-3Q FY 2017; complete Phase I Usability Test 3Q-4Q FY 2017; and initiate Phase II fabricated test articles 4Q FY 2017. FY2016 funding will also be used to complete Phase II Environmental/Shock & Performance Testing 1Q-2Q FY 2018; complete Phase II Usability Test; and complete final test report and FCT closeout. If successful, potential for transition to USMC Program Manager Marine Expeditionary Rifle.	3.000	-	-
Title: Compact High Power Radio Frequency Directed Energy (HPRF-DE) Source (Navy/USMC) ***Description:*** This project will test state-of-the-art HPRF magnetron microwave tubes and solid state power modulators, and evaluate the non-lethal effects offered by this flexible modulator technology. This approach provides the warfighter a capability between "shouting and shooting" by delivering electromagnetic energy that will disrupt, disable, or potentially destroy critical vehicle/vessel electronic circuitry. HPRF-DE is currently in use in United Kingdom and supports Joint Non-Lethal Directorate and Naval Surface Warfare Center Dahlgren Division. ***FY 2016 Accomplishments:***	0.981	1.217	0.443

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Received Phase I test article and component checkout at the end of 3Q FY 2016. Completed Open Air Effects Testing in 4Q FY 2016. ***FY 2017 Plans:*** Perform data analysis and reporting from the Open Air Effects Testing at Naval Surface Warfare Center, Dahlgren Division 1Q FY 2017. Review proposal input in 2Q FY 2017. Perform Test Planning and Test Readiness Review 3Q-4Q FY 2017. Receive Phase II Test Articles 4Q FY 2017. ***FY 2018 Plans:*** Complete Phase II Radio Frequency Output Characterization test during 1Q FY 2018. Complete Phase II Static Open Air Effects test in 2Q FY 2018. Complete System Safety Analysis, Prototype Vessel Temporary Installation and Integration, and Dynamic Developmental Testing and provide transition decision in 4Q FY 2018. Complete technical test reports during 4Q FY 2018. If successful, potential transition to various vehicle or vessel stopping programs within the Coast Guard, Navy, and Marine Corps.			
Title: Soldier/Sniper Weapon Observation Reconnaissance Device (SWORD) (Navy/USMC) ***Description:*** This project will test the SWORD targeting and Blue Force command and control system which is based on commercial Android technology, multiple commercial communications standards, and a weapon based integrated power, data and navigation system. Testing data will assist in modifying current design for fully integrating system components into available tactical networks and provide more of a system of systems configuration. SWORD can enhance the survivability and lethality of the warfighter by providing enhanced shared situational awareness and advanced targeting and data dissemination capabilities. ***FY 2016 Accomplishments:*** Developed lab test plan 3Q-4Q FY 2016. Fabricated test articles 3Q-4Q FY 2016. Received test articles in 4Q FY 2016. ***FY 2017 Plans:*** Complete Phase I bench test and prototype assembly in 1Q FY 2017. Complete prototype test by end of 2Q FY 2017. Complete Phase II Comparative Analysis Report by end of 2Q FY 2017. Initiate limited field testing early 3Q FY 2017. Using FY 2017 funding this project will in FY 2018: conduct field test planning, complete field test 1Q-3Q FY 2018 and complete technical test reports during 4Q FY 2018. If successful, potential for transition to Program Manager Marine Intelligence.	0.550	0.480	-
Title: Enhanced Shipboard Navigation (Navy) ***Description:*** This effort will test and evaluate the capability of a multi-constellation Global Navigation Satellite System (GNSS) receiver to function as an additional navigation source to existing military Global Positioning System (GPS) solutions for U.S. Naval surface ship and airborne applications. This testing will provide valuable insight into the potential benefits of using these signals in a U.S. military environment. Differences in positioning and timing between the foreign GNSS receiver and the platform's principal military GPS receiver may indicate to the platform that it should select an alternate, non-satellite navigation source.	0.295	0.670	0.260

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
FY 2016 Accomplishments: Received first operational prototype, tested basic GNSS functionality in collaboration with U.S. Naval Observatory, and initiated prototype test article and software modifications 1Q-2Q FY 2016. ***FY 2017 Plans:*** Complete GNSS test equipment modifications 1Q FY 2017 and test foreign GNSS receivers as an integrated enhancement to existing navigation systems 3Q FY 2017. Initiate test report 3Q FY 2017. ***FY 2018 Plans:*** Complete final test and prepare closeout and test reports for decision package 1Q-2Q FY 2018. If successful, potential for transition to the Global Positioning Navigation and Timing Systems program of record.			
Title: Small Global Positioning System (GPS) Anti-Jam Antenna for H-1Y/Z (Navy) ***Description:*** This effort will demonstrate all criteria needed for proceeding with a major fielding program for a small GPS anti-jam smart antenna solution for the H-1Y/Z aircraft. This small GPS anti-jam smart antenna system will be a common material solution for the UH-1Y and AH-1Z as both platforms currently share the same unprotected antenna-to-GPS receiver navigation system architecture. This new antenna system when coupled to an Embedded GPS/Inertial Navigation system will eliminate mission capability gaps associated with a variety of H-1Y/Z missions adversely affected in a GPS signal degraded anti-access/area denial environment. The UH-1Y and AH-1Z helicopters are among the last Marine manned platforms without a GPS anti-jam antenna system as small anti-jam solutions were not available until now due to size, weight and power limitations. ***FY 2016 Accomplishments:*** Completed anechoic chamber test plan 2Q FY 2016. Performed anechoic chamber testing 3Q FY 2016. Completed indoor test report and analysis 3Q–4Q FY 2016. ***FY 2017 Plans:*** Develop operational flight test plan during 1Q FY 2017. Perform operational flight test in late 2Q FY 2017. Make transition and procurement decision 4Q FY 2017. If successful, plans in place to transition to PMA-276 Light Attack Helicopters.	0.385	0.800	-
Title: Low Cost Autonomous Classification (Navy) ***Description:*** This project will test an Australian-developed signal processing algorithm and sensor based on underwater measurement of acoustic intensity at low frequency near the seafloor. The algorithm has the ability to robustly classify surface and sub-surface targets. The collaborative at-sea evaluation will be done at the Stirling Naval Base, off the coast of Western Australia, with logistics support provided by the Royal Australian Navy fleet. ***FY 2016 Accomplishments:***	0.016	0.684	0.600

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Initiated processing of project agreement (PA) with the Navy International Programs Office 4Q FY 2016. ***FY 2017 Plans:*** Award contract 3Q FY 2017; complete test plan 3Q FY 2017 and access and review foreign processing software 3Q–4Q FY 2017. ***FY 2018 Plans:*** Complete PA processing; conduct at sea testing 1Q FY 2018; complete evaluation and test reports 3Q–4Q FY 2018 and make procurement decision 4Q FY 2018.			
Title: Rapid Three-Dimensional (3D) Terrain Mapping (United States Special Operations Command) ***Description:*** This project evaluates the capability of a foreign system to provide rapid high-resolution 3D geo-spatial terrain data and produce a shareable global map for navigation in GPS denied or degraded areas. This new, robust capability will provide the war-fighter with expedient, precise, 3D navigational tools necessary for effective mission planning, digital close air support, and battle-space awareness. ***FY 2016 Accomplishments:*** National Geospatial-Intelligence Agency supported Special Operations Forces operational requirements in the Arabian Peninsula and North Africa using 3D terrain data in semi-permissive areas. Army Geospatial Center mapped several areas of interest in Iraq and Syria. Geoprocessing software was used by USSOCOM to automate labor-intensive data fusion. FCT close- out report was submitted.	1.020	-	-
Title: Airborne Lean Services Architecture (United States Special Operations Command) ***Description:*** Evaluates software and open architecture standards that provide innovative tactical and terrestrial network services oriented architecture. This enables affordable, flexible, and dynamic systems interoperability, automation, and security within and between Special Operations Forces (SOF), conventional, coalition aircraft, surface forces, and command and control operating nodes/platforms. ***FY 2016 Accomplishments:*** Conducted initial reviews. Received test articles and specialized testing equipment. Conducted lab benchmark testing. Initiated ground and airborne testing. ***FY 2017 Plans:*** Complete ground and airborne testing. Complete final test report and FCT closeout. If successful, potential to transition software to SOF Airborne Mission Networking program office and Tactical Local Area Network program.	0.600	0.950	-
Title: Low Cost Innovative Projects (Projects Less Than One Million Dollars Each):	13.579	4.413	-

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Description: OSD CTO selected multiple low cost projects in the areas of Force Protection, Force Support, Anti-Access/Area Denial, Robotics and Autonomous Systems, Interoperability and Countering Unmanned Systems. These projects were selected to deliver proof of principle prototypes for evaluation, assessment, and Service adoption within 24 to 36 months. ***FY 2016 Accomplishments:*** - Low Cost Small Satellite Technologies (Navy): Evaluated mature foreign satellite components to provide innovative and cost effective technologies from global marketplace to enhance capabilities and affordability. Surveyed applicable worldwide technologies that can provide desired Maritime Domain Awareness capability onboard small satellites, including advertised performance specifications, issues, and cost information. Conducted capabilities tradeoff study with recommended component selection action plan. Acquired test articles. Additional efforts in FY 2017 using FY 2016 funds include: conduct attitude determination and control, radio, and software testing. Complete test and closeout reports. - Underwater Wireless Power Transfer (Navy): Evaluated foreign wireless power transfer systems for potential use in Navy underwater systems and other military applications to shape emerging requirements for platforms currently in development. Procured test articles and conducted Phase I bench-top testing in the lab. Initiated Phase II test planning and established test environment. Additional testing scheduled in FY 2017. - Holographic Immersion Simulation System (Navy): Tested a deployable training system that renders 3D holographic environments at interactive frame-rates to provide greater training realism and develops faster reactionary skills and improved decision-making. Completed Phase I contract award preparation 4Q FY 2016. Additional testing scheduled in FY 2017. - High Efficiency Flexible Photovoltaics (Navy): Tested high efficiency, lightweight, flexible solar cells for cross-domain military applications that will increase power for Unmanned Aerial Vehicles, small satellites, man-portable and ground-based renewable-energy systems. Initiated fabrication of test articles 3Q FY 2016. Completed Phase I test planning during 4Q FY 2016. Additional testing scheduled in FY 2017. - Small Unmanned Aerial Vehicle (UAV) Payload with Laser Designator (Navy): Tested a compact, high-definition, full motion video payload on the RQ-21A Blackjack that enables laser designation from Navy/Marine Corps Tier II UAVs. Conducted integrated flight test on UAV 2Q-4Q FY 2016. Additional efforts in FY 2017 using FY 2016 funds include: Complete laser designation demonstration in support of USMC AH-1Z attack helicopter early FY 2017 with procurement decision by 2Q FY 2017. - Mobile Gunnery Live Fire Monitoring System (Navy/USMC): Evaluated a Tank and Infantry Fighting Vehicle gunnery training system that wirelessly transmits live audio/visual and weapon systems data to a mobile monitoring station; increases crew's gunnery skills and first round on target accuracy. Completed test planning during 3Q FY 2016. Performed Phase III data collection of U.S. Marine Corps Light Armored Vehicle during 1Q–3Q FY 2016; Conducted Live Fire Test with Assault Amphibious Vehicle and initiated test article fabrication in 4Q FY 2016. A procurement decision will be made in 3Q FY 2017 following performance testing and field user evaluations.			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Compact Multi-Diver Heating System (Navy): Heating system composed of a vapor compression unit, battery, umbilical cords, and liquid circulating garments for wet submersibles (i.e., SEAL Delivery Vehicle) to provide thermal balance for up to eight divers in cold water. Conducted performance verification of prototype 1 in 1Q FY 2016. Vendor built and tested depth-capable prototype 2 in 2Q FY 2016. Performed unmanned performance verification for operation at depth in 4Q FY 2016. Conducted manned performance tests in a chilled test pool with the integrated system in 4Q FY 2016. Vendor began construction of production representative item in 4Q FY 2016. Additional efforts in FY 2017 using FY 2016 funds include: complete analysis, study and integration data 1Q FY 2017. Perform operational and user assessment 1Q–3Q FY 2017. Prepare test report and decision package 4Q FY 2017. - Software Defined Networking (SDN) (Navy): Tested commercially available, advanced computer network solutions designed with open standards to enhance network performance, increase security, and reduce costs. Completed testing of prototypes 1Q-2Q FY 2016. Down-selected to best SDN monitoring and control technologies 2Q FY 2016. Initiated Phase II final testing in late FY 2016. Additional testing scheduled in FY 2017. - H-1 Crash-resistant, Ballistic-tolerant, Fuel Cell Qualification (Navy): Qualified a second source for AH-1Z & UH-1Y fuel tanks that can survive a crash from an altitude of 65 feet because the current vendor cannot support the production & quality needs. Initial testing successfully completed 2Q FY 2016. Received Phase I Cube test articles in 2Q FY 2016. Initiated Phase I Test Cube Qualification 3Q FY 2016. Additional efforts in FY 2017 using FY 2016 funds include: conduct Phase I test cube qualification through 2Q FY 2017 and complete test and closeout reports. - Multifunctional Information Distribution System-Joint Tactical Radio System (MIDS-JTRS) Radio Frequency Amplifier (Navy): Tested a prototype that has the potential to reduce procurement costs, improve thermal management and networking capabilities with multiple waveforms. Completed qualification testing. Completed flight testing and completed decision package. Anticipate Navy procurement decision during FY 2017. - Aerial Delivery Improvement for Underwater Mines (Navy): Evaluated foreign glide kits for the MK-80 series Joint Direct Attack Munition (JDAM) to provide an inexpensive, precision, medium standoff option for conventional ordnance for the underwater mining mission. Performed drop testing of JDAM compatible wing kits during VALIANT SHIELD 2016 to assess range, accuracy, and survivability in mining configuration. Collected test data and completed a test report. The demonstration results have been provided to Navy leadership for consideration. Procurements are pending follow-on efforts for platform integration. - Pilot Physiological Monitoring and Warning System (Air Force): Tested non-invasive pilot physiological monitoring prototypes (helmet integrated sensors & near infrared spectroscopy) to mitigate pilot fatigue, gravity induced loss of consciousness, and hypoxia-related mishaps. Completed hypoxia study and centrifuge testing which provides a non-invasive, unobtrusive physiological monitoring system that is embedded into the flight helmet. Additional efforts in FY 2017 using FY 2016 funds include: Complete final test report and FCT closeout. If successful, the next phase will be to conduct a flight test of the prototype system which is beyond the scope of the FCT and will be funded by the Air Force. - Field Deployable Whole Blood Collection and Transfusion Set (Air Force): Tested a patented, Food & Drug Administration (FDA) approved, whole blood filter integrated into a ruggedized prototype for military use to enable whole blood collection and			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
transfusion in forward deployed settings to improve battlefield casualty survival rates. Completed testing of the filtration and storage studies which leverages a currently FDA approved filter/kit and reconfigures its capability to permit safer whole blood transfusions in the field. Additional testing scheduled in FY 2017. - Photonic Enhancements to the Science and Technology in Electronic Warfare Systems (Air Force): Evaluated a prototype 1-40 gigahertz receiver with near simultaneous optical signal processing/identification to enable agile Electromagnetic Spectrum operations. Completed performance and operational testing. Additional efforts in FY 2017 using FY 2016 funds include: Evaluate system in upcoming Sensors demonstration exercises and complete final test report and FCT closeout. No immediate transition path exists; however, the Air Force and Navy are exploring potential transition opportunities for this prototype system with future programs. - Gallium Nitride (GaN) Amplifier Performance and Reliability Investigation of commercial-off-the-shelf (Air Force): Tested foreign GaN technology with 5-10X performance improvement over existing Gallium Arsenide technology to provide improved components for radar, navigation, communications, and other electronic systems. Conducted benchmark testing and initiated robustness testing. Additional efforts in FY 2017 using FY 2016 funds include: Test foreign GaN technology with 5-10X performance improvement over existing gallium arsenide technology to provide improved components for radar, navigation, communications, and other electronic systems. Complete robustness testing, complete final test report, and FCT closeout report. If successful, select GaN amplifier parts will be evaluated for space radiation tolerance in a follow-on FCT effort in FY 2017-2018 supporting the Air Force Research Laboratory's Space Vehicle directorate and programs. - Solar Power Shelter System (Army): The Solar Power Shelter System inserted into the Force Provider Expeditionary base camp modules provides the warfighter a substantial capability increase in force protection and sustainability. Conducted engineering analysis study and completed Phase One technical testing with completed test report. Completed ballistics testing and Phase Two operational integration assessment, completed test reports, prepared decision packet and close out report. Anticipate Army procurement decision during FY 2017. - Improved Steels (Army): U.S. Army is investigating new classes of high nitrogen steels that may improve durability and protection of tactical vehicles. Completed administrative and technical, scheduling and purchased materials, equipment, and supplies in preparation for testing. Materials received and sent to vendor for rolling and heat treatment of test material. Conducted qualification test to demonstrate improved properties: mechanical, corrosion, ballistic. Additional testing scheduled in FY 2017. - Sappheiros System Unattended Ground Sensing and Monitoring System (Army): Sappheiros system is an unattended ground sensor comprised of dozens of miniaturized sensors (seismic-acoustic, visual, and radar) rapidly deployed to detect suspected enemy activity over large areas for long periods. Completed test reports to see if the sensor system is compatible with satellite communications (SATCOM). Developed a task plan for system upgrade specifically to enable the autonomous system to be interoperable with open standards for unattended sensors and incorporate SATCOM for long haul communications. Additional testing scheduled in FY 2017.			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Evaluation of Towed Jumper Release System (Army): The Hung-Up Parachutist Release Assembly (HURPA) is an emergency parachute system used to safely descend a towed jumper, which is an Airborne soldier, whose equipment did not function correctly and is being dragged outside the aircraft. Procured HUPRA systems and the safety confirmation to evaluate the HUPRA for static-line missions. Additional testing scheduled in FY 2017. - Soldier Borne Sensor Systems (Army): The Soldier Borne Sensor System allows the Army Squad to have situational awareness in a variety of combat conditions thereby reducing risk. Evaluated range, speed, detectability, and camera performance against current requirements and any gaps or risk areas that have been identified. Completed test reports on technical capabilities. Additional efforts in FY 2017 using FY 2016 funds include: Evaluate performance in operationally relevant environments including human factors, environmental limitations and overall system performance. Write closeout report. The knowledge products and hardware will be transitioned in 4Q FY 2019 to Army Product Manager Soldier Maneuver Sensors (PdM SMS). - Hazardous Chemical Exploitation System (SOCOM): Provided the tools necessary for military personnel to expediently access hazardous chemical/materials, ordnance or storage containers and develop a validated on-site disposal or transfer system. Performed test readiness review. Continued advanced tool testing and system validation to validate tactics, techniques, and procedures. Program Manager submitted final test report, and provided technical data to USSOCOM Acquisition Authority for Milestone C Decision. FCT Close-Out Report submitted. - Millimeter Wave Sensing for Autonomy (Navy/USMC): This effort will test and evaluate millimeter-wave automotive radar technology from Austria. Naval Research Laboratory, in partnership with the Army Research Laboratory, will modify the hardware for airborne operation. They will also demonstrate and evaluate the technology and use the findings as the basis for form/fit/function analysis on active electronically scanned array sensor for low-cost unmanned aircraft systems. Additional efforts in FY 2017 using FY 2016 funds include: Complete contract award, test plan and receive test articles. Complete testing and close-out report. If successful, the primary transition path will be the Low-Cost UAV Swarming Technology Innovative Naval Prototype effort scheduled for FY 2018-2022.			
FY 2017 Plans: - Software Defined Networking (SDN) (Navy): Complete Phase II testing and conduct demonstration of feasibility and benefits of SDN monitoring and control technologies 3Q FY 2017. Complete closeout and test report for decision package 4Q FY 2017. - High Efficiency Flexible Photovoltaics (HEFP) (Navy): Complete laboratory acceptance testing 2Q FY 2017; complete test article panels 1Q FY 2017; and initiate Phase II field testing and reporting. If successful, transition decision to occur in 2Q FY 2018 following application field testing. - Holographic Immersion Simulation System (Navy): Purchase test articles in 2Q FY 2017. Perform test article integration and training. Perform data collection analysis and reporting in 3Q FY 2017 and initiate phase II test article procurement and testing 4Q FY 2017. If successful, transition decision expected in 2Q FY 2018 following user assessments. - Underwater Wireless Power Transfer (Navy): Perform Phase II benchtop testing in water; perform Phase III pier-side testing to demonstrate power, efficiency, and communication speed characterization; and make transition decision.			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Improved Steels (Army): Write test reports, new material specification and FCT close out report. If successful, this new material specification is expected to transition in 4Q FY 2017 to PEO Ground Combat Systems. - Sappheiros System Unattended Ground Sensing and Monitoring System (Army): Developmental Testing: determine system communications ranges, system detection ranges, system emplacement characteristics, and mission duration. Operational testing: Assess the potential integration with Fires and the effectiveness of sensors and imagers for accomplishing target identification and battle space situational awareness. This effort may become part of a systems approach towards a materiel solution for Ottawa Treaty compliance. Information collected during this effort will inform Army and USMC ground sensor requirements. - Evaluation of Towed Jumper Release System (Army): Conduct static line evaluation of the Hung-Up Parachutist Release Assembly on C-130 ramp exits during a towed jumper malfunction for T-11, MC-6 and RA-1 parachute systems. Write technical evaluation report. Write closeout report. Anticipate Army procurement decision in 3Q FY 2018.			
Title: Asymmetric Force Application and Autonomous Systems Focus Areas	-	3.872	10.807
Description: FCT will invest in cross-domain, innovative, non-traditional technologies for new and emerging capabilities from international partners to enable cost-leveraging, increase competition, and provide more efficient solutions for our forces during maneuver and engagement operations. Solutions will reduce U.S. reliance on overleveraged blue capabilities and creatively exploit increasingly capable adversary systems while adjusting the cost curve in our favor. Applications of particular interest are those able to provide an innovative technology offset and/or cost calculus advantage. Our allies have made particular progress in the development of systems that offer a significant cost advantage in procurement or operation and reduce the amount of manpower necessary to effectively conduct operations. In addition, FCT will continue to seek out increased interoperability across platforms and systems. These technologies will be likely candidates for evaluation under the FCT program. ***FY 2017 Plans:*** During FY 2017, FCT will focus on selecting projects supporting the below Asymmetric Force Application and Autonomous System Areas: - Technologies to counter threats associated with integrated air defense systems - Technologies that enhance the ability to conduct long range penetrating strike - Offensive and defensive air superiority operations - Mobile unmanned systems that must maneuver in an environment with little or no human assistance - Systems that aid human cognitive tasks ***FY 2018 Plans:*** During FY 2018, FCT will focus on selecting projects supporting the below Asymmetric Force Application and Autonomous System Areas: - Technologies to counter threats associated with integrated air defense systems			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Technologies that enhance the ability to conduct long range penetrating strike - Offensive and defensive air superiority operations - Mobile unmanned systems that must maneuver in an environment with little or no human assistance - Systems that aid human cognitive tasks			
Title: Information Operations and Analytics and Spectrum Agility Focus Areas	-	2.323	6.484
Description: FCT will invest in cross-domain, innovative Information Operations and Analytics and Electromagnetic Spectrum Agility evaluations of new and emerging capabilities with international partners. Solutions will increase U.S. options for enhancing communications and situational awareness and allow the Department of Defense to operate with freedom of maneuver in the electromagnetic spectrum. ***FY 2017 Plans:*** During FY 2017, FCT will focus on selecting projects supporting the below Information Operations and Analytics and Electromagnetic Spectrum Agility Areas: - Provide the Joint Force enhanced communications and situational awareness within the area of responsibility to disrupt and delay adversary force from offensive operations - Counter adversary ability to use deceptive messaging to influence U.S. and Coalition operations - Develop capabilities to counter adversary cyber and command and control communications - Gaining and attaining access to spectrum for friendly forces, denying and/or degrading spectrum to our adversaries - Conducting Electromagnetic (EM) deception operations to degrade an adversary's understanding of our intent and capability - Preventing the adversary from leveraging the EM domain to conduct operations in other domains (i.e., air, space, maritime, land and cyber) - Achieving new effects in the electromagnetic spectrum domain to include directed energy and radio frequency disruption - Evaluating low-cost, efficient or innovative international capabilities ***FY 2018 Plans:*** During FY 2018, FCT will focus on selecting projects supporting the below Information Operations and Analytics and Electromagnetic Spectrum Agility Areas: - Provide the Joint Force enhanced communications and situational awareness within the Area of Responsibility to disrupt and delay adversary force from offensive operations - Counter adversary ability to use deceptive messaging to influence U.S. and Coalition operations - Develop capabilities to counter adversary cyber and command and control communications - Gaining and attaining access to spectrum for friendly forces, denying and/or degrading spectrum to our adversaries - Conducting Electromagnetic (EM) deception operations to degrade an adversary's understanding of our intent and capability			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Preventing the adversary from leveraging the EM domain to conduct operations in other domains (i.e., air, space, maritime, land and cyber) - Achieving new effects in the electromagnetic spectrum domain to include directed energy and radio frequency disruption - Evaluating low-cost, efficient or innovative international capabilities			
Title: Force Logistics Focus Areas ***Description:*** FCT will invest in cross-domain, innovative force logistic technologies for new and emerging capabilities with international partners, including but not limited to these Defense-wide requirements that are consistent with strategic priorities: reducing soldier load, interoperability across platforms and systems, and energy solutions. ***FY 2017 Plans:*** During FY 2017, FCT will focus on selecting projects supporting the below Force Logistics Areas: - Reducing soldier load reduces the weight currently sustained by the individual dismounted soldier, including materials that enable weight reduction to individual weapons, ammunition, or portable missile systems - Increasing interoperability across platforms and systems will invest into technologies for mission-based, on-demand routing, network, and information management, with a focus on command and control interoperability with coalition capabilities through integrated multi-level security enabled networks. Transition of Modular Open Systems Approach (MOSA) capabilities which are portable, modular, partitioned, scalable, extendable, and secure - Improving energy solutions will include power systems and electronics designed for extreme cold to support arctic strategy and renewable energy options that can reduce force support and logistics requirements ***FY 2018 Plans:*** During FY 2018, FCT will focus on selecting projects supporting the below Force Logistics Areas: - Reducing soldier load reduces the weight currently sustained by the individual dismounted soldier, including materials that enable weight reduction to individual weapons, ammunition, or portable missile systems - Increasing interoperability across platforms and systems will invest into technologies for mission-based on-demand routing, network, and information management, with a focus on command and control interoperability with coalition capabilities through integrated multi-level security enabled networks. Transition of MOSA capabilities which are portable, modular, partitioned, scalable, extendable, and secure - Improving energy solutions will include power systems and electronics designed for extreme cold to support arctic strategy and renewable energy options that can reduce force support and logistics requirements	-	1.549	4.135
Accomplishments/Planned Programs Subtotals	24.406	19.343	24.199

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C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Successful FCT's can transition to acquisition via several ways: As a pre-engineering and manufacturing development prototype the item tested could be a technology upgrade insertion into a current platform or program providing greater capability or prolonging the life of the weapon system. If the item was a proof-of-principle prototype the testing results could lead to informed/refined requirements generation providing better outcome for current planned U.S. system or could lead to a direct transition/procurement should the item/article provide a new capability.

E. Performance Metrics

Strategic Goals Supported:
- Develop and Demonstrate Proof-of-Principle prototypes that fill capability gaps.
- Develop and Demonstrate Pre-EMD prototypes that address DoD strategic priorities.
- Develop and Demonstrate a prototype that informs/refines the acquisition process.

Measurable Outcomes:
- FCTs will demonstrate capability objectives within 24-36 months.
- In FY 2016, FCT had a transition rate of 88 percent for completed projects, exceeding the objective of 40 percent for demonstration programs.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603225D8Z / *Joint DOD/DOE Munitions Technology Development*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	73.850	18.129	17.256	18.662	-	18.662	18.775	18.935	19.241	19.645	Continuing	Continuing
P225: *Joint DOD/DOE Munitions*	73.850	18.129	17.256	18.662	-	18.662	18.775	18.935	19.241	19.645	Continuing	Continuing

A. Mission Description and Budget Item Justification

The mission of the Department of Defense (DoD)/Department of Energy (DOE) Joint Munitions Technology Development Program (JMP) is to develop new and innovative warhead, explosive, fuzing, and lifecycle technologies and tools to enable major improvements in conventional munitions. The JMP supports the development and exploration of advanced munitions concepts and enabling technologies that precede Service-specific system engineering. A Memorandum of Understanding signed in 1985 by DoD and DOE provides the basis for the cooperative effort and for cost-sharing the long-term commitment to this effort. The JMP funds budgeted in this justification are matched dollar for dollar by DOE funds. Through this interdepartmental cooperation, DoD's relatively small investment leverages DOE's substantial investments in intellectual capital and highly specialized skills, advanced scientific equipment and facilities, and computational tools not available within DoD. Under the auspices of the JMP, the integration of DOE technologies with Joint and Individual Services' needs has provided major advances in warfighting capabilities over many years and continues to play a crucial role in the exploration, development, and transition of new technologies needed by the Services.

The JMP seeks to develop technological advances in several munitions subject areas. These include: 1) improved modeling and simulation tools for munitions design and evaluation, including evaluation of vulnerability and the design of insensitive munitions (IM), 2) novel experimental techniques and material property databases to support modeling and simulation, 3) higher power and safer explosives and propellants, 4) miniaturized, lower-cost, and higher reliability fuzes, initiators, power systems, and sensors, 5) design tools to enable development of higher performance warheads and weapons, such as penetrators, that are hardened against high impact loads, and 6) tools to assess the health and reliability of the munitions stockpile and predict lifetimes based on these assessments. The supporting experimental research requires the development of new technologies related to the synthesis, processing, and characterization of advanced munition materials, components, and systems. This involves energetic material research, new fuzing concepts, dynamic testing of munition materials, and advanced characterization including high-rate in-situ diagnostics.

The JMP is aligned with the Department's strategic plans and policies such as:

- Munitions for contingency operations, particularly for the reduction of unintended collateral effects.
- Reducing time and cost for acquisition of munitions.
- Rapidly transitioning science and technology (S&T) to support the warfighter in today's conflicts.
- Establishing future core capabilities and maintaining our national S&T capabilities through joint investment and interagency cooperation and teaming.
- Aiding in recruiting and retaining high-caliber scientists and engineers at DoD S&T organizations.
- Developing advanced munitions technologies to support the increased role of conventional weapons to deter and respond to non-nuclear attack, as described in the Nuclear Posture Review report.
- Developing safer munitions that are compliant with IM standards to meet statutory and Department policy requirements.

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The JMP has established a successful collaborative community of DoD and DOE scientists and engineers. This community develops technologies of interest to both Departments within a structured framework of technical reviews and scheduled milestones. The JMP is administered and monitored by the Office of the Secretary of Defense (OSD) and reviewed annually by the Munitions Technical Advisory Committee (TAC), which is comprised of over 25 senior executives from the Army, Navy, Air Force, Special Operations Command, the Defense Threat Reduction Agency, OSD, and DOE. Projects are organized in eight Technology Coordinating Groups (TCG) that bring together the disciplines necessary to properly evaluate technical content, relevance, and progress. The TCGs conduct semi-annual technical peer reviews of JMP projects and plans. DoD Service laboratory technical experts lead each of the TCGs to ensure that the technologies under development address high-priority DoD needs. The JMP also promotes more in-depth technical exchange via short-term visiting scientist and engineer assignments at both the DOE and the DoD laboratories.

The JMP has a long history of successful transitions and significant Return on Investment (ROI).

• The JMP is the primary developer of high-performance structural mechanics computer codes used by DoD, and the primary source for transitioning these codes to the DoD. JMP computational tools are critical to the development and support of DoD programs; a recent tabulation shows that well over 70 DoD programs have been supported by these DOE codes. In FY 2014 it was projected by the High Performance Computing Modernization Program (HPCMP) that JMP-supported codes accounted for 82 percent of all HPCMP Central Processing Unit (CPU) hours, including virtually all HPCMP classified computing. The Department expects this heavy reliance on DOE codes to continue for several reasons, including: preference for using DOE codes because they are export-controlled; DOE codes are scalable, incorporate multiphysics, and run on massively parallel computer systems; and the Department can obtain source codes to modify for individual Service needs. A significant number of defense industrial contractors also use the DOE structural mechanics computer codes.
- The Army Armament Research, Development & Engineering Center (ARDEC) has stated that the DOE computer codes are now routinely used to design all new warheads. The use of these tools has reduced the number of validation tests required for each new warhead from about five to one with concomitant cost and time savings.
- The Army Research Laboratory has used DOE computer codes to develop and deploy new armor solutions to Iraq and Afghanistan with unprecedented speed.
- CHEETAH, a standalone thermochemical computer code, is the most widely used code by DoD and defense contractors for predicting performance of energetic materials.
- The JMP-supported Arbitrary Lagrangian-Eulerian Three-Dimensional (ALE3D) code was used in a high-explosive press accident investigation which helped determine the root cause. The code was also utilized successfully in the M433E1 mortar bomb design, and has been used to assess blast effects on Unmanned Aerial Vehicles.
- The JMP-supported CTH and Sierra codes were used for the Air Force Massive Ordnance Penetrator (MOP) Quick Reaction Effort (QRC), and the Air Force Research Laboratory Conventional Survivable Ordnance Package (CSOP).
• New munitions' case material and explosive fill technologies provide the warfighter with a lethal and low collateral damage capability. These technologies have been transitioned to the Focused Lethality Munition variant of the Small Diameter Bomb, which is currently fielded. The technologies were also the basis for a new GBU 129 weapon that has been developed to meet a Joint Urgent Operational Need requirement for a low-collateral MK-82 class weapon. The GBU-129/B received the 2014 William J. Perry Award from the Precision Strike Association, recognizing significant contributions to the development, introduction, or support of precision strike systems.
• The Joint Improvised Explosive Device Defeat Organization (JIEDDO) has supported applications of JMP technologies, including: compact synthetic aperture radar (SAR) systems for counter-Improvised Explosive Device (IED) efforts; pre-deployment training of military personnel by DOE explosive experts on how to recognize feed

stocks and processes for homemade explosives; and use of massively parallel, multiphysics computer codes to understand how explosive blast waves cause brain injury and how to mitigate these injuries.

- An erosive initiator technology developed under the JMP has been transitioned to the Services for use in selectable output weapons and self-destruct capabilities.
- A novel approach to controlling the sensitivity and therefore the initiability of explosives using microwave energy, as well two new, insensitive energetic materials have transitioned to development projects in the Joint IM Technology and Joint Fuze Technology Programs.
- Reliability analysis tools were used by Army Missile Command to assess Rolling Airframe Missile (RAM), Advanced Medium Range Air to Air Missile (AMRAAM), and Tube-launched, Optically-tracked, Wire command data-linked guided Missile (TOW).
- Robotic demilitarization processing systems were installed at several locations, including a system at Hawthorne Army Depot to recover copper shape charge liners, Comp A5, and grenade bodies.
- Characterization and analysis of the Army's Excalibur fusible plug resulted in a savings of at least $2.000 million.
- The Mortar, Anti-Personnel, Anti-Materiel (MAPAM) projectile used the ViscoSCRAM (Statistical CRAck Mechanics)model for PBXN-110 to determine if flaws in production could safely be fired, potentially saving millions of dollars.
- Provided Photonic Doppler Velocimetry (PDV) adaption technology to a number of DoD laboratories, including ARDEC and ARL.
- Materials and modeling technologies developed and demonstrated in the JMP are being transitioned to a variety of DoD Army programs including the Scalable Technology for Adaptive Response (STAR) Army Technology Objective (ATO), the Future Requirements of Enhanced Energetics for Decisive Munitions (FREEDM) program, and Advanced Warheads for Scalable Effects Munitions (AWSEM).

The JMP also works with the Defense Ordnance Technology Consortium (DOTC) and the National Armaments Consortium (NAC) of industrial suppliers to equitably and efficiently transition JMP technologies to defense industrial contractors. In addition to the computer codes mentioned earlier, the JMP has transitioned case technology for low-collateral weapons, low-temperature co-fired ceramic technology for smaller, less expensive fuze electronic components, and erosive initiator technology for selectable effects weapons to defense industrial suppliers.

The integrated DoD and DOE efforts within the JMP are transitioning new munitions' technologies to the Department and the defense industrial base through the advanced development process. The JMP is a focal point for collaborative work by nearly 300 DoD and DOE scientists and engineers. Technical leaders from both Departments consider the JMP a model of cooperation, both within their respective departments and between departments. The highly challenging technical objectives of the 31 current and two planned JMP projects require multi-year efforts and sustained, long-term investments to achieve success.

The JMP projects are divided into five technical focus areas: 1) Computational Mechanics and Material Modeling, 2) Energetic Materials, 3) Initiators, Fuzes, and Sensors, 4) Warhead and Penetration Technology, and 5) Munitions Lifecycle Technologies.

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B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	18.765	17.256	18.679	-	18.679
Current President's Budget	18.129	17.256	18.662	-	18.662
Total Adjustments	-0.636	0.000	-0.017	-	-0.017
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.636	-			
• Other Adjustments	-	-	-0.017	-	-0.017

Change Summary Explanation

FY 2018 internal realignment reflects funding for higher Departmental priorities and requirements.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense											Date: May 2017	
Appropriation/Budget Activity 0400 / 3					R-1 Program Element (Number/Name) PE 0603225D8Z / *Joint DOD/DOE Munitions Technology Development*				Project (Number/Name) P225 / *Joint DOD/DOE Munitions*			
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
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The JMP projects are divided into five technical focus areas: 1) Computational Mechanics and Material Modeling, 2) Energetic Materials, 3) Initiators, Fuzes, and Sensors, 4) Warhead and Penetration Technology, and 5) Munitions Lifecycle Technologies.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Computational Mechanics and Material Modeling	5.453	5.197	5.542
Description: Projects in this technical focus area develop physics-based computational tools, material models, and calibration and validation databases that support the design and development of weapon systems. These capabilities are intended to predict the complex phenomena across significant length, meso to continuum, and time, microsecond to minute, scales. The tools will provide coupled, multi-physics and chemistry modeling capabilities that are scalable to massively parallel architectures for solving very diverse problems across the weapons systems' research and development and acquisition communities. Numeric tools are the foundation that makes possible the integration of mechanics, materials science, physics, and chemistry. This focus area also includes an extensive experimental component consisting of either: 1) phenomenological or "discovery" experiments that provide the physics basis for model development, 2) experiments directly coupled to model development and application, such as characterization, calibration, and validation experiments, or 3) the development of advanced test methods or device development. The specific projects in computational mechanics and material modeling are:			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- CTH shock physics and Sierra/Solid Mechanics (SM) codes & model development and supporting experiments. - Arbitrary Lagrangian-Eulerian Three-Dimensional (ALE3D) code and model development. - Composite case technology and modeling - Dynamic properties of materials, modeling and validation - Energetic materials and polymers under dynamic and thermal loading - Fragment impact and response experiments ***FY 2016 Accomplishments:*** - Produced and distributed the Final Report on experimental quantification of microstructure, interfaces, and damage in relation to mechanical behavior for energetic materials. - Transitioned Glassy Amorphous Polymer (GAP) Damage model to DOE code teams. - Coupled Fast Fourier Transform (FFT) and/or ViscoPlasticSelfConsistent (VPSC) models with Damage Evolution implemented in ALE3D for use by DoD community in calculations requiring efficient treatment of plasticity. - Completed meso-scale study of stress conditions and statistics of loading in the vicinity of grain boundaries for DoD tantalum (Ta). - Enhanced High-Energy Diffraction Microscopy (HEDM) capability to larger plastic deformation. - Incorporated Thermal/Equation of State (EOS) data in material model parameter database. - Enabled 2D corner turning in Detonation Shock Dynamics (DSD) code. - Tested and modeled damping response in composite specimens. - Minimum Signature Propellant-1 (MSP-1) characterized for Reactive Flow Model(s) and analysis of Army Burn-to-Violent-Reaction (ABVR) test and integrated experiments were conducted. - Over-driven EOS and sound speed experiments conducted on relevant energetic materials using two-stage or three-stage gun. - Demonstration of Uncertainty Quantification (UQ) Capabilities in Sierra coupled codes through integration with the Sierra User Interface were conducted. - CTH versions 11.3 and 12.0 were released. Incorporated exascale improvements in version 12.0. - Characterization and modeling of shock propagation in existing composite models for ALE3D, fit to Sandia National Laboratories (SNL) data were performed. - Tested and modeled the damping response of composite specimens. - Developed a 6-axis winder capable of changing angle at mid-length and printing with filament. - Demonstrated Multiple-Impact fragment impact capability. - Impact heated Plastic Bonded eXplosive (PBX) 9502 targets using a 0.5 inch flat projectile were tested. - Developed the capability to launch concave fragments. - Tested targets of interest using multiple impact points.			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Applied existing robust hydrodynamic flow modeling capability to find the spectrum of impact definitions that are expected to lead to Mach stem initiation. - Designed and conducted new experiments to further validate or refine the Generalized Initiation Criterion. - Characterize Minimum Signature Propellant (MSP) for Reactive Flow model and analysis of Army Burn-to-Violent Reaction (ABVR) tests were performed. - Assessed performance of 2D embedded zone performance against 316L Stainless Steel (SS) test data and proposed next technology steps. - Completed Fast Fourier Transfer-based non-local plasticity models and micro-inertia effects tests. - Completed meso-scale study of stress conditions and statistics of loading in the vicinity of grain boundaries for DoD Tantalum. - Selected appropriate pathways for introducing CartaBlanca to the DoD user community. - Released ALE3D v4.26, with numerous capability enhancements and improvements to usability. - Performed experiments utilizing HEDM+tomography to characterize incipient void nucleation and growth in Ti; validated results against crystal-scale damage mechanics model. - Reported strain rate dependent strength data in compression and shear collected on specimens representative of system response. - Characterized and modeled shock propagation using existing composite models in ALE3D (ysmodel 140), with fit to SNL-provided data.			
FY 2017 Plans: - Demonstrate concave projectile fragment capability by firing into heated and ambient PBX 9502. - Decision gate whether to continue to pursue a Generalized Initiation Criterion. - Perform over-driven EOS and sound speed experiments on relevant energetic materials using two-stage or three stage gun. - Demonstrate three-dimensional solid extended finite element (XFEM) fracture capabilities - Release CTH Version 11.3 with next-generation platform improvements. - Provide equation of state data on glass fiber reinforced polymer material. - Simulate a projectile penetration event that can exhibit multiple modes of failure, such as plugging and shear bands. - Develop three-dimensional formulation of the two-component localization model for use in 3D fragmentation problems where adiabatic shear banding is dominant. - Complete experimental suite to quantify nucleation and growth behavior of adiabatic shear bands in 316L SS, transition to targeted light source experiments. - Complete grain boundary model for use in both meso-scale theory as well as to motivate macro-scale porosity based damage model. - Continue development of CartaBlanca code for failure and fragmentation problems.			
FY 2018 Plans:			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Continue development of CartaBlanca code for failure and fragmentation problems.			
Title: Energetic Materials (EM)	4.815	4.478	4.837
Description: The goals of this technical focus area are to develop new Energetic Materials (EMs) and supporting technologies to satisfy the competing requirements for smaller, more lethal, and safer munitions. Work is primarily focused on explosives, gun and rocket propellants, and, to a lesser extent, pyrotechnics. The projects include development of: 1) new EMs, including new molecules in a range of particle sizes and morphologies, 2) new EM formulations, 3) a fundamental understanding of energetic properties and performance, and 4) computational tools for analysis of performance and sensitivity. New materials and formulations are developed with the recognition that costs must be reasonable, chemical feed stocks reliable, and manufacturing processes suitable for scale-up to production levels. Both Federal statute and Department policy direct the development of safer, less sensitive munitions. Making munitions less sensitive while maintaining explosive or propellant performance is a difficult challenge. This goal is best attained through a combination of new EM development, EM characterization, and more sophisticated modeling and simulation tools. It is cost prohibitive to qualify weapons for compliance with insensitive munitions requirements through testing alone. A better, and in many cases the only means, to qualify these weapons is with the combination of analysis based on validated computational tools and a few well-designed tests. The Department also needs munitions that provide selectable effects. To achieve these effects, weapons designers need to thoroughly understand the performance of EMs used in both the main weapon fill and the initiation systems. Distributed fuzing systems can provide selectable effects as well as safer munitions, but such complex, small-scale systems require more complete knowledge of EM detonation physics and in some cases, new EMs designed for this application. The desire for smaller and lighter munitions is driven in part by the increasing dependence on unmanned weapons platforms and to some extent by the need to reduce logistical burden, especially energy consumption. New EMs are needed to meet the munitions weight and size requirements while maintaining lethality, effects, and safety. The Department is working to increase the range and velocity of weapons and to develop weapons against hardened targets. These applications subject EMs to high accelerations and shock loads. To support the development of these new systems, we need to improve our ability to model EM under higher impact loads and to characterize relevant properties to determine their ability to survive in these aggressive environments. DoD may also need to develop new, more robust EMs that survive impact loads while maintaining lethality and initiability. TCG-III is also a forum for the exchange of information on new energetic materials, their performance and sensitivity characteristics, and physical models that can be used to predict the behavior of energetics under adverse and unplanned			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018

conditions. It is a venue in which collaboration opportunities can be identified to facilitate the transition of technology developed in the DOE to the DoD.

The specific projects in the energetic materials technical focus area for FY16 are:
- Synthesis, properties, and scale-up of new energetic compounds.
- Insensitive munitions and surety.
- Cheetah thermochemical code development and experiments.
- Micro- and nano-energetics synthesis and initiation.
- Hazards analysis of energetic materials.
- Reactive processes in energetic materials.
- Development of tools for energetic material performance characterization.
- Explosives chemistry and properties, and new energetic materials formulation.
- Thermal response of energetic materials.

FY 2016 Accomplishments:
- Scaled-up the synthesis of Landau Level Mixing, (LLM): LLM-227 and LLM-228 to the 10-gram scale.
- Synthesized and characterized new tri-, quadri-, and pentacyclic oxadiazoles as both high-power and insensitive target molecules.
- Published best available models and Sandia Instrumented Thermal Ignition (SITI) data for pressure dependence and gas generation rates of thermal decomposition of a representative MSP and PBX 9501.
- Performed heat of formation measurements on LLM-200, 223, and 215.
- Published results of characterization of damage evolution of PBX 9502 and AP propellant, including permeability as a function of temperature history.
- Experimentally correlated burn rates to thermal damage state and published results.
- Completed MSP1 characterization for unknown-to-detonation transition (XDT) model parameterization.
- Benchmarked cook-off violence model of HMX-based PBX using thermal-damage burn-rate with sub-scale experiments.
- Completed mesoscale sensitivity study to determine key factors for shock initiation response in HMX-based explosive.
- Completed Technology Handbook design, installed on server, and loaded database with new LLNL molecules that have been tested.
- Delivered first kinetics tool for non-ideal EMs front curvature.
- Systematically evaluated and improved code predictions at low Pressure/high Temperature for specific impulse and impetus predictions by expanding library of gaseous and condensed products available for such calculations.
- Developed and implemented a consistent ionic thermodynamics capability to improve equation of state (EOS) and speciation predictions for all energetic materials.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603225D8Z / *Joint DOD/DOE Munitions Technology Development*	**Project (Number/Name)** P225 / *Joint DOD/DOE Munitions*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Developed post-detonation carbon kinetics models for conventional and insensitive high explosives. Tested and validated against small scale experiments. - Developed Cheetah thermochemistry for major metallic additives, and other relevant elements and compounds, (e.g., oxides, fluorides, nitrides, carbides, and borides) to enable thermochemical predictions for elementally rich formulations. - Reported on deposition, microstructure and initiation properties deposited HNS. - Demonstrated small-scale flash radiography of research detonators. - Full dynamic radiographic comparison of Composition B (CompB) and IMX 104 explosives was conducted. ***FY 2017 Plans:*** - Synthesis of new cyclic, planar structures consisting of imidazole or pyazole arrays. - Publish results of characterization of damage evolution of gun propellants. - Benchmark Spiral 1 MSP1 HERMES/XDT with cylindrical ABVR experiments. Perform pre-test predictions for analog rocket motor fragment impact tests. - Perform X-ray measurements of burn-rates and DDT. - Deliver second kinetics tool for non-ideal EM's, possibly initiation behavior. - Integrate CHEETAH code capabilities to facilitate exploratory calculations (e.g., constant volume explosions at user specified conditions, EOS tables for hydro simulations, and multiple constraints on formulation performance). - Perform experiments on milling technique for nanomaterial production. - Report on aging of PBXN-103 underwater explosive formulation. - Report on first use of Lattice Boltzmann and/or Kinetic Monte Carlo Methods to model multiscale reaction processes. - Perform sensitivity testing of energetic binder candidates. - Mechanistic determination of the insensitivity of TATB-based formulations. ***FY 2018 Plans:*** - Mechanistic determination of the insensitivity of TATB-based formulations.			
Title: Initiators, Fuzes, and Sensors ***Description:*** The goals of this technical focus area are to develop new materials, components, diagnostic techniques, and modeling and simulation tools for fuzing systems. Initiators, fuzes, and sensors must work reliably together to prevent unintended detonation, to correctly detect intended targets, and to initiate detonation when required. Projects in this focus area support the Department's needs to miniaturize fuzing systems. Smaller systems are required for several reasons including: 1) compatibility with smaller and lighter weapons systems, 2) trading volume in munitions for other components such as additional explosives, higher energy and power density power sources, or enhanced guidance systems, 3) increasing reliability through redundancy, for example, using of two or more smaller initiating systems, and 4) upgrading existing sub-munitions with smarter and more reliable fuzing systems.	3.510	3.699	3.830

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018

The miniaturization of fuzing systems requires new material and components, new power systems, new diagnostic techniques, and improved modeling tools for microdetonics. The Department also needs weapons systems with selectable effects, and these effects may be achieved with multi-point initiation systems. Such systems are inherently more complex and require improved characterization of initiator materials and components, as well as more sophisticated modeling and simulation tools. To attain greater precision and to avoid unintended collateral effects when weapons are used in the complex environment of counter-insurgency or counter-terrorist operations, target sensors must be reliable and provide high-fidelity discrimination. Projects in this focus area are developing technologies to achieve this level of performance in compact packages.

The specific projects in the initiators, fuzes, and sensors technical focus area are:
- Firing Systems Technology, comprising FireMod firing set code model development and validation, 1.6 hazard classification detonator development, and initiation and detonation physics on the millimeter scale.
- Safe, Arm, Fuze and Fire Technology, comprising Initiation and Detonation, and Advanced Firing System Components.
- Advanced Initiation Systems, comprising diagnostics development, microdetonics, miniature initiation systems, and detonators for enhanced safety.
- Thermal Battery Performance Modeling to develop a multi-physics modeling capability for thermal batteries.
- Thin Film Thermal Batteries (new start in FY 2015) to develop, mature, and transition a method to produce a thin, conformal, low-cost thermal battery.
- Vertical-Cavity Surface-Emitting Laser (VCSEL) sensors for proximity fuzing of munitions.
- Enabling Robust, Mode-Agile GPS-Denied Weapon Guidance through High-Efficiency Data Processing (new start in FY 2015).

FY 2016 Accomplishments:
- Designed Probabilistic Shock Threshold Criterion (PSTC) Validation Experiments to demonstrate validity in arbitrary shock analysis, (e.g., Taylor wave and fragment impact).
- Analysis and theoretical model of wave divergence using PSTC was conducted.
- Performed low-fidelity ignition characterization in small array configuration to verify feasibility.
- Completed ignition characterization of one DoD, and one DOE EM using medium array (36 samples) combinatorial design.
- Collected validation data for reactive burn and equation of state models via small-scale shock experiments.
- Demonstrated 500mA/cm2 with <0.5V polarization in thin-film thermal battery against pellet anode and cathode at 525C.
- Demonstrated 1.8V operation at 100mA/cm2 in thin-film thermal battery against coated separator and cathode at 525C.
- Transitioned the next version of the TABS software (TABS-SC v4) that will include the capability to perform coupled thermo-poro-mechanical and thermo-electrochemical simulations in a single-cell axisymmetric configuration.
- Planned for experiments required to validate coupled models at the battery scale.
- Performed Floret experiments on LX-21 explosive.

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Assessed efficacy of laser initiation of HMX explosive. - Collected spot-size data to extend James Model to account for area effect in LX-16 explosive. - Collected data for assessment of bridge material equations of state and conductivity tables. - Characterized the performance of nano-TATB (triaminotrinitrobenzene). - Report on ALEGRA Lagrangian code simulations of Exploding Foil Initiator (EFI) validation data published and distributed to the Air Force Research Laboratory. - Built prototype 200nF (nanofarad) multilayer glass capacitors that can withstand 2000 Vdc (Volts Direct Current). - PIV (Particle Imaging Velocimetry) diagnostic capability was completed. - Fabricated custom Si Avalanche PhotoDetectors (APDs) optimized for low-voltage performance and integration for the Photonic Proximity Fuze (PPF) sensor. - Prepared report summarizing GPS-denied sensor parameter space coupled with customer weapons guidance requirements. - Outline of proposed GPS-denied processor architectures with reduced size, weight, and power (SWaP) was completed. ***FY 2017 Plans:*** - Demonstrate 1.2V operation of thin-film thermal battery at 500mA/cm2 in coated configuration. - Complete implementation of insulation mechanical model and parameter fitting based on experimental data. - Expand Thermally Activated Battery Simulator (TABS) thermal material database with properties for thin film thermal battery materials, add active insulation capability to the TABS interface, and publish instructions to build and run a 3D thermal model. - Demonstrate validated fully-coupled thermo-poro-mechano-electrochemical single cell battery model. - Demonstrate model of full magneto hydrodynamic (MHD) slapper-initiating explosive train with predicted reliability, incorporating ALE3D. - Perform output characterization, large array (>80 samples). - Demonstrate an integrated modeling tool for detonator explosive performance. - Determine breakdown mechanisms in multilayer glass capacitors (MLGCs) and eliminate defect formers identified during prototype capacitor construction. - Demonstrate MLGC integration into micro fireset. - Micro-optic development, including new designs for detector collector lenses in addition to new VCSEL emitters. - Deliver initial GPS-denied sensor hardware prototype and associated radar guidance software to DoD customer for evaluation. ***FY 2018 Plans:*** - Deliver initial GPS-denied sensor hardware prototype and associated radar guidance software to DoD customer for evaluation.			
Title: Warhead and Penetration Technology	3.214	3.063	3.261
Description: This focus area supports the development of new warheads and penetrator weapons through advances in materials processing and characterization, instrumentation, and computational codes. Significant increases in warhead performance are			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018

directly attributed to our ability to understand and accurately model the physics and fine details of new warhead designs, and to advances in increasingly sophisticated material processing. The Department's requirement to achieve more precise weapon effects with minimum collateral damage is supported by work on controlled fragmentation, non-fragmenting warhead cases, and multiphase blast explosives (MBX). More recently, increases in performance and reductions in vulnerability are being achieved through improved warhead integration into munitions using a systems-oriented approach.

The goals for penetrator weapons are to investigate, develop, and transition advanced technologies for the design, development, and performance assessment of the next generation of high performance, precision strike weapons. This effort directly supports national initiatives to defeat hard and deeply buried targets, which are proliferating worldwide, and to deny/defeat weapons of mass destruction. The work addresses high-velocity penetration into granular materials (sand and soil), penetration into advanced high-strength and ultra-high-performance concretes, new penetrator materials and designs, and non-inertial onboard instrumentation.

The specific projects in the warhead and penetration technology focus area for FY16 are:
- Multiphase blast munitions (MBX) technology.
- Dynamic behavior of concrete. (New start in FY16)
- Integrated munitions modeling & experimentation.
- Modeling of strategic structures subject to ballistic impact or blast.
- Concrete perforation and penetration modeling and experiments.
- Explosive/metal interactions.
- Structure, mechanical & shock-loading response, and modeling of materials.
- Controlled effects warhead materials.

FY 2016 Accomplishments:
- Developed ALE3D version of multiphase model with improved and validated detonics capability informed by Meso-scale simulations.
- Microstructural and constitutive property comparison of wrought vs. Additive Manufacturing-fabricated candidate metals and alloys was conducted.
- Investigated powder bed printing parameters and identified suitable infiltration candidates for preformed frags, skin lattices, and structural energetics.
- Completed oblique HE-driven shock hardening & damage microstructural quantification on Tantalum on flat and curved plate samples to quantify the joint effects of obliquity and curvature.
- Conducted plate penetration experiments using Taylor-Anvil Facility.
- Conducted sphere extrusion testing on "Nano-crystalline" Copper-Alloys and Copper-Tantalum alloys.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Verified Tensile Plasticity (TEPLA) implementation into CartaBlanca and compare improved representation of plate impact response to Lagrange code representation. - Evaluated debris-free fragmentation modeling. - Issued report on technology gaps for interface models. - Completed validation tests of gyro sensor. - Implemented improvements into CTH-MPM-Multi-field model for penetration. - Completed probabilistic studies of projectile penetration/perforation. - Completed transition of Peridynamics technology to Sierra/SM code. ***FY 2017 Plans:*** - ALE3D version of MBX model with validated key particulate plume transport physics, drag model and surface instabilities, through use of experiments. - Exercise ALE3D MBX capability to interact with complex (failing) targets. - Quasi-static and dynamic characterization of lattice structures. - Direct numerical simulations of architected structures under dynamic loading. - Development of constitutive models for Additive Manufactured (AM) microstructures and homogenization for lattice structures. - Design, print, and infill suitable architectures for dynamic compression. - Complete oblique HE driven shock hardening and damage microstructural characterization on Zirconium/Titanium and Copper/Lead alloys. - Transition updated materials databases and materials models. - Utilize Dynamic Tensile-Extrusion experimental facility, diagnostics, and modeling to support warhead material validation and complete shear localization studies of relevant warhead materials. - Calculate the flat-plate oblique shock experiment performed on Tantalum and compare results with experimental data and recovered sample metallography. Make observations about improvement needed to the material model and computational code. - Calculate the curved-plate oblique shock experiment performed on Tantalum and account for improvements made vice the flat-plate configuration. - Issue report on impact energy transfer across threaded interfaces. - Implement material failure models into CTH-Multipoint Method-Multi-field code. - Implement improved user interface into the Peridynamics-Multiscale (PDMS) code. ***FY 2018 Plans:*** - Implement improved user interface into the Peridynamics-Multiscale (PDMS) code.			
Title: Munitions Lifecycle Technologies	1.137	0.819	1.192

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018

Description: This focus area supports improving the Department's ability to understand measure, predict, and mitigate safety and reliability problems caused by materials aging and degradation in weapons systems. Current stockpile assessment methods typically focus on addressing materials aging and reliability problems after they occur, rather than anticipating and avoiding future problems or failure mechanisms. The overall objective of this work is to develop a toolset of computational models that are able to quantitatively predict materials aging processes and ultimately improve the long-term reliability of weapons systems, subassemblies, and/or components. These objectives are achieved by identifying aging mechanisms, quantifying the rates at which those aging mechanisms occur, developing predictive models, and using these models to predict the munitions stockpile reliability. An additional objective of this work is to develop technologies and methodologies to enable munitions health management and condition-based maintenance.

The specific projects in the munitions lifecycle technologies focus area are:
- Predictive Materials Aging, including solder interconnect reliability, corrosion of electronics, and adhesive degradation.
- Microelectromechanical systems (MEMS) reliability.
- Military use of commercial off-the-shelf (COTS) electronics.
- Complex system health assessment.
- Physical/chemical reactive transport modeling of material/system aging and reliability. (New start in FY16).

FY 2016 Accomplishments:
- Completed Package-on-Package-on-Package (PoPoP) experiments (data collection and analysis).
- Expanded the Package-on-Package PoP model to include PoPoP.
- Assessed flash layer approach to tin whisker mitigation.
- Generalized success model for use in other circuits.
- Validated the most promising tin whisker mitigation methods in actual operating environments.
- Refined predictions of adhesive failure: napkin ring tests to identify additional parameters necessary for predictive model (e.g., cure, thermal, and/or dynamic loadings).
- Performed and reported results on principle component analysis (PCA) of data generated from MEMS Gyroscope testing.
- Released to the DoD early prototype of physics-based lifetime predictive model based on physics-of-failure (PoF) approach.
- Developed methodology to compare sub-population characteristics and reliability
- Created software tools for integration Prognostics and Health Monitoring (PHM) and System Assessment (SA) methodologies and strategies, software and documentation.
- Simulated 3D multi-material aging experiments and executed 3D validation experiments, on DOE-relevant materials.
- Down selected DoD-relevant materials and worked through logistics to obtain samples for subsequent testing.

FY 2017 Plans:

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Transition tin whisker mitigation to commercial plating houses. - Transition first principles (Dynamic recrystallinzation) tin whisker mitigation methods to industry. - Demonstrate roll-up of bondpad & connector corrosion models to predict system performance / reliability. - Validate predictions of adhesive degradation in humid environments in a unique geometry: smooth stainless steel surfaces. - Develop Accelerated Aging MEMS protocol/statistically-based model. - Experimentally characterize and model the physical-chemical aging response of one to three DoD material(s), dependent on complexity of mechanism. - Intermediate delivery of compact lifetime predictive models to the DoD customer. - Validate the most promising tin whisker mitigation methods in actual operating environments. ***FY 2018 Plans:*** - Validate predictions of adhesive degradation in humid environments in a unique geometry: smooth stainless steel surfaces.			
Accomplishments/Planned Programs Subtotals	18.129	17.256	18.662

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

1. Transition of technologies developed by the Joint DoD/DOE Munitions Technology Program are tracked and documented. In FY 2015 there were over 50 transitions to DoD weapons programs and personnel.
2. Attendance and technical interactions at the semiannual meetings of the eight Technology Coordinating Groups (TCGs) are tracked and documented.
3. Laboratory Five-Year Plans are prepared, evaluated, and analyzed by management and technical staff.
4. TCG Chairmen's Annual Assessments for each TCG are critically reviewed by the Technical Advisory Committee (TAC) to determine progress, validate transition plans, and verify relevance of each project.
5. Project progress toward goals and milestones is assessed at each biannual TCG meeting and critically reviewed annually by the TAC.
6. Annual technical reports, papers, and presentations are tracked and documented.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603288D8Z / *Science and Technology (S&T) Analytic Assessments*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	13.299	14.145	12.048	13.154	-	13.154	16.676	16.604	16.873	17.228	Continuing	Continuing
P328: *Science and Technology Analytic Assessments*	13.299	14.145	12.048	13.154	-	13.154	16.676	16.604	16.873	17.228	Continuing	Continuing

A. Mission Description and Budget Item Justification

This Program Element (PE) directly supports the development of innovative capabilities to meet the emerging threats from the diverse range of state and non-state actors confronting the Unites States. These capabilities include: space and terrestrial-based indications and warnings systems, integrated and resilient Intelligence, Surveillance, Reconnaissance (ISR) platforms, strategic lift, long-range precision strike weapons, missile defense technologies, undersea systems, remotely operated vehicles and technologies, special operations forces, the Cyber Mission Force, ground systems, and others outlined in the 2015 National Military Strategy. Analytic assessments are informed comprehensive Kill Chain Analysis (KCA) across all domains and the time continuum from 2015-2035 to identify prioritized operational issues and associated actionable technology focus areas and help to support detailed analyses and assessments to inform and influence programmatic decisions regarding technology development and procurement plans. The science and technology (S&T) analytic assessments performed under this budget item include the following activities:

- Technical threat assessments building on intelligence community products for identifying gaps in U.S. capability for critical threats.
- Independent assessment of critical capability and technology development.
- Architecture development and evaluation to develop new U.S. capability.
- Development of strategic analytic tools enabling the analysis and evaluation of critical capability and technology development.
- Quantitative analysis of potential new technology and concepts to address capability gaps and counter emerging threat technologies.

Due to the complexity of these challenges, the process for developing and executing these analytic assessments span fiscal years and may have multiple phases. The emerging nature of the problem sets makes identification of studies beyond the budget year unlikely. Typically, the ratios of resources applied to quick reaction studies, strategic analysis, and development of analytic tools will be roughly 30/50/20 percent. The first step in the process is to quickly assess gaps and options to fill those gaps; second, produce detailed analysis quantifying key attributes of the challenge, assess options, and provide an operational value assessment; and finally, develop analytic tools to help understanding of complex and longer term challenges. Implementation of this process could span multiple years causing the portfolio to cascade from year to year.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603288D8Z *I Science and Technology (S&T) Analytic Assessments*

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	14.645	12.048	13.166	-	13.166
Current President's Budget	14.145	12.048	13.154	-	13.154
Total Adjustments	-0.500	0.000	-0.012	-	-0.012
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.500	-			
• Other Adjustments	-	-	-0.012	-	-0.012

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603288D8Z / *Science and Technology (S&T) Analytic Assessments*	Project (Number/Name) P328 / *Science and Technology Analytic Assessments*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P328: *Science and Technology Analytic Assessments*	13.299	14.145	12.048	13.154	-	13.154	16.676	16.604	16.873	17.228	Continuing	Continuing

A. Mission Description and Budget Item Justification

This Program Element (PE) directly supports the development of innovative capabilities to meet the emerging threats in the diverse range of state and non-state actor's threats confronting the Unites States. These capabilities include: space and terrestrial-based indications and warnings systems, integrated and resilient Intelligence, Surveillance, Reconnaissance (ISR) platforms, strategic lift, long-range precision strike weapons, missile defense technologies, undersea systems, remotely operated vehicles and technologies, special operations forces, the Cyber Mission Force, ground systems, and others outlined in the 2015 National Military Strategy. The science and technology (S&T) analytic assessments performed under this budget item include the following activities:

- Technical threat assessments building on intelligence community products for identifying gaps in U.S. capability for critical threats.
- Independent assessment of critical capability and technology development.
- Architecture development and evaluation to develop new U.S. capability.
- Development of strategic analytic tools enabling the analysis and evaluation of critical capability and technology development.
- Qualitative analysis of potential new technology and concepts to address capability gaps and counter emerging threat technologies.

Due to the complexity of these challenges, the process for developing and executing these analytic assessments span fiscal years and may have multiple phases. The emerging nature of the problem sets makes identification of studies beyond the budget year unlikely. Typically, the ratios of quick reaction studies, strategic analysis, and development of analytic tools will be roughly 30/50/20 percent. The first step in the process is to quickly assess gaps and options to fill those gaps; second, produce detailed analysis quantifying key attributes of the challenge, assess options, and provide an operational value assessment; and finally, develop analytic tools to help understanding of complex and longer term challenges. Implementation of this process could span multiple years causing the portfolio to cascade from year to year with each effort moving through the phases of study, experiment, and evaluation.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Science and Technology Analytic Assessments	14.145	12.048	13.154
Description: Science and Technology Analytic Assessments supports the development of innovative capabilities to meet the emerging threats in the diverse range of state and non-state actor's threats confronting the Unites States. These capabilities include: space and terrestrial-based indications and warnings systems, integrated and resilient Intelligence, Surveillance, Reconnaissance (ISR) platforms, strategic lift, long-range precision strike weapons, missile defense technologies, undersea systems, remotely operated vehicles and technologies, special operations forces, the Cyber Mission Force, ground systems, and others outlined in the 2015 National Military Strategy.			
FY 2016 Accomplishments:			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
In an effort to grow a balanced program, the planned ratio of quick reaction studies, strategic analysis, and analytic tool development will be 30/50/20 percent. The activities in FY 2016 were more heavily weighted towards studies which may later mature into development of analytic tools. In general, the following activities were executed: Quick Reaction Studies: - Quick Reaction Analytic efforts responded to critical questions related to potential vulnerabilities in current and future US systems to identify opportunities or challenges related to developing adversary capabilities. - Engineered feasibility assessment of developing missiles threats. - Engineered feasibility assessment of options for electronic warfare capability applied to missile defense. - Assessed options to counter adversary Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR). - Conducted a quick-look assessment of future US Army aviation options to support ground combat. - Conducted a quick-look effort to build a desktop compendium of US technology efforts focused on countering unmanned undersea vehicles. - Assessed future plans and options for Active Protection Systems for ground combat armored vehicles. - Conducted quick-look independent assessment of Long Range Precision Fires vulnerability in support of Milestone A decision. - Assessed land combat area denial options excluding mines and cluster munitions. - Assessed of future missile warning systems capability against emerging rocket technology. Strategic Analysis: - Quantified distributed electronic warfare capabilities achievable in an Integrated Air Defense Systems (IADS) region. - Identified future threat detection and identification capabilities for future electronic support systems. - Generated techniques for proactive offensive electronic warfare. - Conducted system and technology assessments for surface and sub-surface warfare. - Assessed options for electronic attack against missiles. - Assessed technologies to counter adversary electronic warfare. - Completed the assessment of Multi-Axis/Multi-Threat Raids against U.S. Naval and land based assets. - Assessed counters to Unmanned Aerial Vehicle (UAV) threat capability. - Assessed options for protection of airborne high value air assets (HVAAs). - Assessed options for countering adversary Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR). - Assessed options to counter adversary SIGINT. - Explored feasibility and potential of next generation electronic warfare technologies. - Assessed options and identify similarities in countering unmanned systems in all domains.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603288D8Z / *Science and Technology (S&T) Analytic Assessments*	**Project (Number/Name)** P328 / *Science and Technology Analytic Assessments*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Assessed options to counter strategic unmanned air vehicle threats. Analytic Tools: - Continued development of a reconfigurable airborne multi-band radar test bed designed to emulate the seekers of emerging threat missile systems. ***FY 2017 Plans:*** In order to accomplish a balanced program, the target ratios of quick reaction studies, strategic analysis, and analytic tool development is planned to be 30/50/20 percent. Accordingly, the following activities are planned for FY 2017: Quick Reaction Studies: - Quick Reaction Analytic efforts responding to critical questions related to potential vulnerabilities in current and future US systems to identify opportunities or challenges related to developing foreign capabilities. These short studies typically focus on the following capability areas: foreign, integrated air and missile defense capabilities; options for US electronic warfare and capability to counter adversaries; resiliency in US Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) systems and options to counter adversaries C4ISR capabilities; ground combat offensive and defensive capabilities, air dominance and missile defense, and undersea engagements. Strategic Analysis: - Evaluation of options to counter foreign missile capabilities. - Analysis of options for area denial capability. - Explore feasibility and potential of next generation electronic warfare technologies. - Quantify distributed electronic warfare capabilities achievable in an Integrated Air Defense Systems (IADS) region. - Identify future threat detection and identification capabilities for future electronic support systems. - Generation of techniques for proactive offensive electronic warfare. - Experimental data collection applied to a wider range of ISR capabilities. - System and technology assessments for surface and sub-surface warfare. - Evaluate options for a U.S. land based defense against a cruise missile raid. - Evaluate architecture options for countering Unmanned Aerial Vehicles (UAVs). - Evaluate efficacy of passive systems and counters to passive systems. Analytic Tools: - Development of analytic tools to inform and evaluate new technologies' potential to counter emerging threats and exploit adversary vulnerabilities from air, land, sea, and space domains.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603288D8Z / *Science and Technology (S&T) Analytic Assessments*	**Project (Number/Name)** P328 / *Science and Technology Analytic Assessments*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018

- Continue testing and data collection of the reconfigurable airborne multi-band radar test bed.
- Development of analytic tools to assess and underpin capabilities used in war gaming.
- Development of analytic tools to provide inform and provide decision support to resourcing recommendations.

FY 2018 Plans:

To fully inform the analytic assessments, maintenance and expansion of the Kill Chain Analysis analytic foundation will be included in this effort. This will include improvements in the underlying data fidelity and breadth, and in all aspects of display, analysis, assessment, integration, entity relationships and interactions. Specific tasks that will be executed within the Kill Chain Analysis area include:

- Continued research of new, emerging and modified Blue and Red platforms and components and integration into the Kill Chain Analysis data environment.
- Conduct a data refresh at the platform and component level of detail to ensure the KCA database is populated with the latest intelligence and technical data.
- Updated Kill Chain and Target Set assessments in support of the overall Operational Analysis within KCA.
- Continued development of threat agnostic Operational and Technical Issues and integration into the KCA environment.
- Expansion of the scope of Operational and Technical Issues into new Warfare Areas.
- Integration of Science and Technology elements (initiatives, potential solutions, technologies etc) into the KCA environment (Operational and Technical Issues, Kill Chains, Target Sets etc.).
- Continued development, enhancements, and upgrades to the entire Kill Chain Analysis Toolset including the Kill Chain Analysis Results Display System.

In order to accomplish a balanced program of assessments, the target ratios of quick reaction studies, strategic and operational analysis, and analytic tool development is planned to be 20/60/20 percent. Accordingly, the following activities are planned for FY 2017:

Quick Reaction Studies:

- Quick Reaction Analytic efforts responding to critical questions related to potential vulnerabilities in current and future US systems to identify opportunities or challenges related to developing foreign capabilities. These short studies typically focus on the following capability areas: foreign, integrated air and missile defense capabilities; options for US electronic warfare and capability to counter adversaries; resiliency in US Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) systems and options to counter adversaries C4ISR capabilities; ground combat offensive and defensive capabilities, air dominance and missile defense, and undersea engagements.

Strategic and Operational Analysis:

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603288D8Z / *Science and Technology (S&T) Analytic Assessments*	**Project (Number/Name)** P328 / *Science and Technology Analytic Assessments*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Evaluation of options to counter foreign missile capabilities. - Analysis of options for area denial capability. - Explore feasibility and potential of next generation electronic warfare technologies. - Quantify distributed electronic warfare capabilities achievable in an Integrated Air Defense Systems (IADS) region. - Identify future threat detection and identification capabilities for future electronic support systems. - System and technology assessments for surface and sub-surface warfare. - Evaluate options for land based defense against a cruise missile raid. - Evaluate efficacy of passive systems and counters to passive systems. - Assess emerging operational scenarios against future red and blue capability timelines. - Update existing Kill chain analyses based on emerging red and blue capability assessments. - Conduct Kill Chain analysis on new threat scenarios and projected threat capabilities. Analytic Tools: - Development of analytic tools to inform and evaluate new technologies' potential to counter emerging threats and exploit adversary vulnerabilities from air, land, sea, and space domains. - Development of analytic tools to provide inform and provide decision support to resourcing recommendations.			
Accomplishments/Planned Programs Subtotals	14.145	12.048	13.154

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

- Critical gaps in U. S. capability are identified.
- Gaps in U. S. technology development are identified.
- New architectures and evaluation criteria for developing U. S. capability are identified.
- Analytic tools to evaluate new technologies' potential to mitigate and counter emerging threats and exploit adversary vulnerabilities are developed.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603289D8Z / *Advanced Innovative Analysis and Concepts*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	48.760	48.873	57.020	37.674	-	37.674	37.513	37.925	38.762	39.892	Continuing	Continuing
P329: *Advanced Innovative Analysis and Concepts*	48.760	48.873	57.020	37.674	-	37.674	37.513	37.925	38.762	39.892	Continuing	Continuing

Note

In FY 2018 funds from PE 0603289D8Z / Advanced Innovative Analysis and Concepts is being transferred to PE 0603291D8Z Advanced Innovative Analysis & Concepts - Management Headquarters Activities (MHA), and 4GTN: PE 0903289D8Z / Operation & Maintenance which are not new programs.

A. Mission Description and Budget Item Justification

The Strategic Capabilities Office (SCO) identifies, analyzes, and accelerates the development, demonstration, and transition of selected capabilities to shape and counter emerging threats, and to improve U.S. security posture. In a partnership endeavor across the Office of the Secretary of Defense (OSD), Joint Staff, Combatant Commands (CCMDs), the Services, the Intelligence Community (IC), and other U.S. Government agencies, SCO combines capability innovation with concepts of operation and information management to develop novel, high-leverage approaches to address pressing national security challenges. SCO conducts projects on accelerated timelines, at any classification or access level.

The Advanced Innovative Analysis and Concepts Program Element supports development, studies, analysis, and demonstration of integrated concepts and prototypes, analysis in support of ongoing efforts to shape and counter emerging threats, cross-Service and cross-Defense/Intelligence concepts, and red-teaming. Projects focus on proving component and subsystem maturity prior to integration in major systems, and may involve risk reduction initiatives. Due to the nature of these projects, specific applications and detailed plans are available at a higher classification level.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603289D8Z / *Advanced Innovative Analysis and Concepts*

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	50.030	57.020	56.870	0.000	56.870
Current President's Budget	48.873	57.020	37.674	0.000	37.674
Total Adjustments	-1.157	0.000	-19.196	0.000	-19.196
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.157	-			
• Transfer of funds to PE 0603291D8Z Advanced Innovative Analysis & Concepts - MHA. This is not a new program.	0.000	0.000	-15.000	0.000	-15.000
• Transfer of funds to 4GTN: PE 0903289D8Z / Operation & Maintenance. This is not a new program.	-	-	-4.196	0.000	-4.196

Change Summary Explanation

In FY 2018 funds from PE 0603289D8Z / Advanced Innovative Analysis and Concepts is being transferred to PE 0603291D8Z Advanced Innovative Analysis & Concepts - MHA, and 4GTN: PE 0903289D8Z / Operation & Maintenance which are not new programs.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603289D8Z / *Advanced Innovative Analysis and Concepts*	Project (Number/Name) P329 / *Advanced Innovative Analysis and Concepts*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P329: *Advanced Innovative Analysis and Concepts*	48.760	48.873	57.020	37.674	-	37.674	37.513	37.925	38.762	39.892	Continuing	Continuing

Note

In FY18 funds from PE 0603289D8Z / Advanced Innovative Analysis and Concepts is being transferred to PE 0603291D8Z Advanced Innovative Analysis & Concepts - MHA, and 4GTN: PE 0903289D8Z / Operation & Maintenance which are not new programs.

A. Mission Description and Budget Item Justification

The Strategic Capabilities Office (SCO) conducts analysis in support of ongoing efforts to shape and counter emerging threats, with special emphasis on: innovative and architecture-level concepts, cross-Service and cross-Defense/Intelligence concepts, red-teaming, and on a case-by-case basis, research and development projects to demonstrate concept. SCO identifies, analyzes, and accelerates the development, demonstration, and transition of selected capabilities to shape and counter emerging threats, and to improve U.S. security posture. In a partnership endeavor across the Office of the Secretary of Defense (OSD), Joint Staff, Combatant Commands (CCMDs), the Services, the Intelligence Community (IC), and other U.S. Government agencies, SCO combines capability innovation with concepts of operation and information management to develop novel, high-leverage approaches to address pressing national security challenges. SCO conducts projects on accelerated timelines, at any classification or access level.

The Advanced Innovative Analysis and Concepts Program Element supports development, studies, analysis, and demonstration of integrated concepts and prototypes, analysis in support of ongoing efforts to shape and counter emerging threats, cross-Service and cross-Defense/Intelligence concepts, and red-teaming. Projects focus on proving component and subsystem maturity prior to integration in major systems, and may involve risk reduction initiatives. Due to the nature of these projects, specific applications and detailed plans are available at a higher classification level.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Alternate Strike	6.274	-	-
Description: The Alternate Strike program integrates existing weapons, launch platforms, and command and control structures in novel ways to quickly provide Combatant Commanders with critical multi-mission capabilities. This project will demonstrate the feasibility and utility of launching existing/modified weapons from existing launch platforms. This project will retire risks associated with cross platform integration to enable transition of new weapon/system combinations to Service partners. The FY2016 effort performed preliminary weapon/launch platform integration studies. The Alternate Strike project transitions from the Advanced Innovative Analysis and Concepts Program Element (PE) 0603289D8Z to the Advanced Innovative Technologies (PE) 0604250D8Z in FY 2017. Due to the nature of these projects, specific applications and detailed plans are available at a higher classification level.			
FY 2016 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603289D8Z / *Advanced Innovative Analysis and Concepts*	**Project (Number/Name)** P329 / *Advanced Innovative Analysis and Concepts*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Assessed Size, Weight, Area, and Power (SWAP) and environmental factors for new concepts and refined concepts based on assessments. • Conducted preliminary design of required platform or weapon modifications. • Initialized interface design for weapons/platform integration. • Developed and assessed concepts of operation for new concepts. • Finalized program plans for FY2017 – FY2020 development and demonstration.			
Title: Command and Control of the Information Environment ***Description:*** The Command and Control of the Information Environment (C2IE) project provides Combatant Commands, Services, Agencies, and Department of Defense leadership the ability to detect, monitor, understand, and act in the information environment. The C2IE project leverages commercial and other existing software tools to enable dynamic understanding of the information environment. C2IE will improve the warfighters ability to sense, understand, and visualize the information environment, and collaboratively plan and execute responses. Due to the nature of this project, specific applications and detailed plans are available at a higher classification level. The Command and Control of the Information Environment project transitions from the Advanced Innovative Analysis and Concepts Program Element (PE) 0603289D8Z to the Advanced Innovative Technologies (PE) 0604250D8Z in FY 2017. ***FY 2016 Accomplishments:*** • Developed a System Engineering Plan (SEP) and integrated all C2IE component capabilities. • Finalized data and network architectures and deployed C2IE software on multiple platforms. • Established a test and evaluation platform and lab for C2IE. • Provided an integrated set of analytic and visualization tools. • Conducted two capability demonstrations, and three additional familiarization engagements for various Combatant Commanders (CCMDs).	10.000	-	-
Title: Contender ***Description:*** SCO will develop and demonstrate an operational prototype that will extend the range of the current MK48 torpedo for use in expanded mission sets. The prototype will include modular payloads, communications, and advanced propulsion concepts. The Contender project transitioned to the Advanced Innovative Technologies Program Element (PE) 0604250D8Z in FY 2017. ***FY 2016 Accomplishments:*** • Performed component level analyses and integrated design review.	2.624	-	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603289D8Z / *Advanced Innovative Analysis and Concepts*	**Project (Number/Name)** P329 / *Advanced Innovative Analysis and Concepts*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Established program management and performance teams. • Developed Integrated Master Schedule (IMS) with stakeholder approval. • Performed trade space analysis for all required subsystems.			
Title: High-Fidelity Analysis and Concept Generation ***Description:*** The Strategic Capabilities Office (SCO) conducts analysis to identify and accelerate the development, demonstration, and transition of potentially game-changing capabilities to shape and counter emerging threats and improve U.S. security posture. All innovative concepts developed within SCO must first undergo a phase of thorough analysis before moving forward to become a project. Due to the nature of these projects, specific applications and detailed plans are available at a higher classification level. ***FY 2016 Accomplishments:*** SCO investigated and analyzed multiple game-changing applications of repurposed DoD technology to produce 14 separate issue papers to present for the Fall 2016 program reviews. Of those 14 issues, 11 were added to the FY 2018 PB, and will transition to the 0604250D8Z program element in FY 2018. These programs are Avatar, Breaker, Ghost Fleet, Hornet's Nest, LiTE Saber,Maven, Motley Crew, Sea Dragon, Serenity, StormSystem, and Vanguard. ***FY 2017 Plans:*** SCO will investigate opportunities to accelerate the fielding of capabilities to the warfighter in multiple mission areas; among them are autonomy, deep learning, logistics, and resilient communications. Additionally, SCO will expand its use of campaign level modeling and simulation to assess the relative value of new warfighting concepts and develop initial tactics, techniques, and procedures (TTP) for their employment. ***FY 2018 Plans:*** Continue to innovate in partnership with Services Program Offices and CCMDs to identify game-changing uses of existing systems and technologies.	17.077	57.020	37.674
Title: Sea Stalker ***Description:*** SCO will leverage existing low-cost, persistent maritime platforms to offer Combatant Commanders (CCMDs) deterrence options during a crisis. The Sea Stalker project seeks to retire the risk of platform and payload integration to provide an immediate, flexible capability. Due to the nature of the project, specific applications and detailed plans are available at a higher classification level. The Sea Stalker project transitioned to the Advanced Innovative Technologies Program Element (PE) 0604250D8Z in FY 2017. ***FY 2016 Accomplishments:*** • Developed integrated plan for platform/payload concept.	4.672	-	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603289D8Z / *Advanced Innovative Analysis and Concepts*	**Project (Number/Name)** P329 / *Advanced Innovative Analysis and Concepts*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Conducted proof-of-concept demonstration of maritime platforms in an operationally relevant scenario. • Finalized payload mission analysis. • Performed feasibility tests to quantify the capability to counter strategic threats.			
Title: Strike-X ***Description:*** The Strike-X project leverages existing strike capabilities and develops alternative Concepts of Employment (CONEMP) and Tactics, Techniques, and Procedures (TTP) to deliver near-term innovative strike capabilities to Combatant Commanders. Due to the nature of this project, specific applications and detailed plans are available at a higher classification level. The Strike-X project transitions from the Advanced Innovative Analysis and Concepts Program Element (PE) 0603289D8Z to the Advanced Innovative Technologies (PE) 0604250D8Z in FY 2017. ***FY 2016 Accomplishments:*** . Conducted preliminary design and systems engineering activities in support of system architecture, hardware design, and platform integration requirements. . Studied Doctrine, Organization, Training, Materiel, Leadership & Education, Personnel, and Facilities (DOTMLPF) implications for Strike-X. . Initiated modeling and simulation efforts to better inform Concept of Operations (CONOPS) development. . Developed operationally-relevant proof-of-principle demonstration plans to anchor modeling and simulation performance results.	6.000	-	-
Title: Third Eye ***Description:*** Third Eye is a data architecture that leverages existing and emerging sensors to provide real-time tracking and targeting for multi-Service strike weapons. The project will enhance tracking against hard targets in denied environments and maintain ability to securely communicate with these sensors in real-time. Due to the classified nature of this project, specific applications and detailed plans are available at a higher classification level. The Third Eye project will transition to the Advanced Innovative Technologies Program Element (PE) 0604250D8Z in FY 2017. ***FY 2016 Accomplishments:*** • Completed an integrated plan for platform/payload concept. • Provided innovative technology prototype analysis. • Provided analysis of sensor fusion, track maintenance and reporting performance prior to Clutch Shot Limited Objective Experiments (LOEs). • Provided on-site analytic support and post-experiment performance analysis for Clutch Shot LOEs. • Provided analysis of format conversions from tracks generated by disparate sensors.	2.226	-	-
Accomplishments/Planned Programs Subtotals	48.873	57.020	37.674

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603289D8Z / *Advanced Innovative Analysis and Concepts*	**Project (Number/Name)** P329 / *Advanced Innovative Analysis and Concepts*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics are specific to each Advanced Innovative Analysis and Concepts effort and include measures identified in the management approach, Statement of Work (SOW), and Period of Performance (POP). In addition, completions and successes are monitored against schedules and deliverables stated in the initiative's management approach. Due to the nature of these projects, specific applications and detailed plans are available at a higher classification level

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603291D8Z / *Advanced Innovative Analysis & Concepts - MHA*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	0.000	0.000	0.000	15.000	0.000	15.000	15.000	15.000	15.000	15.000	Continuing	Continuing
1: *SCO Operational Costs*	-	0.000	0.000	15.000	0.000	15.000	15.000	15.000	15.000	15.000	Continuing	Continuing

Note

This is not a new start program. Program was established in FY 2018 and funds transferred from PE 0603289D8Z / Advanced Innovative Analysis and Concepts to identify Management Headquarters Activities (MHA).

A. Mission Description and Budget Item Justification

The Strategic Capabilities Office (SCO) conducts analysis to identify and accelerate the development, demonstration, and transition of potentially game-changing capabilities to shape and counter emerging threats and improve U.S. security posture. This funding line was established in FY 2018 from transferred funds from PE 0603289D8Z / Advanced Innovative Analysis and Concepts, to be used for MHA related endeavors.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	15.000	0.000	15.000
Total Adjustments	0.000	0.000	15.000	0.000	15.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Transferred funds from PE 0603289D8Z / Advanced Innovative Analysis and Concepts	0.000	0.000	15.000	0.000	15.000

Change Summary Explanation

PE 0603291D8Z Advanced Innovative Analysis & Concepts - MHA, was established in FY 2018 from transferred funds from PE 0603289D8Z / Advanced Innovative Analysis and Concepts and is not a new program.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603291D8Z / *Advanced Innovative Analysis & Concepts - MHA*	Project (Number/Name) 1 / *SCO Operational Costs*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
1: *SCO Operational Costs*	-	0.000	0.000	15.000	0.000	15.000	15.000	15.000	15.000	15.000	Continuing	Continuing

Note

PE 0603291D8Z Advanced Innovative Analysis & Concepts - MHA, which is not a new program was established in FY 2018 from transferred funds from PE 0603289D8Z / Advanced Innovative Analysis and Concepts.

A. Mission Description and Budget Item Justification

The Strategic Capabilities Office (SCO) conducts analysis to identify and accelerate the development, demonstration, and transition of potentially game-changing capabilities to shape and counter emerging threats and improve U.S. security posture. This funding line was established in FY 2018 from transferred funds from PE 0603289D8Z / Advanced Innovative Analysis and Concepts for MHA endeavors.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: SCO Operational Costs - MHA	0.000	0.000	15.000	0.000	15.000
Description: The Strategic Capabilities Office (SCO) conducts analysis to identify and accelerate the development, demonstration, and transition of potentially game-changing capabilities to shape and counter emerging threats and improve U.S. security posture. This funding line which is not a new program was established in FY 2018 from transferred funds from PE 0603289D8Z / Advanced Innovative Analysis and Concepts for MHA related endeavors. ***FY 2016 Accomplishments:*** N/A ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** The Strategic Capabilities Office will utilize this funding for MHA related endeavors which will enable continued analysis, development, demonstration, and transition of capabilities to counter emerging threats and improve U.S. security posture. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.000	0.000	15.000	0.000	15.000

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603291D8Z / *Advanced Innovative Analysis & Concepts - MHA*	**Project (Number/Name)** 1 / *SCO Operational Costs*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 39: *0603291D8Z / Advanced Innovative Analysis & Concepts - MHA*	0.000	0.000	15.000	0.000	15.000	15.000	15.000	15.000	15.000	Continuing	Continuing
• 95: *PE 0604250D8Z / Advanced Innovative Technologies*	459.966	844.870	1,168.832	0.000	1,168.832	947.802	612.173	89.365	103.000	Continuing	Continuing
• 4GTN: *PE 0903289D8Z / Operation & Maintenance /*	0.000	0.000	4.144	0.000	4.144	14.200	18.060	16.499	16.883	Continuing	Continuing
• 40: *PE 0603289D8Z / Advanced Innovative Analysis and Concepts*	48.873	57.020	37.674	0.000	37.674	37.513	37.925	38.762	39.892	Continuing	Continuing

Remarks

PE 0603291D8Z Advanced Innovative Analysis & Concepts - MHA was established in FY 2018 from transferred funds from PE 0603289D8Z / Advanced Innovative Analysis and Concepts. This is not a new program element.

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics will be specific to each of the MHA's that are funded. All of which include measures identified in the management approach, Statement of Work (SOW), and Period of Performance (POP). In addition, completions and successes are monitored against schedules and deliverables stated in the initiative's management approach.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603291D8Z / *Advanced Innovative Analysis & Concepts - MHA*	**Project (Number/Name)** 1 / *SCO Operational Costs*

Remarks

Management Headquarters Activities - MHA's that are funded under the Advanced Innovative Analysis & Concepts.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603375D8Z / *Technology Innovation*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	10.000	25.000	89.923	59.863	-	59.863	79.749	99.191	98.856	100.934	Continuing	Continuing
P375: *Technology Innovation*	10.000	25.000	89.923	59.863	-	59.863	79.749	99.191	98.856	100.934	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Department of Defense (DoD) has a long history of technological breakthroughs and innovations originating from within the Department. In order to sustain technological superiority, the Department must take advantage of the rapid evolution of emerging commercial technologies that, when integrated with military systems and novel concepts of operation, will be a source of battlefield advantage.

The Program is focused on developing space-based Intelligence, Surveillance, and Reconnaissance (ISR), Artificial Intelligence-driven Geospatial Intelligence (GEOINT), and Fix-Find-Finish-Exploit-Assess (F3EA) into an integrated capability for defeating threats posed by nuclear-capable, mobile missile - a problem set often plagued by sparse data. Our approach is composed of three innovative building blocks: 1) Machine learning techniques applied to commercial GEOINT for automated anomaly and change detection throughout the country of interest - crucial element for enhancing our indications and warnings required for precision strikes; 2) Machine-Human collaboration architecture to accelerate the F3EA joint forces targeting and decision-making cycle; and 3) Autonomous weaponeering demonstration - Exercise secure (C2S) cloud for timely precision strikes to hold mobile missile systems at risk. These blocks will serve to overcome the sparse data problem set and reduce the decision-making process.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	0.000	39.923	59.917	-	59.917
Current President's Budget	25.000	89.923	59.863	-	59.863
Total Adjustments	25.000	50.000	-0.054	-	-0.054
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	25.000	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Other Adjustments	-	-	-0.054	-	-0.054
• FY2017 Request for Additional Appropriations	-	50.000	-	-	-

Congressional Add Details ($ in Millions, and Includes General Reductions)

	FY 2016	FY 2017
Project: P375: *Technology Innovation*		

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603375D8Z *I Technology Innovation*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2016	FY 2017
Congressional Add: *Technology Innovation IQT*	25.000	-
Congressional Add Subtotals for Project: P375	25.000	-
Congressional Add Totals for all Projects	25.000	-

Change Summary Explanation

FY 2017 Request for Additional Appropriations: $50.000 million is required to address emergency warfighting readiness requirements in support of the Advanced Analytics and Intelligence, Surveillance and Reconnaissance (ISR) projects

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603375D8Z / *Technology Innovation*	Project (Number/Name) P375 / *Technology Innovation*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P375: *Technology Innovation*	10.000	25.000	89.923	59.863	-	59.863	79.749	99.191	98.856	100.934	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Department of Defense (DoD) has a long history of technological breakthroughs and innovations originating from within the Department. In order to sustain technological superiority, the Department must take advantage of the rapid evolution of emerging commercial technologies that, when integrated with military systems and novel concepts of operation, will be a source of battlefield advantage.

The Program is focused on developing space-based Intelligence, Surveillance, and Reconnaissance (ISR), Artificial Intelligence-driven Geospatial Intelligence (GEOINT), and Fix-Find-Finish-Exploit-Assess (F3EA) into an integrated capability for defeating threats posed by nuclear-capable, mobile missile - a problem set often plagued by sparse data. Our approach is composed of three innovative building blocks: 1) Machine learning techniques applied to commercial GEOINT for automated anomaly and change detection throughout the country of interest - crucial element for enhancing our indications and warnings required for precision strikes; 2) Machine-Human collaboration architecture to accelerate the F3EA joint forces targeting and decision-making cycle; and 3) Autonomous weaponeering demonstration - Exercise secure (C2S) cloud for timely precision strikes to hold mobile missile systems at risk. These blocks will serve to overcome the sparse data problem set and reduce the decision-making process.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Technology Innovation	0.000	89.923	59.863
Description: The Program is focused on developing space-based Intelligence, Surveillance, and Reconnaissance (ISR), Artificial Intelligence-driven Geospatial Intelligence (GEOINT), and Fix-Find-Finish-Exploit-Assess (F3EA) into an integrated capability for defeating threats posed by nuclear-capable, mobile missile - a problem set often plagued by sparse data.			
FY 2016 Accomplishments: - Awarded/acquired multiple data sources and analytic performers - Successfully integrated multiple data sources into a "Big Data" environment - Executed analytical tests to establish small subset of baseline patterns of life			
FY 2017 Plans: - Illustrate machine learning (ML) techniques applications to commercial GEOINT for automated anomaly and change detection - ML algorithm development/testing multiple data sources within an integrated unclassified cloud - Development of Synthetic Aperture Radar (SAR) ML algorithms for Air assets - Conduct unclassified user-based training - Machine-Human collaboration architecture to accelerate the F3EA joint forces targeting and decision making cycle - Initiate integration and validation of ML algorithms in Secure (C2S) cloud			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603375D8Z / *Technology Innovation*	**Project (Number/Name)** P375 / *Technology Innovation*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Acquire micro-SAR space assets HW for development ***FY 2018 Plans:*** - Finalize unclassified user-based training - Test/Validate ML algorithms in Secure C2S Cloud - Transition initial prototype (UNCLAS/CLAS) to user - Test/Validate SAR ML algorithms for Air Assets - Initiate integration and validation of SAR within Secure (C2C) Cloud - Development of SAR ML for space-based imagery - Test/Validate micro-SAR space assets			
Accomplishments/Planned Programs Subtotals	0.000	89.923	59.863

	FY 2016	FY 2017
Congressional Add: Technology Innovation IQT	25.000	-
FY 2016 Accomplishments: - Awarded/acquired multiple data sources and analytic performers - Successfully integrated multiple data sources into a "Big Data" environment - Executed analytical tests to establish small subset of baseline patterns of life		
Congressional Adds Subtotals	25.000	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603527D8Z / *Retract Larch*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	39.320	105.243	181.977	171.120	-	171.120	162.440	161.412	164.546	167.933	Continuing	Continuing
P527: *Retract Larch*	39.320	105.243	181.977	171.120	-	171.120	162.440	161.412	164.546	167.933	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program is reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress. For further information, please contact the Director of Special Programs, OUSD(AT&L)/DSP.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	105.243	181.977	171.120	-	171.120
Current President's Budget	105.243	181.977	171.120	-	171.120
Total Adjustments	0.000	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			

Change Summary Explanation

None.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603527D8Z / *Retract Larch*	Project (Number/Name) P527 / *Retract Larch*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P527: *Retract Larch*	39.320	105.243	181.977	171.120	-	171.120	162.440	161.412	164.546	167.933	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program is reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress. For further information, please contact the Director of Special Programs, OUSD(AT&L)/DSP.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Retarct Larch	105.243	181.977	171.120
Description: Not applicable. Information Classified			
FY 2016 Accomplishments: Not applicable. Information is Classified.			
FY 2017 Plans: Information is classified.			
FY 2018 Plans: Information is classified.			
Accomplishments/Planned Programs Subtotals	105.243	181.977	171.120

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Not Applicable. Classified

E. Performance Metrics

Not Applicable. Classified

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603618D8Z / *Joint Electronic Advanced Technology*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	-	28.667	22.030	14.389	-	14.389	13.008	12.167	12.405	12.660	Continuing	Continuing
P619: *Joint Electronic Advanced Technology*	-	13.406	10.992	11.646	-	11.646	12.233	12.167	12.405	12.660	Continuing	Continuing
P244: *Advanced EW Technology Maturation Project*	-	5.426	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
P245: *EW Enterprise Exploration and Innovation*	-	9.835	11.038	2.743	-	2.743	0.775	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

To counter the United States' historic technological advantage, adversaries are increasingly developing asymmetric capabilities that are enabled by advanced commercial electronic components and devices that have become globally available. These threats range from terrorist-employed improvised devices, unmanned air systems and easily transportable man portable air defense systems to dedicated military systems that can diminish our technological advantage in conflicts with nation-states. They include cruise and ballistic missiles, integrated air defense systems (IADS) and the advanced sensor systems used by them to detect and target U.S. forces, and advanced electronic warfare (EW) systems used to deny or negate our sensors, communications and precision navigation and targeting capabilities.

The rate at which new threats are appearing continues to accelerate and new threats are emerging faster than traditional Department of Defense (DoD) research, development and acquisition processes can respond. The plethora of new electromagnetic spectrum (EMS) threats is making operations in the EMS significantly more complex. The challenges posed by new kinetic and non-kinetic threats and the dire consequences of technology surprise emphasize the need to rapidly develop and field innovative EW and EW-Cyber capabilities that can address new threats in fiscally and temporally responsible ways.

The Joint Electronic Advanced Technology (JEAT) Program addresses these challenges through efforts designed to accelerate the pace of EW and EW-Cyber capabilities development by exploring technologies and using approaches that fall outside the scope or purview of the Services' research and development (R&D) programs. Enabling the rapid transition of significant technologies to Service Programs of Record (PoR) at lower cost with lower risk is essential. JEAT thus explores and assesses technological approaches that integrate and demonstrate both new and off-the-shelf military and commercial technologies in innovative ways.

JEAT efforts are focused in four areas under two Project Codes, P619 (Joint Electronic Advanced Technology) and P245 (EW Enterprise Exploration and Innovation). (1) Experimentation/Demonstration (P619) utilizes innovative field and laboratory experimentation venues to understand current and future threats and explore potential countermeasures and overmatch opportunities. (2) Advanced Technology Development/Verification (P619) explores technologies and approaches to counter advanced threats in innovative ways. (3) EW Collaboration & Planning (P619) ensures appropriate technological oversight of Departmental and Service EW and EW-Cyber R&D programs and processes and provides necessary governance insights for senior decision makers. (4) EW Enterprise Exploration and Innovation (P245) accelerates the fielding of essential EW capabilities such as innovative countermeasures to new classes of advanced threats (including anti-access/area denial (A2/AD) threats),

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603618D8Z / *Joint Electronic Advanced Technology*

and exploring and developing a variety of non-kinetic technologies, tools, and approaches to counter advanced threats and enhancing operators' and analysts' comprehension of the electromagnetic spectrum (EMS) environment to enable real-time precision employment of non-kinetic capabilities.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	30.879	22.030	14.402	-	14.402
Current President's Budget	28.667	22.030	14.389	-	14.389
Total Adjustments	-2.212	0.000	-0.013	-	-0.013
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.400	-			
• SBIR/STTR Transfer	-0.812	-			
• Other Adjustments	-	-	-0.013	-	-0.013

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603618D8Z / *Joint Electronic Advanced Technology*	Project (Number/Name) P619 / *Joint Electronic Advanced Technology*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P619: *Joint Electronic Advanced Technology*	-	13.406	10.992	11.646	-	11.646	12.233	12.167	12.405	12.660	Continuing	Continuing

A. Mission Description and Budget Item Justification

Joint Electronic Advanced Technology (JEAT) explores and assesses innovative technologies and approaches to rapidly mitigate advanced threats and demonstrate new overmatch technologies in ways not being explored by the Services. JEAT's three efforts, Experimentation/Demonstration (Expt/Demo), Advanced Technology Development/Verification (ATD/V), and EW Enterprise Collaboration and Planning (EW C&P), focus on enabling nearer-term technology transitions to the Services' Programs of Record (PoR) with reduced risk and cost. Expt/Demo efforts focus on exploring, demonstrating, and assessing innovative technologies and approaches to overcome existing and developing threats and provide new overmatch capabilities for the U.S. military. ATD/V efforts integrate advanced commercial and military off-the-shelf technologies in ways not being explored by the Services to demonstrate nearer-term technological opportunities. EW C&P efforts within Electronic Warfare and Countermeasures Office (EWCO) of the Assistant Secretary of Defense for Research and Engineering assess, ensure coordination and provide senior leadership insights on all Departmental EW and EW-Cyber research and development (R&D) as well as coordinating national and international EW and EW-Cyber efforts.

Experimentation/Demonstration (Expt/Demo):

Expt/Demo explores and demonstrates new EW and EW-Cyber technologies and approaches through the use of large-scale, dynamic field experimentation venues. The current venue, Vigilant Hammer (VH), is a multi-year, multi-agency, live, virtual, and constructive event focused on advancing the state of the art for detecting, classifying, geolocating, and engaging of electromagnetic signals of interest. Modeled after JEAT's highly successful BLACK DART, TRIDENT SPECTRE, and Rotorcraft Aircraft Survivability Equipment Experiment (RASE) venues, VH includes both scripted and dynamic scenarios to give participants an opportunity to explore the efficacy of existing and new capabilities and approaches to engage emerging electromagnetic spectrum (EMS) threats. Follow-on venues will address concerns such as multi-platform/multi-aperture, collaborative/coherent EW and attacking multistatic passive/active sensing architectures.

Advanced Technology Development/Verification (ATD/V):

ATD/V explores, matures and assesses emerging technologies and approaches to address compelling EW and EW-Cyber warfighting needs. JEAT's ongoing ATD/V effort, the Distributed Electronic Effects Development (DEED) Laboratory, explores, matures and assesses emerging EW and EW-Cyber technologies to enable, for example, multi-aperture collaborative/coherent EW and EW-Cyber employment through exquisite coordination of sensing and electronic attack capabilities.

EW Enterprise Collaboration and Planning (EW C&P):

EW C&P supports all activities of the Director, EWCO, related to the selection, organization, oversight, and coordination of all EW- and EW-Cyber-related efforts across DoD. EW C&P oversees and ensures coordination and collaboration between OSD and the Joint Staff, the Combatant Commands, and the Services on all EW and EW-Cyber activities within DoD. To do this, EW C&P identifies, assesses, and develops recommendations to address EW- and EW-Cyber-related threats impacting sensor,

seeker, communications, platform survivability, countermeasures and battle management technologies. EW C&P also provides programmatic recommendations and decision support to the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics (OUSD(AT&L)) on PoR, including technology maturity and availability, Critical Program Information standards, Foreign Disclosure, and Technical Signals Requirements. EW C&P also conducts and leads analyses of advanced threats and technological opportunities to support Departmental EW and EW-Cyber R&D research, development and acquisition efforts.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Experimentation/Demonstration (Expt/Demo)	3.519	5.497	5.915
Description: Leveraging our history of conducting highly successful experimentation venues, our current multi-year, multi-agency, live, virtual and constructive series of field experimentation venues, Vigilant Hammer (VH), explores and assesses technologies and approaches to more effectively detect, classify, geolocate, engage, and assess actions against modern, agile and cognitive signals in a very dense and highly complex signals environment. Our next Expt/Demo venue, Nike's Hammer, will focus on multi-platform/multi-aperture nonkinetic (electronic and digital) engagement (NKE) of multistatic passive/active sensing architectures. As with VH and earlier all earlier JEAT experimentation venues, Nike's Hammer and subsequent future venues will be scoped to address the most pressing electromagnetic spectrum (EMS) threats, and the selection of venue topics and the scoping of these efforts will involve the EW and Cyber Communities of Interest and EXCOMs to ensure maximum relevance and benefits to Departmental efforts. ***FY 2016 Accomplishments:*** VH 2 was conducted in early May of FY 2016 and the final report was completed in November 2016. Assessment of VH 2 results is helping scope planning efforts for VH 3. ***FY 2017 Plans:*** Given the significant findings of VH 1 and VH 2, VH 3 is being delayed until the second quarter of FY 2018 to enable more focused engagement of specific sets of targets and higher fidelity examination of warfighting-essential nonkinetic engagement (NKE) capabilities. Assessment of earlier VH events, compelling threats, and technological maturity is also guiding initial planning efforts of our next Expt/Demo venue, Nike's Hammer, which will focus on multi-platform/multi-aperture NKE of multistatic passive/active sensing architectures. This venue will be planned during FY 2017 and FY 2018, and is tentatively scheduled to be held in early FY 2019. ***FY 2018 Plans:*** The third VH event will be held in the second quarter of FY 2018 with a report to follow within a couple of months. The results of VH 3 are expected to enable earlier transitions of new NKE warfighting tools and will guide planning for Nike's Hammer.			
Title: Advanced Technology Development/Verification (ATD/V)	2.934	1.511	1.627
Description: ATD/V research efforts mature and assess emerging technologies to address compelling EW and converged EW-Cyber warfighting needs. Utilize JEAT's Distributed Electronic Effects Development (DEED) Laboratory, these efforts focus on identifying and integrating multiple advanced technologies to synergistically create effects that are far greater than the sum of the			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603618D8Z / *Joint Electronic Advanced Technology*	**Project (Number/Name)** P619 / *Joint Electronic Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
constituent systems and identifying more effective and lower cost approaches to more effectively utilize, manage, and protect U.S. electromagnetic spectrum capabilities. The DEED Laboratory integrates promising technologies into UAVs managed by the Naval Air Warfare Center, Weapons Division (NAWCWD), for further exploration and assessment in venues like VH. ***FY 2016 Accomplishments:*** Initial setup of the DEED Laboratory started in mid-FY 2016. Significantly leveraging existing laboratory and analytical capabilities at the NAWCWD, Point Mugu, CA, the DEED Laboratory's first experimentation efforts will begin following certification of the laboratory in FY 2017. ***FY 2017 Plans:*** The DEED Laboratory's first experimentation efforts will focus on exploring, developing and validating multi-platform, multi-aperture techniques and approaches that can be employed from distributed systems (unmanned air systems (UAS)). Once developed and validated within the DEED Laboratory's controlled environment, these capabilities will be integrated into prototypical systems and further explored and assessed in field experimentation venues such as VH. ***FY 2018 Plans:*** Building on FY 2017 efforts, the DEED Laboratory will continue exploring, developing and validating multi-platform, multi-aperture techniques and approaches that can be employed from distributed systems. Promising capabilities will be integrated in UAS for exploration and assessment in VH 3 and Nike's Hammer.			
Title: Innovative Technology Exploration (ITE) ***Description:*** ITE supported the Assistant Secretary of Defense for Research and Engineering (ASD(R&E)), and the Director, Electronic Warfare and Countermeasures, through studies and analyses of emerging asymmetric threats. Past efforts included supporting the Aircraft Survivability Equipment Joint Analysis Team and the Helicopter Survivability Task Force, both of which resulted in significant strategic technology investments by the DoD. ***FY 2016 Accomplishments:*** FY 2016 efforts focused on analysis of alternative courses of action employing advanced, adaptive and cognitive EW technologies emerging in commercial data communications, radar, and other advanced spectrum domains previously dominated by DoD. The evaluation of complex spectrum environments, system-to-system interactions; link budget analyses; size, weight and power analysis; and other relevant analytic studies were accomplished under this effort, including issues related to modeling of many advanced jammers operating in the same airspace. ***FY 2017 Plans:***	1.328	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603618D8Z / *Joint Electronic Advanced Technology*	**Project (Number/Name)** P619 / *Joint Electronic Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Project terminated in FY 2016. Efforts were consolidated into Expt/Demo and ATD/V. ***FY 2018 Plans:*** Project terminated in FY 2016.			
Title: EW Enterprise Collaboration and Planning (EW C&P) ***Description:*** This effort supports the Director, Electronic Warfare and Countermeasures in coordinating, overseeing and managing the plethora of electromagnetic spectrum (EMS) warfare-related research and development (R&D) activities across DoD for the Assistant Secretary of Defense for Research and Engineering. It includes maintaining cognizance of all EW capabilities and capability development activities worldwide; overseeing the all EW-related R&D activities across DoD; exploring new and innovative EMS technologies and approaches; coordinating Departmental, EW-related R&D, programs, protocols, and policy; analyzing requisite development and operational interfaces across DoD and with international partners; and reporting relevant information to top senior leaders and across Department as well as to Congress and other external groups. ***FY 2016 Accomplishments:*** In FY 2016, EW C&P efforts included participating in the EW Executive Committee (EXCOM); providing guidance to and oversight of EW Community of Interest (COI) activities; providing direction and management of Joint Electronic Advanced Technology Experimentation/Demonstration and Advanced Technology Development/Verification efforts including initiating new interactions with the Intelligence Community at senior levels to address critical intelligence gaps related to foreign EMS capabilities and advanced technology development efforts; stimulating the initiation of a new study assessing foreign material exploitation and acquisition processes; organizing a new security portfolio for all DoD EW Special Access programs; advancing initiatives for the establishment EW vulnerability portfolios; and providing leadership of efforts to identify potential technological solutions to address Joint Urgent Operational Need SO-0010. ***FY 2017 Plans:*** In addition to continued participation in ongoing efforts mentioned above, FY 2017 efforts include analysis of alternative courses of action for employing advanced, adaptive and cognitive EW technologies that are being developed and marketed commercially for data communications, radar, and other advanced spectrum domains previously dominated by DoD. Assessment of complex spectrum environments, system-to-system interactions, link budget analyses, size, weight and power analyses and other relevant analytic studies will be undertaken as part of this effort, to include issues related to modeling of many advanced jammers operating in the same area. Plans and exploratory investigations will evolve to evaluate and harvest emerging concepts and technologies from the R&E Reliance Process and the EW S&T COI road maps. Analysis and coordination of national and international efforts addressing emerging Information Operations and EW-Cyber Convergence topics will begin as well as efforts	5.625	3.984	4.104

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603618D8Z / *Joint Electronic Advanced Technology*	**Project (Number/Name)** P619 / *Joint Electronic Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
to advance imaging IRCM countermeasure technologies and expand U.S.-Australia collaboration in EW-Cyber. Efforts will also guide planning of EW Enterprise Exploration and Innovation (P245) research efforts. ***FY 2018 Plans:*** In addition to previous, ongoing efforts, FY 2018 efforts will focus on the development of a variety of new EW capabilities including distributed cooperative or coherent aperture techniques; battle management and visualization technologies for optimization of non-kinetic fires; asymmetric targeting technologies; passive system countermeasure techniques; and national technical means applications to EW.			
Accomplishments/Planned Programs Subtotals	13.406	10.992	11.646

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603618D8Z / *Joint Electronic Advanced Technology*	Project (Number/Name) P244 / *Advanced EW Technology Maturation Project*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P244: *Advanced EW Technology Maturation Project*	-	5.426	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Advanced Electronic Warfare (EW) Technology Maturation Project is a one-year effort to mature and demonstrate modular, distributed, configurable EW technologies and systems designs addressing U.S. Marine Corps (USMC) and U.S. Army warfighting requirements that will accelerate the fielding of advanced EW capabilities in the FY 2017 Intrepid Tiger II (IT2) Program of Record. This effort will develop and integrate capabilities to counter radar targets while mitigating blue-on-blue and co-site interference impacts into an existing communications jamming capability.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Advanced EW Technology Maturation Project	5.426	0.000	0.000

Description: Technologies demonstrated in this effort will be integrated into future USMC precision EW system of systems architectures and will enable distributed, adaptive, and scalable counter-communications and counter-radar EW capabilities that are compliant with existing open architecture systems and net-centric architectures. The architectural evaluation in conjunction with the digital RF technologies evaluation will inform USMC EW developers on the "art of the possible" of current advanced technology capabilities and influence multi-element system designs. These capabilities are envisioned to support combat and contingency operations throughout the world, and are anticipated to transition to the warfighter in the USMC Intrepid Tiger II (AN/ALQ-231) Family of systems. These efforts have potential to influence future U.S. Army and Joint Service programs.

FY 2016 Accomplishments:

FY 2016 efforts included the collaboration and evaluation of maturating technologies developed by the Defense Advanced Research Projects Agency (DARPA), industry and the Services to support the USMC EW requirements for counter-radar electronic attack capabilities into existing counter-communications EW systems. New capabilities developed in this effort will counter current and future radar threats, provide improved communications operational availability by adding a spectral "relocation" coordination capability and mitigate co-site interference on a mission by mission basis by utilizing dynamically reprogrammable channelized amplifiers and digital filters. Specific efforts included:

• Initial threat systems evaluation conducted to support technology requirements definition.
• Initial architectural design (systems and RF) identified and drafted. This included a modular system mechanical layout supporting ground, air and surface system needs and functionality inclusion to support spectrum relocation and co-site interference mitigation.
• Identified technology requirements needed to provide spectrum diverse capabilities from up to millimeter wave in alignment with the above listed threats.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603618D8Z / *Joint Electronic Advanced Technology*	**Project (Number/Name)** P244 / *Advanced EW Technology Maturation Project*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Significant market research completed including meeting with industry partners. • Investigated, identified and procured advanced transceiver technologies. • Investigated, identified and procured advanced modem and network technologies including waveform transitions. • Investigated amplifier technologies, solid state and microwave power module. • Investigated general antenna technologies and implementations for both podded and external mounting options. • Investigated industry standards to determine best approach to support the open architecture design. • Evaluated simultaneous transmit and receive antenna technologies and analog cancellers. • Evaluated phased array antennas. These efforts will be continued under USMC program funding starting in FY 2017. ***FY 2017 Plans:*** This one-year effort was completed in FY 2016. ***FY 2018 Plans:*** This one-year effort was completed in FY 2016.			
Accomplishments/Planned Programs Subtotals	5.426	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603618D8Z / *Joint Electronic Advanced Technology*	Project (Number/Name) P245 / *EW Enterprise Exploration and Innovation*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P245: *EW Enterprise Exploration and Innovation*	-	9.835	11.038	2.743	-	2.743	0.775	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

This four-year project started in FY 2016. It accelerates the development of innovative technologies to: (1) provide countermeasures to new classes of advanced electronic warfare (EW) threats, (2) develop and demonstrate new approaches to enable high fidelity, real-time comprehension and control of the electromagnetic spectrum battlespace and the effects of non-kinetic attack tools within it, and (3) develop and validate new EW-Cyber capabilities. Five efforts were initiated to address these objectives. Advanced Airborne Countermeasures Development and Advanced Defensive Countermeasures Development address area (1). Non-Kinetic Battle Management and Visualization Technology Development address area (2) and Advanced EW and EW-Cyber Exploration/Development address area (3). The fifth effort, Ultra Wideband Receiver Development, successfully demonstrated two systems in Vigilant Hammer. Given the maturity of these approaches and many additional developments taking place in this area, the effort was terminated after FY 2016.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Advanced Airborne Countermeasures Development	3.474	4.550	0.000
Description: This two-year classified effort commenced in FY 2016. It will mature and demonstrate an advanced countermeasure to a new class of missile seeker threats that have expanded spectral and temporal coverage and resolution. Final products of this effort will be integrated into existing countermeasure architectures for effectiveness assessment. Expanding on earlier developmental efforts, the final objective of this effort is to enable the earlier transition of a candidate countermeasure capability to the warfighter. ***FY 2016 Accomplishments:*** FY 2016 efforts expanded ongoing existing efforts to develop and begin assessments of the objective threat countermeasure. Since the objective countermeasure must fit within the existing countermeasure form, size and weight constraints, integration design efforts also occurred, as well as laboratory assessments of countermeasure effectiveness. ***FY 2017 Plans:*** FY 2017 efforts will continue FY 2016 work with the focus on integrating and demonstrating the new countermeasure candidates into prototypes and assessing their performance against realistic threats in relevant environments. ***FY 2018 Plans:*** Project competed in FY 2017.			
Title: Advanced Defensive Countermeasures Development	1.856	2.500	0.000

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Description: This two-year classified effort commenced in FY 2016. It will develop and assess the efficacy of a new approach to defend naval assets against advanced threat weapons employing increasingly sophisticated seeker technologies. Significant leveraging of existing countermeasure approaches will be emphasized with the objective of demonstrating the efficacy of this approach in a realistic field environment. ***FY 2016 Accomplishments:*** Laboratory developmental efforts were initiated, to include both modeling and experimental approaches. ***FY 2017 Plans:*** FY 2017 efforts will continue FY 2016 work and will proceed towards an initial field demonstration of this approach. ***FY 2018 Plans:*** Project competed in FY 2017.			
Title: Non-Kinetic Battle Management and Visualization Technology Development	2.243	2.248	2.743
Description: Non-Kinetic Battle Management and Visualization Technology Development explores a variety of advanced technologies – to include legacy electromagnetic (EM) battle management (BM) tools and Intelligence Community (IC) capabilities and state-of-the-art 'big data' analytics, visualization and novel human-machine interface technologies – to significantly enhance the fidelity, timeliness and comprehensibility of information provided to warfighters and analysts responsible for understanding and exercising control of the EM and cyberspace warfighting domains. Leveraging state-of-the-art algorithmic-driven processing, artificial intelligence, and autonomy support, predictive analytics will be developed to enable course of action development for the highly accurate, precise and timely employment of non-kinetic capabilities within the EM and cyberspace warfighting domains. ***FY 2016 Accomplishments:*** FY 2016 efforts initiated development of the next generation of EM battlespace situational awareness, visualization and control technologies. Plans were developed and initial steps were taken to maximally leverage hardware- and software-in-the-loop laboratory capabilities to enable build-assess-improve cyclic capability growth relying on state-of-the-art visualization and 'big data' assessment technologies. Initial development of heuristics to enable rapid course-of-action development was also started. ***FY 2017 Plans:*** Building on FY 2016 efforts, FY 2017 efforts significantly expand and refine approaches to increase the representational fidelity and comprehensibility of non-kinetic battlespaces and advance course-of-action development capabilities. Operational and IC users will be highly leveraged in this work to refine initial products and streamline the transitioning of newly developed capabilities to users for field experimentation and assessment. ***FY 2018 Plans:***			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Efforts will continue work identified in FY 2016 and FY 2017 with a focus on demonstration of capability in field demonstrations with operational and IC users to enable transition of capabilities to these communities.			
Title: Advanced EW and EW-Cyber Exploration/Development ***Description:*** This task will work on access and payload capability for EM spectrum-cyberspace capabilities for closed network access and effects against hard-to-reach targets in A2/AD environments. This initiative focuses on the continuum between EW effects such as jamming and Cyber effects to produce greater military impact against the adversary. It will also incorporate algorithms, signal processing and techniques for increasing the viable standoff distance for prosecution, interrogation and disruption of adversary threats. ***FY 2016 Accomplishments:*** In FY 2016, this effort began development of composite EW and Offensive Cyber Operations (OCO) capabilities against A2AD threats, including advanced adversary weaponry, for employment on software-defined and reprogrammable transceivers. Initial prototypes were developed and these will be demonstrated in field experimentation venues in subsequent years. ***FY 2017 Plans:*** FY 2017 efforts will continue work started in FY 2016 with a focus on demonstrating the potential efficacy of newly developed capabilities in field demonstration venues. Operational and IC users will be involved to enable earlier transitions of capabilities to these communities. ***FY 2018 Plans:*** Project competed in FY 2017.	2.079	1.740	0.000
Title: Ultra Wideband Receiver Development (UWBR) ***Description:*** This effort will explore technologies to provide significantly greater instantaneous bandwidth with extreme sensitivity to enhance the detection, identification, classification, geolocation, and cueing of countermeasures against threat emitter systems that have increased spectral coverage, bandwidth, agility, and waveform diversity. Chip-scale, hyper sensitive and ultra wide band receiver technology components will be explored, developed, and demonstrated in dense, extremely complex EM environments, possibly to include VH and/or subsequent JEAT experimentation/demonstration venues. ***FY 2016 Accomplishments:*** FY 2016 efforts focused on accelerating efforts to (1) mature chip-scale, hyper sensitive and ultra wide band receiver components, (2) develop algorithms and components to process the vast amounts of collected data, and (3) initially characterize system performance. Brassboard capability demonstrations in laboratory and field environments were used to baseline and assess performance in increasingly complex EM environments, and an early prototype system was demonstrated at Vigilant Hammer 2.	0.183	0.000	0.000

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Based on progress made in this effort and extensive ongoing work by others exploring similar and other approaches, this effort may be terminated upon assessments in FY 2017. ***FY 2017 Plans:*** Assess state-of-the-art to determine if continued work is still needed. Further work is to be determined. ***FY 2018 Plans:*** Assess state-of-the-art to determine if continued work is still needed. Further work is to be determined.			
Accomplishments/Planned Programs Subtotals	9.835	11.038	2.743

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603648D8Z / *Joint Capability Technology Demonstration (JCTD)*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	600.675	130.829	148.184	105.871	-	105.871	106.798	108.283	113.167	115.756	Continuing	Continuing
P648: *Joint Capability Technology Demonstration (JCTD)*	600.675	130.829	148.184	105.871	-	105.871	106.798	108.283	113.167	115.756	Continuing	Continuing

Note

The Joint Capability Technology Demonstration (JCTD) program supports the identification, development, and demonstration of game-changing technologies to satisfy Multi-Service and Combatant Commands (CCMDs) priorities. The JCTD program engages the interagency, international, and non-governmental partners to expand the Department of Defense's (DoD) access to innovation. It serves as the vehicle for CCMDs and Services to address strategic priority areas that present significant risk and suffer from inadequate investment as identified by the Chairman's Gap Assessment, Services science and technology roadmaps and other senior level guidance.

JCTD projects are executed in the following focus areas: electromagnetic spectrum maneuver; space capability resilience; autonomous systems; intelligence, surveillance and reconnaissance, asymmetric force application and information operations and analytics. The objective is to maintain U.S. technological superiority across the range of military operations. The JCTD program achieves this objective by reducing the cost of operations, and allowing for the rapid insertion of new capabilities within two to four years.

A. Mission Description and Budget Item Justification

JCTD funding is used to address near and mid-term CCMD and Joint Forces capability gaps. It provides a mechanism for DoD-wide prototyping and demonstration of game-changing technologies in operationally relevant environments. In FY 2016, the JCTD Program successfully completed the military utility assessment and transition of several JCTD prototypes that fielded affordable and sustainable solutions to meet immediate operational needs.

Key values demonstrated by the JCTD program are:

• Create a bridge from science and technology to operational use and formal acquisition.

• Accelerate fielding of decisive technical capabilities while mitigating operational risk to the warfighter.

• Leverage open architectures to enhance interoperability and promote affordability.

• The JCTD program delivers capabilities far quicker than the traditional DoD planning, programming, budgeting, and execution (PPBE) process. Recent examples include:

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603648D8Z / *Joint Capability Technology Demonstration (JCTD)*

1. The Advanced Weapons Enhanced by Submarine Unmanned Aerial Vehicles (UAV) against Mobile Targets (AWESUM) JCTD. The AWESUM JCTD developed a three inch diameter unmanned aerial system (UAS). The UAS is deployed from submarine countermeasure launchers. UAS control and sensor feeds are fully integrated into the submarine combat control system enabling rapid development of fire control solutions for torpedo and third party targeting, and battle damage assessment following engagements. AWESUM transitioned to U.S. Navy submarines in 2016.

2. In support of the Army Robotic Systems Joint Program Office, the Autonomous Mobility Applique Systems (AMAS) JCTD successfully developed, demonstrated and transitioned autonomous capabilities to the U.S. Army Route Clearance and Integration System Program of Record (PoR) that will be incorporated into existing Tactical Wheeled Vehicle (TWV) program of record. AMAS has completely changed the Army's future ground robotics plans and requirements and will have a lasting impact on future ground autonomous programs through the application of lessons learned and capability from the AMAS JCTD.

3. The High Speed Container Delivery System (HSCDS) JCTD developed a parachute system to offload up to eight container delivery system bundles at an elevation of 250 feet and 250 knots from C-130J and C-17 aircraft. This has significantly improved the accuracy of existing delivery systems while providing increased safety for the aircraft and friendly ground forces. HSCDS transitioned to the Army's Product Manager for Force Sustainment Systems, has been extensively used in Afghanistan and used to deliver humanitarian assistance to Yazidi people on Mount Sinjar, Iraq.

MEASURABLE OUTCOMES:

• JCTDs will demonstrate capability objectives within two to four years.
• The JCTD program will continue to achieve high transition rates. In FY 2016, 88 percent of completed JCTDs successfully transitioned. Seven of sixteen completed JCTDs transitioned to a new or existing Program(s) of Record. Seven transitioned to fieldable-prototypes (residual capabilities) sustained by non-JCTD funds in direct support of operations in theater. Two were returned to the technology base for further analysis and/or future use.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	132.258	148.184	115.975	-	115.975
Current President's Budget	130.829	148.184	105.871	-	105.871
Total Adjustments	-1.429	0.000	-10.104	-	-10.104
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	2.000	-			
• SBIR/STTR Transfer	-3.429	-			
• India Science & Technology baseline	-	-	-10.000	-	-10.000
• Baseline adjustment for higher priorities and requirements	-	-	-0.104	-	-0.104

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603648D8Z *I Joint Capability Technology Demonstration (JCTD)*

Change Summary Explanation

The FY 2016 $2.000 million reprogramming entry is the net of -$2.000 million to resource AT&L priority projects and a $4.000 million reprogramming to remunerate JCTD for funds extended to Emerging Capabilities Technology Development (Program Element 0603699D8Z) during 2016 for the Missile Defeat Project.

The decrease in the funding profile from FY 2017 to FY 2018 is due to a one-time funding increase to FY 2017 to support CCMD prototyping activities as well as FY 2018 base adjustments.

The FY 2018 base adjustment reflects a -$10.000 million India Science & Technology baseline transfer to Emerging Capabilities Technology Development (Program Element 0603699D8Z) to enable proper alignment and execution of the effort, and a -$0.104 million base adjustment for higher DoD priorities.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense											Date: May 2017	
Appropriation/Budget Activity 0400 / 3					R-1 Program Element (Number/Name) PE 0603648D8Z / *Joint Capability Technology Demonstration (JCTD)*				Project (Number/Name) P648 / *Joint Capability Technology Demonstration (JCTD)*			
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
P648: *Joint Capability Technology Demonstration (JCTD)*	600.675	130.829	148.184	105.871	-	105.871	106.798	108.283	113.167	115.756	Continuing	Continuing

Note

The Joint Capability Technology Demonstration (JCTD) program supports the identification, development, and demonstration of game-changing technologies to satisfy Multi-Service and Combatant Commands (CCMDs) priorities. The JCTD program engages the interagency, international, and non-governmental partners to expand the Department of Defense's (DoD) access to innovation. It serves as the vehicle for CCMDs and Services to address strategic priority areas that present significant risk and suffer from inadequate investment as identified by the Chairman's Gap Assessment, Services science and technology roadmaps and other senior level guidance.

JCTD projects are executed in the following focus areas: electromagnetic spectrum maneuver; space capability resilience; autonomous systems; intelligence, surveillance and reconnaissance, asymmetric force application and information operations and analytics. The objective is to maintain U.S. technological superiority across the range of military operations. The JCTD program achieves this objective by reducing the cost of operations, and allowing for the rapid insertion of new capabilities within two to four years.

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integrated into the submarine combat control system enabling rapid development of fire control solutions for torpedo and third party targeting, and battle damage assessment following engagements. AWESUM transitioned to U.S. Navy submarines in 2016.

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• The JCTD program will continue to achieve high transition rates. In FY 2016, 88 percent of completed JCTDs successfully transitioned. Seven of sixteen completed JCTDs transitioned to a new or existing Program(s) of Record. Seven transitioned to fieldable-prototypes (residual capabilities) sustained by non-JCTD funds in direct support of operations in theater. Two were returned to the technology base for further analysis and/or future use.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Joint Multi-Platform Advanced Combat Identification (JMAC)	0.500	-	-
Description: JMAC will provide government-owned software that can be integrated into any sensor or Command and Control (C2) system to provide real-time identification of air threats, including Unmanned Aerial Systems (UAS), cruise missiles, rotary wing, military jets, and general aviation. The Department of Homeland Security also contributed funding to the JMAC JCTD. JMAC will be integrated into the National Capitol Region-Integrated Air Defense System (NCR-IADS) via upgrades to the improved-sentinel radar, the Next Generation Fire Control Radar, the NCR-IADS network, and the Joint Air Defense Operations Center (JADOC).			
FY 2016 Accomplishments: JMAC refined messaging architecture; developed stop, stare, and track mode interface; continued algorithm refinement and integrated sidecar processors. Integrated the Enhanced Regional Situation Awareness (ERSA) sensor to address the counter-unmanned air systems problem in the National Capitol Region. Conducted Field Demo two and three. Developed system integration and assessment plans. Refined concept of employment and tactics, techniques, and procedures. Fully demonstrated an improved combat identification capability by use of electronic identification (EID) in order to provide decision-makers with			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
an EID of either specific aircraft type or general classification of the airborne object. Transitioned JMAC within the NCR-IADS existing architecture as necessary to interrogate specific tracks of interest and to transmit those EID messages to the users. Updated NCR-IADS concept of employment and air defense systems tactics, techniques and procedures to employ EID capabilities.			
Title: Low Cost Attritable Strike Demonstration (LCASD) ***Description:*** LCASD will develop and demonstrate technologies that enable rapid design, manufacturing, test and deployment of very low cost (essentially expendable) airframes. The strategic objective is to challenge the cost paradigm associated with current airframe manufacturing. LCASD will conclude with a demonstration of an aircraft capable of 1000 nautical mile flight range and costing less than $3.000 million. This will be realized through a number of innovative prototyping and experimentation approaches that include new manufacturing technologies, very low cost life cycle control measures in the airframe design (i.e. reliability as needed, modeling and simulation for advance performance testing, etc.). The effort will also include use of engineered resilient systems (ERS) technology to develop fixed-wing trade space analysis tools to allow for rapid optimization and manufacturing of future systems. ***FY 2016 Accomplishments:*** Demonstrated suitable manufacturing techniques to control production and life cycle costs, developed and demonstrated ERS system to inform trade space of airframe design choices, prototyped initial airframe subsystems and tested for reliability. Prototyped final airframe and integration subsystem components to ready for flight demonstration. Conducted initial flight demonstration, validated ERS design trade space analysis tool. Conducted final flight demonstration. The proof of principle LCASD demonstration will drive future spirals of the Air Force low cost attritable airframe technology initiative and transition strategy. Other funding contributors to this program include Air Force Research Laboratory and Industry.	6.300	-	-
Title: Low Cost Cruise Missile (LCCM) ***Description:*** LCCM provides a decentralized autonomy capability for low-cost, conventional air-launched cruise missiles that will enable joint access and maneuver in the global commons. It will be capable of conducting networked integrated attacks, in-flight dynamic retargeting/reallocation and synchronized cooperative/saturation attacks. Flight demonstrations will be conducted using surrogate weapon platforms and will provide residual leave-behind payloads for transition to a full weapon system development program. Additional resources are provided by the United States Air Force Research Laboratory and the Office of Naval Research. ***FY 2016 Accomplishments:*** Project initiated in Q4 FY 2016. The integrated management team (IMT) drafted key program documentation to guide execution. IMT conducted initial critical subsystems integration design for the autonomous multi-mission air vehicles. Office of Naval	5.000	5.000	5.000

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Research worked with partner organizations to help reduce per unit costs of the autonomous platform. Team identified communications systems and standards used currently across the Department of Defense for airborne systems to determine the best option for LCCM. ***FY 2017 Plans:*** Conduct autonomous vehicle selection to include key subsystems needed for autonomous operations and contract production of initial group of vehicles. Develop the autonomy module's ability to sense the environment and execute counter measures based on Commander's intent type instructions or rules of engagement. Complete required program management documentation and planning for the Operational Utility Assessment. Coordinate IMT activities for initial delivery of six inch diameter vehicles in early FY 2018. ***FY 2018 Plans:*** Conduct surrogate weapon operational demonstrations of ingress formations. Pending successful demonstrations, LCCM will provide residual leave-behind payloads for transition to a full weapon system development program.			
Title: Low Cost Missile Defeat (LCMD)	18.124	50.000	-
Description: Low Cost Missile Defeat (LCMD) is a ballistic missile defense system designed to counter current and emerging weapons of mass destruction (WMD) and anti-access/area denial (A2/AD) threats. LCMD program execution has been structured using a building block approach; the FY 2015 step was a technology demonstration effort under the Deputy Assistant Secretary of Defense, Emerging Capability & Prototyping (DASD (EC&P)) to accelerate technology maturation. The concept of operations (CONOPS) for the system has been formulated to integrate LCMD into the existing National Ballistic Missile Defense (BMD) architecture and will prioritize the use of existing components and systems already fielded. LCMD is not designed as a replacement to existing BMD systems, but rather as a lower cost complementary/augmentative component to forward-deployed BMD assets. The LCMD capability will augment current BMD systems and mitigate threat vulnerabilities to U.S. personnel and strategic assets. ***FY 2016 Accomplishments:*** Successfully completed a system requirements review to further develop the concept. Successfully completed phase I design maturation and CONOPS development. Bench tested the attitude control system. Fabricated a bench top seeker optical train and cooling system. Designed the rocket motor and evaluated propellants. Completed systems requirements review. ***FY 2017 Plans:*** Five million dollars will be allocated to support LCMD input into an Analysis of Alternatives (AoA) study for the BMD low cost interceptor and data archiving to provide the DoD the intellectual property and knowledge base through completion of the LCMD system requirements review. The balance of FY 2017 funds are being held pending completion of the AoA. Future LCMD			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
development will be informed by the results of the AoA with funding for development in the out years coming from the JCTD Concept Development / Pre-EMD Prototypes.			
Title: Low Power Module (LPM) ***Description:*** Emerging Capability & Prototyping is combining efforts with Navy in developing a low-power modular counter-electro-optical-infra-red (C/EO-IR) sensor capability to counter intelligence, reconnaissance, surveillance and targeting (ISRT) systems. Details are classified. ***FY 2016 Accomplishments:*** Conducted effects testing and operational plan (OPLAN) analyses. Details are classified.	1.100	-	-
Title: Military Application of the Space Environment (MASE) ***Description:*** The MASE prototype demonstrates mature space environment technology to improve combat operations. The prototype will provide weapons system specific visualizations that will be integrated into operational plans and tactics, techniques, and procedures as decision aids to assess their utility for mission operations. Products will be evaluated using quantitative standard measures of performance, effectiveness, and outcome against theater operational requirements. A leave behind capability will provide residual capability at the conclusion of the prototype demonstration while a program of record is established. ***FY 2016 Accomplishments:*** Conducted end-to-end system/mission engineering to include sensor-to-shooter data flow/work flow, component technologies (model, applications and system effects), interfaces, and data exchanges. Generated user friendly mission planning tools with multiple effects and vetted graphical product suite, sensor laydown and types of data. Successfully completed a military utility assessment which directly contributed to the concept of operations development for the JCTD. ***FY 2017 Plans:*** Complete the final operational utility assessment. Finish end-to-end system/mission engineering and development of mission planning tool. Conduct final demonstration. Transition to Air Force Space Command for an extensive period of testing. Once the operational user requirement is tested and well understood, it will transition to combat air forces in Pacific Command. Complete the JCTD.	2.634	3.086	-
Title: Port Improvement via Exigent Repair (PIER) ***Description:*** PIER will deliver a dynamic, agile, cost effective (non-military construction) expeditionary engineering solution to rapidly repair damaged or degraded ports to a minimum level of serviceability after an attack or natural disaster. Agility is achieved through a smaller footprint, commercial off-the-shelf infusion, and quick reaction of theater-based repair assets (e.g. pre-packaged, pre-positioned). The intent of PIER is to assure continued logistics resiliency and freedom for our U.S. Forces to	2.368	2.608	2.104

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
maneuver and conduct agile strategic sealift and logistics. PIER will allow the Department to address the doctrine, organization, training, materiel, leadership, personnel, facility, and policy (DOTMLPF+P) concerns about its ability to conduct rapid port damage repair. The plan is to transition to the U.S. Army, U.S. Navy and the Defense Logistics Agency. ***FY 2016 Accomplishments:*** Designed and validated substructure technologies: pile capacity upgrade, pile bracing, pile cap repair, beam replacement, beam and cap upgrade. Conducted the first technical demonstration to prove the efficacy of multiple pile jacketing technologies for repairing damaged pier piles and to select the best technology for an operational utility assessment. These technologies allow for secondary components to strengthen the superstructure of the ports. The plan is to transition to the U.S. Army, U.S. Navy and the Defense Logistics Agency. ***FY 2017 Plans:*** Conduct the first limited operational utility assessment on the substructure technologies. Design and validate the superstructure technologies to repair deck craters and holes and over-bridging of gaps using the pier over-decking system. Conduct second technical demonstration. ***FY 2018 Plans:*** Design and validate the mooring and fender systems with an emphasis on assuring the structural integrity of elements required for safe operations. Conduct the final technical demonstration and operational utility assessment. Transition components to U.S. Army, U.S. Navy and Defense Logistics Agency.			
Title: Small Satellite Communications Network (SSCN) ***Description:*** SSCN provides an adaptive, self-healing, full-mesh network for assured communications, using a proliferated constellation of low-earth orbit satellites and advanced software defined radios. Details are classified. ***FY 2016 Accomplishments:*** Source selection was accomplished. Completed preliminary design review. Began the engineering, manufacturing and development phase (EMD). ***FY 2017 Plans:*** Finish EMD, begin laboratory testing of selected designs and anechoic chamber tests. Coordinate with launch share partner to ensure payload tests are conducted, evaluated and deficiencies resolved well in advance of launch date. Conduct on-orbit test with single design and final demonstration. The classified user will continue to use the system until it is no longer functional to explore large small satellites constellations for utility, resilience, reconstitution and technology adaptation. Complete the JCTD.	14.000	6.000	-
Title: Salty Siren	1.000	-	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603648D8Z / *Joint Capability Technology Demonstration (JCTD)*	**Project (Number/Name)** P648 / *Joint Capability Technology Demonstration (JCTD)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Description: Salty Siren will develop an indications and warning capability for countering anti-access/area-denial (A2/AD) missions. Details are classified. ***FY 2016 Accomplishments:*** Operationalized the field unit and conduced end-to-end acceptance testing. Transitioned to a classified user. Details are classified.			
Title: Ravenscraig ***Description:*** Ravenscraig will provide technical and operational characterization and countermeasures for a class of threat signals. Details are classified. ***FY 2016 Accomplishments:*** Continued development and demonstration. Conducted phase III component testing. Details are classified. ***FY 2017 Plans:*** Additional enhancements, features and capabilities for experimentation/demonstration. Complete the JCTD and transition to multiple classified users. Details are classified.	15.000	3.000	-
Title: Wasabi ***Description:*** Wasabi will produce a real-time common operational picture of adversary missile and space activity. Details are classified. ***FY 2016 Accomplishments:*** Implemented rule sets to enable collaboration with coalition partners. Details are classified.	4.000	-	-
Title: Combatant Commander (CCMD) Support, Transition Enabling and Strategic Project Operational Management ***Description:*** This effort is comprised of three programs that support the entire JCTD Program, separate from the specific JCTD projects. The three programs are (1) Unified CCMD Direct Support, (2) JCTD Pre-Transition and (3) Program Integration Office for execution of select, classified projects. (1) CCMD Direct Support: The CCMDs are essential in specifying capability needs, project development, demonstration, military utility assessment, and transition of JCTDs. The JCTD Program provides direct support to CCMDs enabling the CCMDs to provide an on-site JCTD operational manager. (2) JCTD Pre-Transition: In some cases, Service or Agency partner transition funding is not available for one to two years following the JCTD assessment phase due to Service or Agency commitments. In such cases, where there is a clear transition and the need to sustain the capability for a short time prior to availability of Service or Agency transition funds, the JCTD Pre-Transition fund may be used to meet that need. (3) Program Integration Office: Executes a select number of classified projects in areas such as electronic miniaturization,	22.421	23.000	19.896

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
electronic countermeasures, advanced mobile ad hoc network communications, space situational awareness (SSA) intelligence surveillance and reconnaissance (ISR), sensor platforms and communications, and persistence surveillance. ***FY 2016 Accomplishments:*** Provided each of the CCMDs a JCTD liaison officer to enable CCMD staff participation in developing and executing Pre-Engineering and Manufacturing Development (Pre-EMD) prototypes while addressing the strategic priorities of the Department. Sustained selected projects until program of record funds are received. CCMD liaisons provided direct support and coordination for JCTD operational demonstrations and military utility assessments. Provided staffing support to the Program Integration Office. Developed and executed projects selected as a result of the technology assessment panels. Executed five classified projects. ***FY 2017 Plans:*** Continue to provide CCMD direct participation to enable CCMD staff participation in developing and executing Pre-EMD prototypes. Develop and execute projects selected as a result of the Technology Assessment Panels. Sustain selected projects until program of record funds are received. Execute a limited number of classified projects' military utility assessments. ***FY 2018 Plans:*** Continue to provide CCMD direct participation to enable CCMD staff participation in developing and executing Pre-EMD prototypes. Develop and execute projects selected as a result of the Technology Assessment Panels. Sustain selected projects until PoR funds are received. Execute a limited number of classified projects' military utility assessments.			
Title: JCTD Concept Development/Pre-Engineering and Manufacturing Development (Pre-EMD) Prototypes	6.890	25.680	62.901
Description: The JCTD program will develop projects as Pre-EMD prototypes to address broader Defense strategic initiatives in areas such as electromagnetic spectrum agility; space capability; autonomy systems and multi-domain technologies; countering weapons of mass destruction; and force application. Selected projects will leverage networks within the global research and engineering enterprise to include government labs and integration facilities, depots, academia, as well as traditional and non-traditional providers. Prototypes will utilize best practices to satisfy joint and cross-cutting needs and the Emerging Capability and Prototyping Office will work with the Services to identify means to streamline prototype transition into the acquisition systems where appropriate. ***FY 2016 Accomplishments:*** Conducted advanced prototyping activities focusing on Asymmetric Force Application, Space Capability Resilience, Electromagnetic Spectrum Agility, and Autonomous Systems. ***FY 2017 Plans:*** Conduct advanced prototyping activities focusing on: information operations and analytics, asymmetric force applications, autonomy and electromagnetic spectrum agility. Specific activities may include continued integration, subsystem and system level			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
demonstrations and assessments for multi-vehicle expendable platform/expendable payload concepts working collaboratively to deliver reconfigurable effects using non-traditional delivery methods, deployment of hybrid radio frequency-optical tactical communications and protected communications for small unmanned systems, automated and integrated space manufacturing capabilities, reconfigurable self-forming and self-healing space based communication networks, machine cognition to aid human task loading to deploy multiple platforms, sensors, and weapons in complex mission scenarios. ***FY 2018 Plans:*** Continue to conduct advanced prototyping activities in the following four (4) focus areas: - Asymmetric Force Application - The use of nontraditional technologies and symmetric approaches to provide a clear military advantage in protection, maneuver, and engagement. - Electromagnetic Spectrum Maneuver - The use of technologies to maneuver freely in the electromagnetic spectrum for offensive and defensive operations across multiple domains, e.g. air, maritime, land, space, and cyber. - Information Operations & Analytics - Efficiently and accurately exploit information collection and analytics technologies for seamless Processing, Exploitation, and Dissemination of all-source data and information as well as multi-domain Command and Control across Services, Combatant Commands, and Partner Forces. - Intelligence, Surveillance, and Reconnaissance (ISR) and Counter-ISR - Enhance the effectiveness of strategic integration of ISR capabilities as a force multiplier to provide decision makers with fused, actionable data and intelligence, and to deny the adversary ISR capability.			
Title: Enabling Technologies (ET) ***Description:*** The ET funds are used to assess or mature emerging capabilities that support the initiation of a Pre-Engineering and Manufacturing Development (Pre-EMD) prototype. Emerging Technology investments are small, short (less than one year) efforts that may lead to a prototype, depending on the final assessment and determination of technical maturity. ***FY 2016 Accomplishments:*** -Developed Autonomous Mission Package Planning and Execution (AMPPE): a risk reduction bench-top prototype of unmanned aerial systems that can autonomously perform Intelligence, Surveillance & Reconnaissance (ISR) and communications operations that responsively find and track moving high value targets while updating manned strike/Command and Control platforms operating out of threat range. - Conducted a high energy laser risk reduction study. - Conducted a space resilience study of developing a tactical over-the-horizon radar system. - Developed reconfigurable unmanned aircraft system (RUAS). A Government-owned canister-launched UAS prototype, with small airframe design (2.75 inch diameter with 19 inch and 23 inch lengths), to serve as a vehicle for integration with various	2.268	8.000	8.000

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
payloads, maximum loitering between 60-90 minutes, and the ability to cruise at 50-60 knots, with an objective dash speed greater than 80 knots. ***FY 2017 Plans:*** Projects will continue to be used to assess or mature emerging capabilities that support the initiation of a Pre-Engineering and Manufacturing Development Prototypes. Selected efforts will be small, focused, and executable in less than one year and require a concrete deliverable prototype hardware and/or software, integrated subsystem or technology assessment report. ETs will be derived from the Emerging Capability and Prototyping Technical Assessment Panels. ***FY 2018 Plans:*** Projects will continue to be used to assess or mature emerging capabilities that support the initiation of a Pre-Engineering and Manufacturing Development Prototypes. Selected efforts will be small, focused, and executable in less than one year and require a concrete deliverable prototype hardware and/or software, integrated subsystem or technology assessment report, etc. ETs will be derived from the Emerging Capability and Prototyping Technical Assessment Panels.			
Title: Assured Command and Control using Emerging Nanosat Technology (ACCENT) ***Description:*** ACCENT places an adaptive filter algorithm into a nano-satellite receiver to mitigate radio frequency interference. This project's emphasis is to rapidly integrate the filter into a number of radios with an optional path to test in space using existing nano-satellite radios. ACCENT receives partner funds from the Office of Naval Research. ***FY 2016 Accomplishments:*** Selected and established the program's integration and management team (IMT). Produced and coordinated the program plan. Modeled and simulated the impact of the adaptive-filter into nano-satellite radios (laboratory tested). Began testing the radios in a laboratory environment. ***FY 2017 Plans:*** Receive and review modeling and simulation and technical demonstrations reports. Integrate designs for two different nano-satellites radios (Ultra High Frequency and S-Band). Produce framework to allow quick integration of filter into additional radios. Provide follow-up laboratory test results. ***FY 2018 Plans:*** Optimize adaptive algorithm and radios as needed to meet on-orbit performance goals. Incorporate and integrate adaptive algorithm and radio modification to improve performance. Test filter-algorithm in space with Prometheus Block 2. Produce on-orbit test results and military utility assessment reports. Plan to transition to Navy program executive office for space systems science and technology. Special Operations Command will upload the filter onto existing Prometheus satellites.	1.250	0.850	0.400
Title: Caribbean Collaborative Environment (CCE)	9.000	-	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Description: The CCE project will develop and demonstrate a decision support system architecture to counter drug trafficking and national security concerns across the Caribbean. System will fuse multi-intelligence maritime and airborne data with big data analytics and visualization tools on an enterprise platform and provide an up-domain capability to higher classification levels. This will provide seamless actionable, sensitive but unclassified intelligence and warning information to the intelligence community, DoD, law enforcement and partner nations to allow timely command and control. ***FY 2016 Accomplishments:*** Developed a scalable prototype system on a laboratory test bed capable of ingesting multiple intelligence data sets, fusing it, and producing visualization tools that provide actionable information at the tactical edge. Demonstrated a decision support system that integrates data from remote sensing assets in an operationally relevant environment with an ability to share data and visualization tools among joint, interagency and partner nations. Began transition to U.S. Navy and U.S. Coast Guard.			
Title: High-altitude Attritable Link Offset (HALO) ***Description:*** HALO uses high altitude, low-cost balloons as communication relays in denied environments. It accomplished this by using the ultra-high frequency (UHF) spectrum and techniques that allow non-attribution to its source. The advanced technology resides at the user terminals on the ground, which receive data from the balloon-platforms, and subsequently perform the processing and communication receiver function that allows effective two-way communication in a contested environment. HALO receives partner funds from U.S. Air Force Air Combat Command and U.S. Air Force Life Cycle Management Center. ***FY 2016 Accomplishments:*** Developed hardware and software designs and initial algorithms using mathematical analysis and laboratory emulation to minimize technical risks. Performed initial laboratory demonstration of the beam forming capability. ***FY 2017 Plans:*** Create and refine adaptive beam forming algorithm capable of handling doppler spread, delay spread, gain control, phase noise and computational complexity. Conduct flight demonstration in a non-contested environment. ***FY 2018 Plans:*** Select and size a representative operational area and infuse environmental factors to perform extended testing and a military utility assessment. Complete the Concept of Operations. Successfully conduct a flight demonstration in a contested environment. Transition to U.S. Air Force and U.S. Navy program offices for production acquisition contracts.	2.370	4.910	4.340
Title: Jacob's Ladder ***Description:*** Jacob's Ladder uses emerging advanced electronics to allow the use of dedicated intelligence assets to provide tactically actionable targeting data to warfighters on a responsive and persistent timeline. This will significantly improve reaction	5.920	4.660	2.200

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
times and provide greatly enhanced targeting information for warfighters. Jacob's Ladder receives partner funds from the Assistant Secretary of the Army, Acquisition Logistics Technology. ***FY 2016 Accomplishments:*** Selected and established program's integration and management team (IMT). Produced and coordinated program plan. Received and approved system requirements document (SRD), preliminary engineering design and preliminary design review (PDR) data package. ***FY 2017 Plans:*** Receive and approve critical design review (CDR) data package for three flight units, one engineering development unit, one flight qualification unit and three ground stations. Assemble, integrate and test flight units and ground stations. ***FY 2018 Plans:*** Complete integration, conduct mission readiness review, deliver flight units and conduct performance checkout testing. Conduct joint military utilization assessment (JMUA) and deliver report; retain residual capability and document Lessons Learned. Pending a successful JMUA, Jacob's Ladder will be submitted into the Joint Capabilities Integration and Development System acquisition process.			
Title: India Science and Technology Focus Area ***Description:*** The India Science and Technology (S&T) Focus Area is a Secretary of Defense directed project designed to deepen and streamline defense cooperation between the U.S. and India. By sharing research resources, capabilities, and expertise, the United States and India can jointly develop technological innovations needed to enable our defense industrial bases to support our militaries now and in the future. Further, development of vibrant S&T cooperation is a key step in building an enduring partnership. ***FY 2017 Plans:*** Continue to develop and execute cooperative S&T projects initiated in FY 2015 and FY 2016. Additional cooperative S&T areas targeted include: munitions development, advanced manufacturing, micro-power grids, and other identified project areas. In FY 2018, the India Science and Technology Focus project and related funding will be transferred to Emerging Capabilities Technology Development (Program Element 0603699D8Z) to enable proper alignment and execution of the allocated funds.	-	10.000	-
Title: Atmospheric Propagation of High Energy Lasers (APHL) ***Description:*** APHL is a joint U.S. - India JCTD that will develop new atmospheric propagation models and compensation techniques to maximize high energy laser propagation in urban atmospheric conditions. It will characterize the atmosphere in five categories: aerosol scattering, molecular absorption, thermal blooming, deep turbulence and refraction. These characteristics	3.150	0.260	-

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
of the atmosphere are very important in urban environments due to the effects they will have on laser propagation and power on target for military applications. The U.S. Navy is also contributing funds to support APHL activities. ***FY 2016 Accomplishments:*** Created atmospheric propagation of extinction coefficients and turbulence in urban environments. Characterized aerosols through environmental measurements using extinction imagers and other meteorological instruments and developed a database that will be used in creating propagation models of the environment. ***FY 2017 Plans:*** Validate propagation models by performing outdoor laser propagation experiments by measuring laser characteristics such as laser wave front, turbulence, thermal blooming and power in the bucket. Experiments will be conducted through non-invasive technology (i.e. cameras and algorithms to determine the levels of energy propagated through urban environments at different distances). Develop and validate the atmospheric compensation models for beam control technology to maximize laser propagation in urban environments. Complete the JCTD and transition data, models, and database to the DoD High Energy Laser-Joint Technology Office and the India Defence Research Development Organisation.			
Title: Experimental and Computational Studies of Blast and Blunt Traumatic Brain Injury ***Description:*** This project is a joint U.S. - India JCTD that will yield a mechanistic understanding of blast and blunt related mild traumatic brain injury (TBI) that will serve as the basis for developing effective personal protective equipment designed to prevent or mitigate TBI; tools for rapidly screening and diagnosing service members involved in potentially concussive events; and effective therapies for treating and rehabilitating service members with blast and blunt related TBI. In addition, the project will enhance the DoD's ability to use advanced imaging tools and techniques for both diagnostics and prognostics. ***FY 2016 Accomplishments:*** Developed, validated, and cross-validated computational models for blast injury for TBI using imaging techniques and histological procedures, and assessed changes in behavior and cognition. Developed anatomically accurate head and brain models for blast and brain injuries from clinical and experimental data. Developed a master dose response curve using a field-validated blast injury rat model. Compared the blunt and blast data and developed a scaling ratio for use among the various models. Conducted experiments and tests in U.S. DoD laboratories. Completed the JCTD and transitioned data and models to the U.S. Army for designing personal protection devices and for use in theatre and in military health system clinical practices and the India Defence Research Development Organisation.	1.904	-	-
Title: Small Intelligent Autonomous System for Situational Awareness	1.500	-	-

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Description: This project is a joint U.S. - India JCTD that will enable warfighters to obtain critical real-time situational awareness information in tactical situations and provide the capability to conduct manned and unmanned reconnaissance and surveillance operations. ***FY 2016 Accomplishments:*** Developed and tested platform agnostic algorithms that provided real-time automated image and video processing on small autonomous unmanned air systems. Developed and tested situational awareness algorithms that can detect objects and events, recognize surroundings, and perform three dimensional reconstructions. Conducted a final test and demonstration in multiple scenarios (i.e. flying in and out of buildings and through terrains with varying degrees of vegetation and urbanization). Completed the JCTD and transitioned deliverables to the U.S. Army Program Executive Office for Intelligence, Electronic Warfare and Sensors and the India Defence Research Development Organisation.			
Title: Improving Cognitive Models and Artificial Cognition ***Description:*** This project is a joint U.S. - India JCTD that will create architectures and modules that monitor and predict fatigue, provide new interaction capabilities, and allow autonomous systems to learn through interactive tasks. The overall architecture, which will use a combination of adaptive control of thought—rational and logic architecture will be demonstrated on two separate tasks: finding people and finding objects. The goal is to build the basic level architecture to learn how to find people and objects by improving embodied cognition, human robot interaction, and interactive task learning. ***FY 2016 Accomplishments:*** Developed embodied cognition models (i.e. fatigue and emotions). Tested these models in a simulated environment at the U.S. Navy Laboratory for Autonomous Systems Research. Integrated human level interaction (i.e. vision, gesture, and touch) into cognitive architectures. ***FY 2017 Plans:*** Create task learning modules and teach the system how to look for people and objects with task learning modules. Create a computational system based on logic architecture. Develop mechanisms reflecting degradation in perceptual and motor deficits associated with the vigilance decrement. ***FY 2018 Plans:*** Integrate adaptive control of thought—rational embodied and logic architecture. Conduct final tests. Complete the JCTD and transition to the U.S. Marine Corps Warfighting Lab for integration into future marine urban operations, the U.S. Navy Explosive Ordnance Disposal Technology Division for use in explosive ordnance disposal, the U.S. Special Operations Command for use in finding people and the U.S. Border Patrol and the India Defence Research Development Organisation.	1.130	1.130	1.030
Title: Cognitive Tools for Target Detection System	3.000	-	-

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Description: This project is a joint U.S. - India JCTD that will improve human analyst target detection performance through computer vision algorithms for target detection, human computer interaction, and cognitive enhancement. ***FY 2016 Accomplishments:*** Developed visual media reasoning system for target detection of streaming or live video. Developed aerial target detection to apply to other domains such as un-manned aerial vehicle and security surveillance. Developed and tested prototypes of more efficient user interfaces and information visualizations to augment target and pattern detection. Developed multi-sensory interfaces to enable direct and natural manipulation of images, video, and information. Used transcranial electrical stimulation to enhance the cognitive capabilities and attentional skills of the analyst. Trained intelligence analysts and conducted experiments. Completed the JCTD and transitioned to the U.S. National Geospatial Intelligence Agency, the U.S. Army Intelligence and Security Command and the India Defence Research Development Organisation.			
Accomplishments/Planned Programs Subtotals	130.829	148.184	105.871

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Successful JCTDs can transition to acquisition via one of several methods:
- The JCTD addresses a documented capability gap in an existing program of record (PoR). The existing PoR can acquire, further develop, sustain, and provide the capability under existing program documentation.
- The capabilities address capability gaps that naturally fit with an existing PoR, but program documentation addressing the new capabilities does not exist. In these cases, existing PoR documentation (such as the Capabilities Development Document or Capabilities Production Document) is revised to include the new capabilities from the JCTD, and the JCTD capabilities transition to the PoR.
- The capabilities address a current operational need without requiring PoR changes. In these cases, the JCTD capabilities may transition directly to operational use, with sustainment (operations and maintenance) funding arranged through the gaining command.
- The capabilities may be widely applicable commodity products, useful to many commands. In these cases, the commodity products listed on General Services Administration schedule, and made available for purchase by any commands needing the capability, using procurement funds.
- Results of JCTD can be used to inform the research and engineering, acquisition, or requirements process.

E. Performance Metrics

Strategic Goals Supported:
- Develop and demonstrate a prototype that fills a Joint capability gap

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- Demonstrate a capability to address a DoD key strategic gap
- Develop a prototype that informs the acquisition and requirements process
- Independent Assessment Capability
- Successful military utility assessment (MUA)

MEASURABLE OUTCOMES:

• JCTDs will demonstrate capability objectives within 24-48 months:

• The JCTD program will continue to achieve high transition rates. In FY 2016, 88 percent of completed JCTDs successfully transitioned. Seven of sixteen completed JCTDs transitioned to a new or existing Program(s) of Record. Seven transitioned to fieldable-prototypes (residual capabilities) sustained by non-JCTD funds in direct support of operations in theater. Two were returned to the technology base for further analysis and/or future use.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603662D8Z / *Networked Communications Capability*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	0.000	5.452	9.331	12.661	-	12.661	7.779	2.882	2.941	3.002	Continuing	Continuing
P663: *Network Communications Analysis*	-	5.452	9.331	12.661	-	12.661	7.779	2.882	2.941	3.002	Continuing	Continuing

A. Mission Description and Budget Item Justification

Currently fielded satellite communications (SATCOM), terrestrial, and Tactical Data Links (TDLs) will be adversely affected during operations in contested Anti-Access/ Area-Denial (A2/AD) environments. The primary threat is from sophisticated electronic warfare capable of advanced jamming and signal collection techniques that are rapidly evolving to be more capable and agile. Department of Defense (DoD) advances in smart sensors and smart weapons have an urgent need for more resilient networks than tactical data links of today. In FY 2016, the Network Communications Capability Program (NCCP) returned with a new focus on developing enabling technologies for Joint assured communications networks. The goals of this program are: to mitigate degradation across battlespace tiers (strategic, operational, and tactical) and domains (nuclear, intelligence surveillance and reconnaissance [ISR], command and control [C2], etc.) and to provide agility that will support the mission needs of Joint Functional Component Commanders (JFCCs), Joint Force Commanders (JFCs), and deployed forces.

The DoD's current TDLs platforms and capabilities are not sufficiently protected from emerging adversary threats and contain insufficient capacity for future needs. In order to enable the promise of net-centric operations for the warfighter, the next generation of airborne and ground tactical networks must provide greater affordability, higher network capacity, greater durability against electronic attack, better network connectivity, and faster response times to the changing demands from airborne, maritime, and ground users. Many line-of-sight (LOS), beyond LOS (BLOS), and SATCOM waveforms have been integrated onto platforms for various missions. These waveforms necessarily exhibit tradeoffs in target performance attributes including capacity, latency, protection, and complexity. As a result, no single waveform capability will be able to satisfy all emerging mission needs emphasizing the need for interoperability and software defined waveforms. The challenge is to understand the essential needs of the users, avoid needless redundancy, develop affordable capabilities, and integrate separate capabilities into a cohesive network. This research will develop transformative technologies to ensure performance in contested A2/AD environments by focusing on future communications networks that are a "leap ahead" of today's capabilities.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense					Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*			**R-1 Program Element (Number/Name)** PE 0603662D8Z / *Networked Communications Capability*		
B. Program Change Summary ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**
Previous President's Budget	5.967	9.331	12.718	-	12.718
Current President's Budget	5.452	9.331	12.661	-	12.661
Total Adjustments	-0.515	0.000	-0.057	-	-0.057
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.387	-			
• SBIR/STTR Transfer	-0.128	-			
• Other Adjustments	-	-	-0.057	-	-0.057

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense											Date: May 2017	
Appropriation/Budget Activity 0400 / 3					R-1 Program Element (Number/Name) PE 0603662D8Z / *Networked Communications Capability*				Project (Number/Name) P663 / *Network Communications Analysis*			
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
P663: *Network Communications Analysis*	-	5.452	9.331	12.661	-	12.661	7.779	2.882	2.941	3.002	Continuing	Continuing

A. Mission Description and Budget Item Justification

In a contested environment, especially when conducting forward operations, platforms face a significant electronic warfare threat. The primary threat is from advanced jamming, signal collection, and geolocation techniques that are rapidly evolving to be more capable and agile. Concurrently, DoD advances in smart sensors and weapons demand robust tactical waveforms and networks with greater capacity but lower cost than communications links of today.

Beginning in FY 2016, the NCCP's Future Autonomous Battlespace RF with Integrated Communications (FABRIC) (formerly referred to as Robust Tactical Data Links Modernization (RTDLM)) project will develop next generation communications layer architecture for tactical networks for operations in anti-access and area denial (A2/AD) threat environments. This architecture will also deliver capacity and affordability to enable future smart sensors and smart weapons. The network architecture will be flexible enough to support Commander's Intent in any mission, environment, operating tactical platform, and weapon system under various threat conditions. FABRIC's efforts will focus on developing the advanced component technologies, such as Anti-Jam(AJ)/Low Probability of Interference (LPI)/Low Probability of Detection (LPD)/ Low Probability of Exploitation (LPE) waveforms, adaptive processing algorithms, adaptive antenna technologies (transmit/receive/nulling), adaptive power control, Dynamic Spectrum Access (DSA)/Dynamic Spectrum Management (DSM) techniques, self-healing mechanisms and cyber hardening, and advanced routing ensuring Quality of Service. The guiding tenets for creating this new Command, Control, Communications, Computers, & Intelligence (C4I) capability encompass enabling new missions, i.e. providing resilient TDLs, communications and networking "service level" capabilities, interoperation, cost (affordable), and improved performance in terms of military value.

Based on the developed thresholds and objectives for the required network architecture, the specific advanced component technologies were prioritized and form the foundation of the FABRIC design. Through simulation and field experimentation, FABRIC will verify the technology in operationally relevant environments against representative threats, and facilitate the migration and transition of these technologies to service platforms, radios, and other combat mission systems.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Future Autonomous Battlespace RF with Integrated Communications (FABRIC) (formerly referred to as Robust Tactical Data Links Modernization (RTDLM))	5.452	9.331	12.661
Description: The FABRIC project researches and develops hardware, software, and algorithms to advance network technologies to create a robust tactical network to operate in contested A2/AD environments. This project will investigate and develop flexible, high performance, and affordable technologies for the tactical network, supporting capability changes as a mission progresses from phase to phase. The project will develop and mature technologies to support direct transition of the algorithms, prototype implementations, waveform improvements, and system design improvements to radio, waveform, and weapon systems programs managed by each military department.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603662D8Z / *Networked Communications Capability*	**Project (Number/Name)** P663 / *Network Communications Analysis*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018

FY 2016 Accomplishments:

FY 2016 focused on developing the required network architecture attributes through the exploration of case studies and scenarios.

- Completed Pathfinder analysis to set nine critical technical metrics with threshold and objective measures.
- Completed “Arsenal Plane” scenario to establish required capabilities and network attributes.
- Developed an extensive classified write-up about anti-access, area denial (A2/AD) scenarios, tactics, techniques and procedures, resulting in 4 scenarios that can be used as reference examples for system performance analysis.
- Implemented a high-fidelity emulation model of multi-beam directional network and did extensive performance testing to characterize benefits of multi-beam networking in tactically relevant scenarios.
- Performed cross-validation of scenario analysis through independent implementation of models in MATLAB at Ka band and X band frequencies.
- Validated link budget calculation and atmospheric attenuation model. Cross-validated the performance metrics including connectivity, average hops, number of active beam cumulative distribution function (CDF) distribution, and antenna beam pointing statistics.
- Modeled simultaneous beams and nulls on advanced electronically scanned array (AESA) showing independent beams and nulls.
- Created simulations for jamming resistant routing and multi-beam antenna medium access control (MAC) protocols.
- Developed a MATLAB model to adjust the data rate and link range to find the maximum link range vs data rate and plot data rates per link range curves.
- Developed simulation architecture to study multi-beam directional networking approaches. Assessed physics-based and theoretic performance limits of multi-beam directional networking.
- Demonstrated flexible and affordable software defined implementation of a common data link (CDL) waveform.
- Completed high level specification of Cyber Hardened Embedded and Exascale Trusted Architecture (CHEETAH) to meet computing needs.

FY 2017 Plans:

FY 2017 focus areas include:

Modeling and Simulation Frameworks: Provide high performance computing modeling and simulation capability to support hardware, software, and scenario development.

- Define means for models developed in VHSIC (Very High Speed Integrated Circuit) Hardware Description Language (VHDL), MATLAB, C, Network Simulator-3 (NS-3) or CREATE to share the modeled performance to other models as required.
- Establish NS-3 baseline simulations for sparse and dense scenarios with performance visualization
- Augment NS-3 models for platform orientation (roll-pitch-yaw)

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Assess performance and scalability of network simulation capabilities (as a function of the number of nodes, traffic loads, and the platforms executing) - Develop a VHDL simulation environment to model and simulate FABRIC's CHEETAH processor - Develop and assess VHDL and Instruction Set Architecture (ISA) simulator performance. Hardware and Software Development: Perform detailed design and performance assessment of critical expected software and hardware functions. - Select a suitable software development environment of common tools including C, C++, and MATLAB to enable the development, exchange and validation of models of FABRIC processors, waveforms, networking functionality in order to establish interoperability for all relevant activities of the FABRIC development participants. - Analyze selection and optimization of the operating systems including real time extensions. - Study the selection of cyber defense and information assurance and information management functions suitable for the processor. - Port the Orthogonal Frequency Division Multiplexing (OFDM) Waveform baseline and assess its performance on the CHEETAH processor. - Complete detailed behavioral VHDL design of the processor. Functionality Design and Development: Design and prototype beamforming, modem, and network hardware and software functions. - Perform the mechanical and electrical design of the Electronically Steerable Aperture (ESA) - Develop and evaluate a baseline of directional networking protocols to meet the FABRIC design performance metrics. - Establish and assess OFDM waveform modem baseline and/or alternatives - Model and simulate OFDM waveform acquisition, beam quality, and nulls with platform dynamics Scenario Assessment: Assess system and mission performance in a variety of realistic operational scenarios by integrating the performance models from each hardware, software, and functional domain. - Model multiple scenario environments, concept of operations and network traffic flows through the use/experimentation of static and dynamic engagement models - Define design features of various platform nodes regarding the mission execution that are able to be adapted via software control interactions with or through FABRIC as part of mission functionality in response to threat detection and re-plans. - Characterize performance metrics of all levels of communications (physical, media access control, link, network, etc.) ***FY 2018 Plans:*** FY 2018 focus areas include:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603662D8Z / *Networked Communications Capability*	**Project (Number/Name)** P663 / *Network Communications Analysis*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Hardware and Software Development: Complete detailed design of CHEETAH processor and fabricate through 14 nanometer trusted foundry. Prototyping and experimentation: Code and refine FABRIC directional networking functionality to enable measurements of performance in realistic mission environments. - Complete lab-bench prototyping of the directional networking functionality (radio frequency (RF) front-end and the ESA). Transition Planning - Refine demonstration plans. - Continue to modify and mature variations of the A2/AD related scenarios to identify performance and potential transition opportunities.			
Accomplishments/Planned Programs Subtotals	5.452	9.331	12.661

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

The FABRIC project will address capability gaps for Joint TDL networks by developing the technologies that the Military Departments can incorporate in future platform and radio acquisitions. The proposed experimentation, with field demonstrations and modeling, will increase the Technology Readiness Level (TRL) of critical technology components, suitable for transition to acquisition programs. This will also help provide DoD leadership with the supporting technical and cost details to identify candidate "building blocks" for timely incremental improvements.

E. Performance Metrics

The Research, Development, Test, and Evaluation (RDT&E) goal for FABRIC is capability improvements that achieve greater than 70 percent “Buy-Back” of the tactical data link operational range and 80 percent of the area of operation lost in the A2/AD environment.

- Enhanced Link Capacity: 10X-100X Faster
- Enhanced Connectivity: 4X-10X Network Neighbor Connections
- Enhanced Spatial/Time Filtering: 4-7 Adaptive Nulls (Scenario Dependent)
- Receiver Based Mitigation: 20-30dB per Jammer Type (Scenario Dependent)
- Enhanced LPI/LPD: 4X-10X Closer Range to Target with Same Percent LPI/LPD

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603662D8Z / *Networked Communications Capability*	**Project (Number/Name)** P663 / *Network Communications Analysis*

- Enhanced Network Scalability: 300-1000 nodes
- Low cost AESA systems: <$25K each

Achieve significant DoD savings for radio modifications or integration into new terminals or platforms (economies of scale) as services share non-recurring development costs for common and successful TDL enhancements.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	246.689	151.999	158.398	136.159	-	136.159	115.573	88.343	69.296	70.767	Continuing	Continuing
P680: *Manufacturing Science and Technology Program*	133.902	15.501	21.442	23.375	-	23.375	23.264	30.858	35.128	35.134	Continuing	Continuing
P350: *Manufacturing Innovation Institutes*	112.787	136.498	136.956	112.784	-	112.784	92.309	57.485	34.168	35.633	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Defense-wide Manufacturing Science and Technology (DMS&T) program is the joint, defense-wide component of the DoD Manufacturing Technology (ManTech) Program directed in Title 10 U.S.C. Section 2521, the latter of which represents the Department's comprehensive advanced manufacturing program focused on enabling the strategic goals of timely, affordable delivery of dominant technologies to the warfighter, and improving the acquisition and sustainment of defense products and systems across their life cycles. Designing for manufacturability early in the development of defense-essential products and systems can yield dramatic and positive impacts for the Department's operational and modernization missions.

The DMS&T component of the DoD ManTech program specifically focuses on the development of cross-cutting and potentially game-changing manufacturing technologies, processes and capabilities that are typically beyond the scope or risk of any one Military Department or Defense Agency or platform.These high-leverage, defense-wide investments are designed to benefit the performance, affordability, and delivery timelines/deployment cycles of many of the department's most essential products and systems in ways that are not typically achievable through the efforts of a single service, agency or program office.

The DMS&T program, therefore, is a unique and fundamental DoD ManTech Program component that is needed to optimize a coordinated manufacturing technology development process across the department broadly. Concurrent development of manufacturing processes and capabilities along with S&T development enables the timely, affordable adoption and deployment of emerging technologies needed to maintain U.S. warfighting dominance. Key DMS&T technical areas for investment include Advanced Electronics and Optics Manufacturing, Advanced Materials Manufacturing, Enterprise and Emerging Manufacturing, and respective technology focus areas addressed by each of the DoD-led manufacturing innovation institutes (discussed in the next paragraph). Advanced Electronics and Optics addresses advanced manufacturing technologies for a wide range of applications such as sensors, radars, power generation, switches, and optics for defense applications. Advanced Materials addresses advanced manufacturing technologies for a wide range of materials such as composites, metals, ceramics, nanomaterials, metamaterials, and low observables. Enterprise and Emerging Manufacturing addresses advanced manufacturing technologies and enterprise business practices for defense applications. Key focus areas include the industrial information infrastructure, advanced design/qualification/cost tools, supply network integration technologies and management practices, direct digital (or additive) manufacturing, machining; robotics, assembly, and joining.

Manufacturing innovation institutes established by the DoD and part of the whole-of-government Manufacturing USA Program are also funded in this program element. Technical innovation and leadership in U.S. manufacturing are essential to sustaining the foundations of industrial competitiveness to enable our military to maintain technological advantage and global dominance. Eight DoD Manufacturing USA institutes have been established to serve as regional hubs accelerating technological

innovation and associated production processes and educational/workforce competencies for military and commercial applications via shared public-private sectors. These Manufacturing USA institutes, supported by resources from multiple U.S. Government agencies, are generating significant industry cost-share for manufacturing innovation and are forming new technology transition pathways via regional hubs spurring active collaboration among government, industry, and academia to help meet critical government and warfighter needs. The overall concept of the Manufacturing USA program (previously named the National Network for Manufacturing Innovation until changed in FY16) and the design of its manufacturing innovation institutes are provided in several key federal documents; among them: 1) the President's National Science and Technology Council (NSTC) report by the Advanced Manufacturing National Program Office entitled, "National Network for Manufacturing Innovation: A Preliminary Design," published in January 2013, and more recently, in the following two NSTC reports: 2) "National Network for Manufacturing Innovation Program Strategic Plan" and 3) "National Network for Manufacturing Innovation Annual Report," both published in February 2016.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	156.743	158.398	136.848	-	136.848
Current President's Budget	151.999	158.398	136.159	-	136.159
Total Adjustments	-4.744	0.000	-0.689	-	-0.689
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• AT&L SRRB (spell this out)	-4.744	-	-0.689	-	-0.689

Change Summary Explanation

Two project codes are used in this Program Element (PE) to distinguish between DMS&T Manufacturing Technology investments (P680) and the manufacturing innovation institute investments (P350). The growth in funding in this PE from prior President's budgets is primarily associated with P350 investments.

P350 Manufacturing Innovation Institutes - issues affecting year-to-year changes:
1) Cooperative agreement (CA) and technology investment agreement (TIA) five-year funding profiles for each of eight institutes are not straight-line funded in each year, but instead are incrementally increased and then decreased across five fiscal years, with the third year being the peak year. This profile leverages the ability to optimally attain matching funds from industry and academia partners for R&D projects.
2) The number of institutes changed from six in FY 2016 to eight in FY 2017.
3) FY 2016 and FY 2017 are the peak funding years supporting establishment of the eight DoD-led Manufacturing USA institutes, with significant annual decreases programmed annually thereafter.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*	Project (Number/Name) P680 / *Manufacturing Science and Technology Program*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P680: *Manufacturing Science and Technology Program*	133.902	15.501	21.442	23.375	-	23.375	23.264	30.858	35.128	35.134	Continuing	Continuing

A. Mission Description and Budget Item Justification

The DMS&T investment strategy follows a two-pronged approach built on: 1) broad technology initiatives and 2) specific individual projects meeting more focused manufacturing technology needs. Investments in both cases are built and managed in collaboration with the Department's research, development and acquisition (RDA) communities (including active, ongoing coordination with the DoD ManTech Program's Joint Defense Manufacturing Technology Panel) and industry and target the development of defense-essential advanced manufacturing processes and associated workforce capabilities. The portfolio includes a focus on above-the-shop-floor new manufacturing processes and practices having the potential to improve manufacturing efficiencies at broader, enterprise levels. Single specific projects address investment opportunities not associated with selected technology initiatives and enable the program to more surgically apply investments to compelling and sometimes urgent manufacturing needs.

Data calls are launched through two methods to identify technology initiatives and single specific issues requiring investment. One method is through the JDMTP. The JDMTP is comprised of the ManTech Directors from the Services, Defense Logistics Agency, and Office of Secretary of Defense (OSD). The call is distributed through the ManTech Directors to the four JDMTP sub panels: Metals Processing and Fabrication Subpanel, Composites Processing and Fabrication Subpanel, Electronics Processing and Fabrication Subpanel, and Advanced Manufacturing Enterprise Subpanel. Potential candidates are evaluated by the JDMTP based on criteria set forth in the call and announcements, and then down-selected for further development prior to final selection. The other method is through funding opportunity announcements to industry. Priority is given to investments that support affordability and producibility of critical enabling manufacturing technologies that cut across multiple platforms. Investments also balance defense priorities in specialty materials, electronics, propulsion and power, and manufacturing processes including "above the shop floor" (lean and business technologies facilitating interoperable manufacturing). Final projects are selected by the OSD ManTech Director, considering input from the JDMTP,and as approved by Deputy Assistant Secretary of Defense, Manufacturing and Industrial Base Policy (MIBP). Technology initiatives and projects are executed at the Component level.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Advanced Electronics and Optics	9.810	12.681	14.076
Description: Advanced Electronics and Optics is a series of efforts addressing advanced manufacturing technologies for a wide range of applications such as sensors, radars, power generation, switches, and optics for defense applications. Focal points are productivity and efficiency gains in the defense manufacturing base to accelerate delivery of technical capabilities to impact current warfighting operations, and manufacturing technologies to reduce the cost, acquisition time and risk of our major defense acquisition programs. Future efforts will focus on advances in fuel cells, lasers, enhanced acuity microdisplays, and transparent ceramics for opto-mechanical and armor applications.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
The Transparent Ceramic Initiative will address DoD applications for electro-optics, including fibers, films, and bulk solid state components, such as windows. Typical materials include: sapphire, ALON, and spinel. Transparent ceramics offer the potential for improved ballistic strength for battlefield armor and personnel protection. Investments include but are not limited to: high strength spinel scale-up, Nanocomposite Optical Ceramics (NCOC) powder scale-up, infrared windows, and curved transparent ceramics. Projects: Mini Short-wave Infrared (SWIR) Cameras and Imagers (FY 2016): Expedite the transition of 10 um (TEC)-less SWIR cameras to the warfighter and develop wafer level processing techniques to improve yield and reduce contaminants in the SWIR focal plane array (FPA)/ camera assembly. Will establish the industrial base for SWIR technology systems and components. Reduced unit cost allows more individuals to carry imagers; 6x improved cost, reduced from $30K to $5K; 3x reduced size from 3cm3 to 1cm3; 3x reduced weight from 120 g to 40 g. Applications include COSI, INOD, COS3, AWST, Joint Effect Targeting System (JETS), IDNST, PAWS, and MTS-B. Mini Vis - SWIR Cameras and Imagers (FY 2016): Develop a manufacturing capability to produce one camera that can see the entire spectral band of Visible, Near Infrared (NIR), and Short-wave Infrared (SWIR); while being compatible with visible, NIR, and SWIR laser pointers and illuminators. Applications include: COSI, INOD, COS3, Advanced Weapon Sight Technology (AWST), Joint Effect Targeting System (JETS), Integrated Day/Night Sight Technology (IDNST), PAWS, and Multispectral Targeting System (MTS-B). Manufacturability of Vertical Cavity Surface Emitting Lasers (VCSELs) – Phase II (FY 2016-2018): Develop the capability to produce a Multi-Function Laser Illuminator and Pointer that delivers the functionality of five different devices (Green, NIR, and Short-wave Infrared (SWIR) Laser Pointers plus NIR and SWIR illuminators) in a single, high-power, lightweight unit, which would give the warfighter commonality with all other weapon systems and be covert. Would provide the SWIR VCSEL a three-fold increase in efficiency and output power to meet critical needs for covert illumination in both High Definition and SXGA formats. Applications include: PUMA, RAVEN, TigerShark, Anubis, Spectre-FINDER, Speckles, TigerMoth, WAAS, PAWS, IPODS, AngelFire, MAV-OBAT, nLoss, LOS-short, CLRF, Joint Effect Targeting System (JETS), IDNST, TLDS, Big Safari, OEF, OIF, STINGER , and ARGUS, others. Vital Infrared Sensor Technology Acceleration (VISTA) High Temp Mid-Wave Infrared (MWIR) Detectors (FY 2016-2017): Establish a critical domestic industrial base for MWIR focal plan arrays (FPA) having capabilities in III-V antimony-based Infrared (IR) FPAs to reduce size, weight, power, and cost while increasing yield and operability as an alternative to current technology.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Will achieve wafer production scale-up to 40-50 wafers per month while shortening sensor turn-on and cool down time by 50%, extending cooler lifetimes 150% - 200% as a result of reduced stress during temperature cycling, and substantially reducing the sensor lifecycle maintenance cost. Applications include: Air Force: EODAS Enhancement (F-35), EOTS Enhancement (F-35), LWIRST (F-15), Targeting System Enhancements (MQ-9, F-16), Overhead Persistent Infrared (OPIR); Army: Next Gen FLIR, Degraded Visual Environment, Rotary Wing Pilotage; Navy: Shipboard Multifunction Sensors (APDIS), Overhead Persistent Surveillance for USMC, UAV, and Navy: BAMS, F-18 (Advanced IRST), EO/IR Standard Integration System (EISIS), and Affordable Modular Panoramic Photonics Mast. Improved Focal Plane Array (FPA) – Hyperspectral – Phase II (FY 2016): Demonstrate utility of III-V based FPAs for Long-Wave Infrared (LWIR) Hyperspectral (HIS) applications. Up to $1M/year/sensor reduction in system life cycle costs compared to arsenic-doped silicon blocked impurity band (Si:As BIB) detectors. Significant reduction in up-front costs compared to Mercury Cadmium Telluride (MCT). Improved reliability, maintainability, and availability, along with increased detection range. Organic Light Emitting Diode (OLED) Microdisplays - Phase II (FY 2016-2017): Establish manufacturing capability for producing an ultra-high resolution, high brightness, high contrast, full color microdisplay at a low unit cost. Mature and combine manufacturing processes: Silicon on Insulator (SOI) and Direct Patterning technologies to enable a 5X improvement in yield and 5X longer lifetime of displays, reducing life cycle costs. $221.7M savings for aviation and Enhanced Visual Acuity (EVA) goggles (27,700 displays between 2017-2032) x $8K/unit savings). Applications include F-35 Heads-up Helmet Mounted Display System, Apache, EVA, F-18, F-15, F-16, affordable color/monochrome displays with high brightness and high contrast to enable Warfighter to fully use sensors and cuing/augmented reality hardware. Nanocomposite Optical Ceramics (NCOC)(FY 2017-2018): Advance manufacturing maturity of NCOC to replace sapphire. The large reduction of emissivity at elevated temperatures experienced during flight makes NCOC more favorable for a missile dome by increasing the signal to noise ratio. Effort will focus on scale-up NCOC dome manufacturing processes to meet projected AIM-9X full rate production quantities. ***FY 2016 Accomplishments:*** Mini Short-wave Infrared Cameras and Imagers: established plan for device transitions; continue wafer growth/processing, hybridization, sensor packaging, and camera calibration efforts. Continued and concluded process development and yield enhancement efforts.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Mini Vis - SWIR Cameras and Imagers: completed design and development of additional manufacturing processes for sensor substrate removal; developed specifications for vis-SWIR devices; and developed test and evaluation methods for extended response to <900 nm. VISTA High Temp MWIR Detectors: develop fabrication process improvements that reduce defects and increase availability and yields; target achievement of wafer production scale-up to 40-50 wafers per month while shortening sensor turn-on and cool down time by 50%, extending cooler lifetimes 150% - 200% as a result of reduced stress during temperature cycling, and substantially reducing the sensor lifecycle maintenance cost. Manufacturability of Vertical-Cavity Surface Emitting Lasers – Phase II: continued pointer device development; designed and developed electronics and packaging; and began planning for manufacturing and field testing. Organic Light Emitting Diode (OLED) Microdisplays – Phase II: conducted an initial Manufacturing Readiness Assessment (MRA); identified key processes for direct patterning; performed diagnostic tests to enhance understanding of direct patterning device performance; identified, designed, and ordered direct patterning equipment; fabricated graphics array test cells and product wafers for the direct patterning initiative; installed and tested the initial linear sources for the direct patterning initiative; completed a design and tape-out of the Silicon on Insulator (SOI) backplane; demonstrated OLED on Silicon on Insulator and direct patterning on bulk silicon. Issued a SOI qualification plan. Improved Focal Plane Array (FPA) - Hyperspectral – Phase II: focused on detector and FPA fabrication, testing, and validation; demonstrated 640x480, 20 µm Very Long Wavelength Infrared FPAs; provided detailed FPA characterization; developed cost and yield models using multi-wafer lot runs.			
FY 2017 Plans: Manufacturability of Vertical-Cavity Surface Emitting Lasers – Phase II: continue device development and product transitions; continue making gains in wall plug efficiency (WPE), illuminator power, and reliability. Organic Light Emitting Diode Microdisplays - Phase II: deliver upgraded tooling to project contractor; develop direct patterning and SOI backplane; demonstrate critical manufacturing processes (direct patterning: 0.5 um accuracy, linear source process uniformity, SOI: high dynamic range, display uniformity); qualify the SOI process at the foundry; install the final direct patterning equipment; conduct iterative improvement direct patterning lot runs. Integrate lot runs for direct patterning and SOI; conduct a qualification process; perform a final TRL/MRL assessment and produce a final TRL/MRL report.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
VISTA High Temp MWIR Detectors: continue GaSb substrate quality improvement; continue single-detector-wafer production optimization; continue molecular beam epitaxy (MBE) capability scale up to 40 - 50 wafers per month; fabricate focal plane arrays (FPAs) on 5 inch wafers. Nanocomposite Optical Ceramics (NCOC): Continue powder conditioning, blank forming, heat treatment, optical finishing and coating related activities. ***FY 2018 Plans:*** Manufacturability of Vertical-Cavity Surface Emitting Lasers – Phase II: continue device development and additional product transitions; obtain feedback from end users and implement improvements. Nanocomposite Optical Ceramics (NCOC): Continue powder conditioning, blank forming, heat treatment, optical finishing and coating related activities; measure results and assess Manufacturing Readiness Levels.			
Title: Advanced Materials Manufacturing	3.029	5.713	5.508
Description: Advanced Materials Manufacturing is a series of efforts addressing advanced manufacturing technologies for a wide range of materials such as composites, metals, ceramics, nanomaterials, and metamaterials. Through productivity and efficiency gains, these manufacturing technologies will accelerate delivery of technical capabilities to impact current warfighting operations, while reducing the cost, acquisition time and risk of our major defense acquisition programs. Advanced materials manufacturing technologies undergoing development include materials for ballistic survivability and ballistic protection, survivability and rapid fabrication of structural components. Advanced Propulsion Initiative: Advance propulsion has a crucial need to develop fuel efficient sustainable propulsion capabilities. Several technologies will be developed including Risk-based Life Cycle Management for System Sustainment and As-Manufactured and As-Maintained State Awareness. In addition, technologies will be pursued addressing capability gaps associated with adaptive engine design and high performance lightweight materials, organic matrix composites, oxide/oxide composites, thermal barrier coatings for high temperature structure and light weight alloys. Additional capabilities will focus on unique manufacturing challenges associated with affordable Medium-Small Engine fabrication methods including Expendables. Projects: 40MM M433 Warhead Producibility (FY 2016): Achieve improved anti-personnel lethality at the squad level, increasing first shot effectiveness against personnel targets through optimization of production process prior to transition to Full Rate Production,			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*	**Project (Number/Name)** P680 / *Manufacturing Science and Technology Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
avoiding high cartridge unit costs. Primary applications include Mk 19 GMG, M203 GL, M320GL, and M32 MSGL. Secondary applications include Cannon and Tank Calibers, and Hand Grenades. Cold Spray Repair and Rebuild Phase II Large Structures (FY 2016): Expand the Cold Spray product envelope from 5 feet to a target of 40 feet to enable large tubular component repair. Applications include Seawolf Class Submarine Periscopes and TD-63 Actuators. Dimensions on Day One (FY 2016): Demonstrate a methodology that accurately predicts and accounts for the numerous geometric, tooling and material factors impacting finished composite parts enabling the correct upfront process and tooling design to yield first article parts meeting the “dimensional requirements on day 1”. Applications include F-35/UCLASS/F/A-XX/Long Range Strike for maintaining part and aircraft tolerances, which enables survivable, supportable and affordable air vehicles. Large Scale Encapsulate Ceramics - Phase II (FY 2016): Enable combat vehicles to defeat the large caliber Kinetic and Chemical Energy objective threats within the allocated weight parameters. Help address affordability of the armor, with an estimated cost reduction of $10K /sq. foot. Armor panels will be producible in the shapes required by individual vehicles. Applications include Abrams, which has a known protection limitation. GCV and other vehicles will use this technology to design those areas of vehicles subject to large caliber KE and CE threats. Out of Autoclave Processing of Organic Matrix Composites (OMCs) for Advanced Propulsion (FY 2017-2018): Current state of the art out of autoclave processable OMCs are currently limited to a service life of between 325F and 375F limiting advanced propulsion applications. Expanding performance of OMCs to temperatures between 400F and 625F will dramatically increase the design trade space for developing the next generation advanced propulsion systems. Advanced propulsion structure includes front frames, vanes, stators and outer by-pass ducts. Insertion of this technology onto the AETP program will lower cost, increase range and maintain performance for the next generation tactical aircraft. Fabrication of Non-Eroding Metallic Throat (FY 2016-2018): Scale the manufacturing of Thin walled, Non-Eroding Tungsten (W) Throats from 4” up to 12” inner throat diameters. Applications include Stage 2 & Stage 3 ICBMs as well as Stage 2 Standard Missile III. Advanced Technology Capability (FY 2016-2018): Development of advanced technologies that support warfighter survivability and capability against advanced threats. Enables new capabilities to be produced in sufficient affordable quantities to allow transition to multiple platforms.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Advanced Propulsion Initiative: Advance propulsion has a crucial need to develop fuel efficient sustainable propulsion capabilities. Several technologies will be developed including Risk-based Life Cycle Management for System Sustainment and As-Manufactured and As-Maintained State Awareness. In addition, technologies will be pursued addressing capability gaps associated with adaptive engine design and high performance lightweight materials, organic matrix composites, oxide/oxide composites, thermal barrier coatings for high temperature structure and light weight alloys. Additional capabilities will focus on unique manufacturing challenges associated with affordable Medium-Small Engine fabrication methods including Expendables. Projects: 40MM M433 Warhead Producibility (FY 2016): Achieve improved anti-personnel lethality at the squad level, increasing first shot effectiveness against personnel targets through optimization of production process prior to transition to Full Rate Production, avoiding high cartridge unit costs. Primary applications include Mk 19 GMG, M203 GL, M320GL, and M32 MSGL. Secondary applications include Cannon and Tank Calibers, and Hand Grenades. Cold Spray Repair and Rebuild Phase II Large Structures (FY 2016): Expand the Cold Spray product envelope from 5 feet to a target of 40 feet to enable large tubular component repair. Applications include Seawolf Class Submarine Periscopes and TD-63 Actuators. Dimensions on Day One (FY 2016): Demonstrate a methodology that accurately predicts and accounts for the numerous geometric, tooling and material factors impacting finished composite parts enabling the correct upfront process and tooling design to yield first article parts meeting the “dimensional requirements on day 1”. Applications include F-35/UCLASS/F/A-XX/Long Range Strike for maintaining part and aircraft tolerances, which enables survivable, supportable and affordable air vehicles. Large Scale Encapsulate Ceramics - Phase II (FY 2016): Enable combat vehicles to defeat the large caliber Kinetic and Chemical Energy objective threats within the allocated weight parameters. Help address affordability of the armor, with an estimated cost reduction of $10K /sq. foot. Armor panels will be producible in the shapes required by individual vehicles. Applications include Abrams, which has a known protection limitation. GCV and other vehicles will use this technology to design those areas of vehicles subject to large caliber KE and CE threats. Out of Autoclave Processing of Organic Matrix Composites (OMCs) for Advanced Propulsion (FY 2017-2018): Current state of the art out of autoclave processable OMCs are currently limited to a service life of between 325F and 375F limiting advanced propulsion applications. Expanding performance of OMCs to temperatures between 400F and 625F will dramatically increase the design trade space for developing the next generation advanced propulsion systems. Advanced propulsion structure includes front frames, vanes, stators and outer by-pass ducts. Insertion of this technology onto the AETP program will lower cost, increase range and maintain performance for the next generation tactical aircraft.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Fabrication of Non-Eroding Metallic Throat (FY 2016-2018): Scale the manufacturing of Thin walled, Non-Eroding Tungsten (W) Throats from 4” up to 12” inner throat diameters. Applications include Stage 2 & Stage 3 ICBMs as well as Stage 2 Standard Missile III. Advanced Technology Capability (FY 2016-2018): Development of advanced technologies that support warfighter survivability and capability against advanced threats. Enables new capabilities to be produced in sufficient affordable quantities to allow transition to multiple platforms. ***FY 2016 Accomplishments:*** 40MM M433 Warhead Improvement Producibility: Developed fragment insertion methods/tools to reduce time to fill mold with fragments & settle/align fragments; enabled mold stage transitions at reduced cycle times. Fabricated updated tooling and implemented high-rate-enabling technologies, such as part inserters, pick & place, vibratory alignment feeders. Fabricated Molded Body Assemblies utilizing an improved process. Cold Spray Repair and Rebuild Phase II Large Structures: expanded the capability of Cold Spray Phase I System to accommodate larger components; incorporated a means of processing long parts (40 feet); developed a fully integrated "tube" repair processing line. Large Scale Encapsulate Ceramics - Phase II: conducted manufacturing trials to scale up solutions; tested prototype panels; refined models; produced the required thermal design to manufacture the armor panels; set up a Government manufacturing facility. Fabrication of Non-Eroding Metallic Throat: study Vacuum Plasma Spray (VPS) manufacturing capability scale-up issues; fabricate 4” diameter specimens and conduct thermal-mechanical property testing to use as a material property baseline; modify equipment for scale up to 6” diameter specimens; assess instrumentation for control and diagnostics research needed to increased size and shape (diameter, thickness, length) for inner throat diameters up to 12”; develop and test a coating system to limit reaction of the W throats with its carbon support structure; investigate non-destructive evaluation (NDE) techniques for tungsten based nozzles; Use modeling, the material properties, the nozzle size requirements and the proposed propellant temperature to determine the optimal thickness requirements for the thin walled throats.			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Dimensions on Day One: Completed testing of material properties to determine model parameters. Completed modeling of three sub-elements including full-size, highly complex components. Built three sub-elements to use for validating the model, and compared models to as-built components. Advanced Technology Capability: Development of new and novel advanced manufacturing processes that enable scale up production of demonstrated prototypes. ***FY 2017 Plans:*** Out of Autoclave Processing of Organic Matrix Composites (OMCs) for Advanced Propulsion: Develop novel manufacturing capabilities for affordable OMC advanced propulsion structure including front frames, stators and ducts. Mature current state of the art OMC systems with elevated service life ranging from 375F to 625F, beyond the capabilities of BMIs and cyanate esters. Fabrication of Non-Eroding Metallic Throat: produce 6” specimens and conduct testing; modify equipment and produce 9” specimens; study post VPS processing to assure 98% density. This included sintering and hot isostatic press (HIP) consolidation scale-up issues. Conduct research to improve the manufacturability of non-eroding throats; continue investigating and updating size requirements and non-destructive evaluation techniques; assess assembly requirements for supports/insulators and recommend/assess measures to reduce step down erosion in the exit cone; construct a material property data base as a function of VPS size and processing; create a preliminary design for scale-up of non-eroding throats to 12” ID. Advanced Technology Capability: Improvement and continued development of new and novel advanced manufacturing processes to enable scale up of production capabilities. ***FY 2018 Plans:*** Fabrication of Non-eroding Metallic Throat: Modify existing system with tooling and plasma gun for 12” diameter throats; fabricate tungsten base alloyed powders; continue to refine fabrication of 6” and 9” diameter throats; make 12” diameter material property specimens; conduct sintering and Hot Isostatic Processing; improve manufacturing methods and practices to reduce unit costs and reduce rejects; finalize the design of 6” and 9” diameter throats; conduct a preliminary design analysis for 12” diameter throats; test 12” material property specimens. Out of Autoclave Processing of Organic Matrix Composites (OMCs) for Advanced Propulsion: Assess required operating parameters for processing Organic Matrix Composites without autoclaves.			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Advanced Technology Capability: Improvement and continued development of new and novel advanced manufacturing processes to enable scale up of production capabilities.			
Title: Enterprise and Emerging Manufacturing	2.662	3.048	3.791
Description: Enterprise and Emerging Manufacturing addresses advanced manufacturing technologies and business practices for defense applications. Key focus areas include direct digital (or additive) manufacturing, advanced manufacturing enterprise, machining, robotics, assembly, and joining. Projects selected will accelerate delivery of technical capabilities to impact current warfighting operations while reducing cost, acquisition time, and risk of major defense acquisition programs. It is paramount for the U.S. military to improve its own agility and flexibility. The focus is to find a solution to overcome a burdensome acquisition cycle requiring a great amount of cost, time, security, and storage space. Through the use of secure satellite data links or a local parts database, warfighters can access computer-aided design (CAD) for replacement parts, allowing them to repair equipment without the need to establish supply chains or wait for shipments. It allows operators to modify a part's design based on its performance in the field. Emerging manufacturing technologies undergoing development include: a large-scale challenge for advanced, interoperable machine tool applications, and methods for exchange of 3D official technical data throughout the supply chain and between the Government and contractors. Projects: MTConnect Challenge Phase II (FY 2016): Promote academia’s educational development and implementation of production interactive solutions to the broad U.S industrial base with the expansion of MTConnect Challenge that contributes to reduced cycle times and the development of real-time production metrics for adaptable dashboard applications. Securing American Manufacturing (SAM) (FY 2016): develop a Trusted and Assured supply chain, identify threat vulnerabilities of industrial control systems, provide input to DoD policies, and shape follow-on investment to mitigate threat vulnerabilities. Applications span the US Defense Industrial Base. Cyber Security for the Shop Floor - Phase II (FY 2017-2018): The manufacturing factory floor is a growing area of concern for DoD cyber security because defense contractors throughout the DoD's supply chain are continually targeted by cyber criminals seeking to: 1) steal technical data, including critical national security information and valuable commercial intellectual property; 2) alter data, thereby affecting processes and products; and 3) impair or deny process control, thereby damaging or shutting down operations. Protecting the operational systems of a manufacturing enterprise presents a different set of challenges from protecting enterprise IT systems and networks. This phase II project will develop a Trusted and Assured supply chain, identify			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
threat vulnerabilities of industrial control systems, provide input to DoD policies, and shape follow-on investment to mitigate threat vulnerabilities. Applications span the US Defense Industrial Base. ***FY 2016 Accomplishments:*** MTConnect Challenge – Phase II: Focus on data accumulation in obtaining and exchanging information on the factory floor. Market the challenge opportunities for awareness to the Society of Manufacturing Engineers, NTMA, and Colleges for participation and submittals. Developed judging criteria and initiated development of the challenge review criteria. Securing American Manufacturing (SAM): Focused on multiple threat levels triggered on manufacturing equipment at the shop floor level. Assessed performance of companies for vulnerabilities after implementing the new Defense Federal Acquisition Regulation (DFAR) requirements. ***FY 2017 Plans:*** Cybersecurity for the Shop Floor - Phase II: develop a trusted and assured supply chain, identify threat vulnerabilities of industrial control systems, provide input to DoD policies, shape follow-on investment to mitigate threat vulnerabilities, and document assessment results that discuss DFAR requirements and suppliers' mitigation and cost implications. ***FY 2018 Plans:*** Cybersecurity for the Shop Floor – Phase II: enhance the relationship with the trusted and assured supply chain, analyze and mitigate known and suspected threat vulnerabilities of industrial control systems, provide input to DoD policies, and document and study assessment results that discuss DFAR requirements and suppliers' mitigation and cost implications.			
Accomplishments/Planned Programs Subtotals	15.501	21.442	23.375

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• (BA3) 0603680F: *Air Force ManTech*	-	-	-	-	-	-	-	-	-		
• (BA3) 0603680N: *Navy ManTech*	-	-	-	-	-	-	-	-	-		
• (BA7) 0708045A: *Army ManTech - Industrial Preparedness*	-	-	-	-	-	-	-	-	-		
• (BA7) 0603680S: *DLA ManTech*	-	-	-	-	-	-	-	-	-		

Remarks

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D. Acquisition Strategy

Not applicable for this item. Outyear data for "Other Program Funding" is contained within the Service budgets.

E. Performance Metrics

The majority of DMS&T investment project performance metrics are specific to each effort and include measures identified in the project plans. Typical metrics include target dates and conditions-based milestones in project work breakdown schedules, production measures, production goals, production numbers and demonstration goals and dates.

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COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P350: *Manufacturing Innovation Institutes*	112.787	136.498	136.956	112.784	-	112.784	92.309	57.485	34.168	35.633	Continuing	Continuing

A. Mission Description and Budget Item Justification

Technological innovation and leadership in manufacturing are essential to sustaining the foundations of economic competitiveness to maintain technological advantage and global dominance for our military. To support these goals, Manufacturing USA institutes, each led by non-profit 501(c) entities, have been established by the Department to serve as national assests with headquarters and regional hubs to accelerate technological innovation into commercial applications and concurrently develop the educational competencies and production processes via shared public-private sectors. Collaborative execution and funding by the Departments of Defense (DoD), Energy (DOE), and Commerce (DoC), the National Aeronautics and Space Administration (NASA), and the National Science Foundation (NSF) to support the establishment of these Manufacturing USA institutes will spur industry cost-share for manufacturing innovation and quickly develop a pathway for technology-focused regional hubs for collaboration among government, industry, and academia that will meet critical government and Warfighter needs. The overall concept of the Manufacturing USA program (previously named the National Network for Manufacturing Innovation until changed in FY16) and the design of its manufacturing innovation institutes are provided in several key federal documents; among them: 1) the President's National Science and Technology Council (NSTC) report by the Advanced Manufacturing National Program Office entitled, "National Network for Manufacturing Innovation: A Preliminary Design," published in January 2013, and more recently, in the following two NSTC reports: 2) "National Network for Manufacturing Innovation Program Strategic Plan" and 3) "National Network for Manufacturing Innovation Annual Report," both published in February 2016.

Each of the eight DoD-led Manufacturing USA institutes addressed in this budget is expected to be self-sustaining, without reliance on federal sustainment funding, by the end of the period defined by the respective cooperative agreement (CA) or technology investment agreement (TIA) between the federal government and the non-profit organization leading each institute consortium of members. This CA/TIA period is typically for five years, with the flexibility to extend the agreement up to two years for the benefit of DoD projects, technical achievement, etc., and to fully leverage the minimum 1:1 cost share.

Each of the eight DoD-led Manufacturing USA institutes is intended to:
1) Bring together industry, universities and community colleges, federal agencies, and state and local governments and organizations to create regionally-based but nationally-impactful public-private partnerships underpinning the formation of sustainable manufacturing innovation ecosystems
2) Accelerate innovation to bridge the gap between Research and Development (R&D) and deployment of technological innovations in domestic production of goods
3) Invest in industrially relevant manufacturing technologies with broad applications, accelerating innovation within DoD and across all manufacturing sectors to increase U.S. competitiveness
4) Provide shared assets to help companies access cutting-edge capabilities and equipment
5) Create an unparalleled environment to educate and train students and workers in advanced manufacturing skills
6) Focus on maturing the associated manufacturing technologies typically from from Manufacturing Readiness Level (MRL) 4 through 7

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The first and second year of each of these new institutes is devoted to establishing a sustainable business model and operations, with continued refinement throughout the full period of the cooperative agreement, including: expanding the institute's membership base (as appropriate); establishing and solidifying revenue streams (e.g., funding from new R&D activity, membership fees, training and workforce development, certification and licensing, etc.); establishing provisional Executive Council and Technical Advisory committees to execute the business of each institute; finalizing Intellectual Property plans; developing technology roadmaps to inform investment strategies; opening industrial commons to provide for shared resource facilities available to all institute members; initiating workforce training programs in each technology area; establishing complementary relationships between Manufacturing USA institutes; analyzing the U.S. and Global industrial base in partnership with other government agencies to build upon the institute portfolio and address critical requirements; and further developing national technology roadmaps.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Institute 1 – National Additive Manufacturing Innovation Institute (America Makes)	1.107	1.111	1.026

Description: Additive manufacturing (i.e., "3D printing") is a process of joining materials to make objects from 3D model data, usually layer upon layer, as opposed to subtractive manufacturing methodologies such as traditional machining. Advanced additive manufacturing will benefit the DoD by enabling lifecycle cost savings and enhanced capabilities, including moving toward "focused logistics" – getting the right part in the right place in just the right time – for wartime and humanitarian missions using local supply chains. This Manufacturing USA institutes was established in 2012, with cooperative agreement funding included in this budget through FY 2015, and DoD program management costs included in subsequent fiscal years until all R&D projects, reporting, and fiduciary responsibilities are completed.

FY 2016 Accomplishments:
Launched a fourth call for R&D projects based on the institutes' most current technology roadmap; competitively reviewed and awarded additional applied research projects with highest potential for industry and government shared benefit; Formed a group of Standards Development Organizations to define needed industry standards; launched a project to enable low-cost sustainment capabilities for DoD; launched enhanced processes for transitioning technologies developed by the institute; implemented initiatives to increase the value proposition to members and support institute self-sustainability; continued education and workforce training initiatives.

FY 2017 Plans:
Complete technical performance of all projects awarded in FY 2015 and make results available in the knowledge base. Continue leading a group of Standards Development Organizations to define and document industry standards; continue implementing new processes for transitioning technologies developed by the institute; continue education and workforce training initiatives.

FY 2018 Plans:
Complete technical performance of all projects awarded in FY 2016 and make results available in the knowledge base. The period of performance for technical work under the Cooperative Agreement ends on August 31, 2017. Program management

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
subsequently continues to provide oversight through August 31, 2019 for the close-out of all R&D projects, cost share accrual, final reporting, and transition to sustainability, in addition to completion of RDT&E fiduciary responsibilities.			
Title: Institute 2 – Digital Manufacturing and Design Innovation Institute	24.109	13.537	4.635
Description: This national institute focus is on the implementation of the Digital Thread, the unencumbered flow of data across the lifecycle of a manufactured product encompassing data from design, production, supply, sourcing, inventory, assembly, quality, maintenance and sustainment. It includes the analysis of this data to reduce the time and cost of bringing new products to market, the elimination of barriers between design, manufacturing and sustainment by using both product data and process data in a way that is seamless and transparent. Technology thrust areas: advanced manufacturing enterprise; intelligent machines; advanced analysis; open source platform; and cyber manufacturing system security. This institute was established in February 2014, with cooperative agreement funding contribution included in this budget through FY 2018. ***FY 2016 Accomplishments:*** A total of 52 projects are underway or are in the process of award. Four calls for proposals were executed in 2016 with a topic in each of the technology thrust areas with a planned value of $7 - $10 million. Two combined Proposal Call Workshops were conducted. The Beta version of the digital manufacturing commons was launched and a call for applications for the open source system was executed with eight projects awarded. The Technology Roadmap and Strategic Investment Plan to lead the technology domain in the completion of a Digital Thread was revised. Education and workforce development projects were initiated: 1) Digital Manufacturing Skills Classification “Taxonomy” to create a comprehensive breakdown of digital manufacturing (DM) skill sets and create job profiles that match industry needs; 2) work with NIST/MEP on cooperative mechanisms such as “Train the Trainer” programs and utilization of their existing small and medium enterprises (SME) network to implement workforce development training and engagement; 3) Digital Analytics Boot Camp to develop a three to five day workshop on digital analytics in the manufacturing environment; 4) Digital Manufacturing-101 to develop DM open-source, online courses for the general public but target existing engineers, lead plant managers at Small-and-Medium-sized (SME) Manufacturers. ***FY 2017 Plans:*** Proposal calls are planned to occur approximately every six months, resulting in approximately 30 new projects with a planned value of $10 million. Conduct multiple Proposal Call Workshops, and award projects in the technology thrust areas identified above. Continue the on-going workforce development projects initiated in FY 2016. Instantiate a networking and capability matching mechanism with all new project calls and an online version on the website. Launch the commercial version of the Digital			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Manufacturing Commons. Revise the Technology Roadmap and Strategic Investment Plan to lead the technology domain in the completion of a Digital Thread. Announce the commercialization of new digital manufacturing and design technologies and industry capabilities. Significantly scale up commercialization, skill development and workforce development efforts from research projects and relationships with other government agencies. ***FY 2018 Plans:*** Proposal calls are planned to occur approximately every six months, resulting in approximately 15 new projects with a planned value of $6 million. Conduct two Proposal Call Workshops, and award projects in the technology thrust areas identified above. Continue and expand the workforce development projects initiated in FY 2016 and 2017. Expand the Digital Manufacturing Commons Open Source collaboration tool. Revise the Technology Roadmap and Strategic Investment Plan to lead the technology domain in the completion of a Digital Thread. Announce the commercialization of new digital manufacturing and design technologies and industry capabilities. Significantly scale up commercialization, skill development and workforce development efforts from research projects and relationships with other government agencies.			
Title: Institute 3 – Lightweight and Modern Metals Manufacturing Innovation Institute (Lightweight Innovations for Tomorrow (LIFT)) ***Description:*** Advanced lightweight metals retain properties comparable to heavier, traditional materials, and can enable weight reduction in a variety of components and products with significant energy savings and increased payloads. This institute will scale-up research across multiple areas to accelerate market expansion by applying an integrated materials and manufacturing approach, addressing a lack of design guides and certifications as well as cost and scale-up challenges. The goal is to catalyze the development of an advanced lightweight metal U.S. supplier base and to enable DoD to realize greater speed and agility of manned, unmanned, and Warfighter systems as well as benefits for commercial applications. Technology thrust areas: (1) priority metal classes and its alloys of advanced high-strength steels, titanium, aluminum and magnesium; (2) technology development needs grouped into six pillars: melt processing; powder processing; thermo-mechanical processing; low cost - agile tooling, coatings, and joining and assembly; (3) Crosscutting themes: Integrated Computational Materials Engineering (ICME), design, life-cycle analysis, validation/certification, cost modeling, supply chain, corrosion, and ballistic/blast This institute was established in February 2014, with cooperative agreement funds programmed in this budget through FY 2018. ***FY 2016 Accomplishments:*** Eight (8) projects released as result of first project call, with a tentative value of approximately $25 million. Second Project call status is white paper responses in eight project topic areas. 17 Workforce Development Program initiatives launched with an	27.897	13.479	4.108

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
approximate value of approximately $6.4 million. Conducted SWOT (strength-weakness-opportunity-trends) analyses along with road mapping to update mid and long-term technology investment strategies. Conducted a defense-focused workshop designed to assist in mapping investments in defense-related applications. Introduced the small and medium enterprise (SME) challenge, a “shark tank-type event which allowed SMEs to propose small technology venture projects to a panel of large industry members and subject matter experts. Expanding outreach to SMEs through workshop series to additional states within and outside the five-state region. Introduced an open-source platform of educational resource materials to supplement and improve education from K-12 through graduate degree programs. Worked with state of Indiana to design the first state-wide “work and learn” initiative to innovate and expand internships, apprenticeships, coop programs, and other models to integrate work-based learning into manufacturing programs at the secondary and post-secondary levels. Successfully launched Education and Workforce Development “infrastructure” in all five (5) State LIFT Teams. ***FY 2017 Plans:*** Project calls are planned to occur every six months, with a planned value of approximately $15 million for the year. In addition, will conduct several technology demonstrations and workshops to disseminate and implement the manufacturing technologies developed during project call number one. Complete installation and training for several pieces of critical equipment within the headquarters high bay facility. Conduct a series of workshops targeting small and medium enterprises (SME) across the nation. LIFT will develop a replicable, scalable roadmap to building a technology-competent, educated and skilled workforce – incorporating the new solutions “tested” in the five-State LIFT region – that will expand and enhance STEM education in the nation. Continue implementation and expansion of the “work and learn” initiative developed in FY 2016. ***FY 2018 Plans:*** Project calls are planned to occur every six months, with a planned value of approximately $15 million for the year. Will conduct additional technology demonstrations and workshops to disseminate and implement the manufacturing technologies developed during previous project calls. Conduct a series of workshops targeting small and medium enterprises (SME) across the nation. Complete installation of all equipment planned for the HQ high bay area. Continue to invest in education and workforce development solutions that link education, workforce development, and economic development resources to help create a coordinated economic development asset. Continue implementation and expansion of the “work and learn” initiative developed in FY 2017.			
Title: Institute 4 - Integrated Photonics Manufacturing Innovation Institute (American Institute for Manufacturing (AIM) Integrated Photonics) ***Description:*** Integrated photonics manufacturing advances the promise of unprecedented interconnection between electronics and photonics that will deliver previously unattainable performance in speed, density and power consumption, quickly providing differentiating benefits for defense applications such as high-speed signal processing, electronic warfare, information transport	33.311	25.459	25.331

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018

and computation, sensing, imaging and targeting. This institute will establish an end-to-end 'ecosystem' in the U.S. for advancing domestic integrated photonics manufacturing. This institute will include responsive integrated photonics fabrication foundry access, photonics-electronics integrated design tools, and advances in packaging, assembly and test automation. The goal will be to catalyze a vibrant, enduring integrated photonics domestic industrial base, much as SEMATECH did with the domestic semiconductor industry.

This institute was established in 2015, with cooperative agreement funding programmed in this budget through FY 2019.

FY 2016 Accomplishments:
Achieved initial operational capability of the institute, including the development and alpha release of an institute process design kit for silicon photonics, commencement of a multi-project wafer capability with a broker function to enable domestic integrated photonics production capability, and initial acquisition and buildout of new state-of-art package, assembly, and test tools and facilities in Rochester, NY. Conducted a second round of applied R&D project calls and awarded projects in the following key core areas identified in the roadmapping phase: Very High Speed Digital Data and Communication Links, Analog RF Applications, Integrated Photonics Sensors, and Photonic Integrated Circuit Array Technologies. Initiated efforts to develop a world-class integrated photonics work force through focused education, webinars, and training programs.

FY 2017 Plans:
Fully implement the integrated photonics manufacturing innovation ecosystem, including evolutionary improvements in photonic integrated circuit design tools, multi-project wafer capabilities, and package, assembly, and test tools and facilities. Provide a second domestic-wide integrated photonics manufacturing capability (in addition to silicon photonics), in this case for indium phosphide-based integrated photonics. Stand-up the packaging, assembly and test hub in Rochester, NY. Continue development of novel automated tools for cost-effective high volume end-to-end assembly and packaging of photonic integrated components. Conduct an additional round of applied R&D project calls and award projects across the eight manufacturing centers of excellence and key technology manufacturing applications areas. These projects will address common manufacturing challenges identified by the eight technology working groups and is reflected in the AIM roadmap. Transition FY 2016 projects' output to the elements of the domestic integrated photonics supply chain. Execute additional plans for development of a world-class integrated photonics work force through establishment of master's level program, design training, webinars, and training programs. Begin to transition key capabilities from this institute to ongoing DoD programs requiring integrated photonics solutions across each military service.

FY 2018 Plans:
Continue advancement of the integrated photonics manufacturing innovation ecosystem, including release of mature photonic integrated circuit design tools for both silicon and indium phosphide-based photonics, full implementation of robust, high-yield multi-project wafer capabilities, and completed buildout of state-of-the-art package, assembly, and test tools and facilities in

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Rochester, NY. Conduct additional round of applied R&D project calls and award projects in the key core areas identified in the roadmapping phase. Transition FY 2017 projects' output to the supply chain. Leverage the now mature integrated photonics domestic ecosystem to develop novel integrated photonics components for DoD programs . Incorporate emerging domestic world-class integrated photonics work force into ecosystem. Begin to see a sustainable integrated photonics institute emerging, as evidenced by fee-for-service wafer production, increased membership, licensing of institute intellectual property, and other revenues being realized. This will help extend this institute beyond the length of the Cooperative Agreement, providing key manufacturing capability for the DoD requirements through 2020 and beyond.			
Title: Institute 5 – Flexible Hybrid Electronics Manufacturing Innovation Institute (Nextflex – America's Flexible Hybrid Electronics Manufacturing Institute)	31.122	21.630	16.318
Description: Flexible hybrid electronics manufacturing involves highly tailorable devices on non-traditional, compliant substrates that combine thinned components manufactured from traditional processes with components that are added via "printing" processes. This institute will invest in prototyping and scale-up of manufacturing processes for high speed pick-and-place, printed circuits, and hybrid fabrication that will enable defense and commercial applications in wearable electronics, unattended sensors and integrated array antennas, medical devices and soft robotics devices, and the continuous improvement in SWAPC (Size, Weight And Power plus Cost) for electronic systems. This institute will establish an end-to-end domestic innovation 'ecosystem,' containing design, packaging, assembly and test automation research and workforce development capabilities which can be accessed by small, medium and large companies as well as academic institutes. The goal is to help enable the creation of a sustainable domestic industrial base which can rapidly respond to global needs using a quick technology cycle and scale-up. This institute was established in 2015, with cooperative agreement funds programmed in this budget through FY 2019.			
FY 2016 Accomplishments: NextFlex pursued a "fast-start" approach, with two project calls ($45M in investments over 25 projects for accelerating development and adoption of flexible hybrid electronics (FHE) for DoD and commercial applications) launched within the first nine months of the Institute announcement. These project call topics resulted from multiple roadmap activities by technical working groups, including a 2-day workshop with 172 subject matter experts, and subsequent meetings of nine technical working group. Built membership and released Participation Agreement and Intellectual Property Policy. NextFlex has signed agreements with 42 members, with 22 companies and 20 universities and non-profits. Began three workforce development projects, including Hack3Defense and FabLab STEM Program. Achieved initial capability for the NextFlex Institute Hub in San Jose, CA.			
FY 2017 Plans: Major plans for FY17 include building to 100 members total, updating the technology driven and application aligned Roadmap to version 2.0, and then releasing project call #3 (based upon Roadmap 2.0) targeting $20M of investment. Continue to support the innovation ecosystem, with focus on Industry transition pathways and building Hub Capabilities "Pilot Line" through installation			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
of tooling, metrology and application labs. For Workforce Development, build "Flex Factor from 30 students to 300 students in FY17, expanding from one California school district to 4 districts in California and 3 districts in two other states. Host quarterly webinares, three technical workshops and a large "Flex" conference with peer-reviewed technical papers. Finally, engage with new DoD customers to bring at least $5M in new manufacturing R&D activities to the Institute. ***FY 2018 Plans:*** Project calls are expected to be made every year, with potential for continued Phase II investment for successful Projects from PC 1.0 and 2.0. Open a functioning pilot line for prototyping, using all major EMS processing steps for FHE. Focus on dissemination of the five Manufacturing Technology Area (MTA) and Technology Development Platform (TDP) results into Industry application areas. Refine workforce development activities to ensure sufficient pipeline expertise and recruitment.			
Title: Institute 6 - Revolutionary Fibers and Textiles Manufacturing Innovation Institute ***Description:*** The RFT institute will address the spectrum of manufacturing challenges associated with revolutionary fibers and textiles, from design to end products. It will support an end-to-end innovation 'ecosystem' in the U.S. for revolutionary fibers and textiles manufacturing and leverage domestic manufacturing facilities to develop and scale-up manufacturing processes. The institute will provide innovative system demonstrations based on robust design and simulation tools, pilot production facilities, a roster of subject matter experts, suppliers, and workforce development opportunities through targeted training and curriculum programs. This institute will be established in early 2016, with cooperative agreement funds programmed in this budget through FY 2020. ***FY 2016 Accomplishments:*** update pending update pending ***FY 2017 Plans:*** update pending update pending ***FY 2018 Plans:*** update pending update pending	17.452	21.740	21.366
Title: Institute 7 - Advanced Tissue Biofabrication Manufacturing Innovation Institute (ATB-MII) ***Description:*** This institute is intended to advance state-of-the-art human tissue manufacturing innovations in cell and biomaterial processing, bioprinting, automation and non-destructive testing technologies. The motivation is to increase U.S. competitiveness	0.750	20.000	20.000

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
in advanced tissue biofabrication manufacturing by encouraging insertion of disruptive technologies into multiple biotechnology sectors, streamlining integrated testing technologies and ultimately reducing the barrier to entry for new inventors. The goal is to establish a collaboration that will mature tissue-related technology across a range of manufacturing readiness levels (MRL) 4-7, enabling post-delivery assurance of tissue identity, viability, function, and efficacy. This Institute will bring together the diverse and currently fragmented collection of industry practices and institutional knowledge across many disciplines (cell biology, bioengineering, materials science, analytical chemistry, robotics, and quality assurance). Scaling up to commercial level production of tissues will require manufacturing and process automation suitable for living cells, as well as testing and preservation methods appropriate for tissue-based products with limited shelf-life and a narrow window of efficacy. Technical focus at a minimum will be comprised of four thrust areas: 1) Cell & Material Selection & Sourcing; 2) Biofabrication Platforms; 3) Process Design and Automation; 4) Tissue Finishing and Testing Technologies This institute was established in late 2016. Technology Investment Agreement funds are programmed in this budget from FY 2016 through FY 2022. ***FY 2016 Accomplishments:*** Conducted analysis of Request for Information, Institute Technology Readiness Reviews, established a program management structure at the Services and OSD levels to support this technology selection, conducted acquisition planning and execution, and selected Advanced Tissue Biofabrication topic as the 7th DoD-led institute. Awarded the Technology Investment Agreement in late calendar year 2016. Proceeded with establishment of a management structure and initial staffing. ***FY 2017 Plans:*** Establish this new Manufacturing USA institutes following the processes used for previous institutes and as refined through lessons learned in solicitations and standup of Institutes 1-6. Conduct initial technology road mapping activities. Complete a data call for a first round of S&T projects addressing common manufacturing problems in advanced tissue biofabrication and award project contracts in the key core technology areas identified within the road mapping activities. ***FY 2018 Plans:*** Continue to expand the membership and refine core investment areas supporting the innovation ecosystem. Initiate two rounds of applied R&D project calls in core areas. Execute workforce development projects.			
Title: Institute 8 - Robotics in Manufacturing Environment (RiME)	0.750	20.000	20.000
Description: The motivation for this Manufacturing Innovation Institute is to improve U.S. competitiveness in manufacturing through advancements in the smart collaborative robotic field. This technology has the potential to level the manufacturing playing field with competing low labor cost economies, with decreased manufacturing cost, better quality and timely reaction			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
to changes needed by the customer. Smart, collaborative robotics can also enable "batch of one" production, also known as mass customization. The technologies developed in this institute will be primarily focused in making advanced manufacturing more competitive, addressing DoD needs, and contribute to improving prosperity in the United States. The Institute will focus on technology areas such as human robot interaction, adaption, learning, manipulation, autonomy, mobility and perception. This institute will be established in FY 2017. Cooperative Agreement/Technology Investment Agreement funds are programmed in this budget from FY 2017 through FY 2022. ***FY 2016 Accomplishments:*** Conducted analysis of Request for Information, Institute Technology Readiness Reviews, established a program management structure at the Services and OSD levels to support this technology selection, conducted acquisition planning and execution, and selected Robotics in Manufacturing Environment topic as the 8th DoD-led Manufacturing USA institutes. ***FY 2017 Plans:*** Award Technology Investment Agreement and establish this new institute following the processes used for previous institutes and as refined through lessons learned in solicitations and standup of Institutes 1-6. Conduct initial technology road mapping activities. Complete a data call for a first round of S&T projects and award project contracts in the key core technology areas identified within the road mapping activities. ***FY 2018 Plans:*** Continue to expand the membership and refine core investment areas supporting the innovation ecosystem. Initiate two rounds of applied R&D project calls in core areas. Execute workforce development projects.			
Accomplishments/Planned Programs Subtotals	136.498	136.956	112.784

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Each Manufacturing Innovation Institute is established through a competitive selection process. The executing military department or agency, in close and continuous coordination with OSD ManTech, publishes a formal solicitation (funding opportunity announcement) for proposals describing the scope of required activities and extensive proposal evaluation criteria. Non-Profit Organizations (including universities) are eligible to bid, and each bidder forms a broad consortium of industry and academic partners. The executing military department or agency, in close coordination with OSD, uses a team of government experts to evaluate each proposal against the evaluation criteria and selects a winning consortium. The final terms of the cooperative agreement/technology investment agreement between the selectee and

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the federal government are then negotiated and the CA or TIA is signed. Throughout and after completion of this process, the federal government makes clear that members of non-selected teams are encouraged to join the selected consortium as conditions permit.

E. Performance Metrics

Assessing the performance of the DoD-led manufacturing institutess, part of the whole-of-government Manufacturing USA Program, requires a multi-faceted view of 'performance,' given the program's layered base of DoD, government-wide, and national level public-private stakeholders and interests. Notwithstanding this complexity, the Department is careful to maintain orientation with the DoD ManTech program's statutory goals and objectives and has concluded that those requirements are highly complementary to, and supportive of, the broader national goals of the Manufacturing USA Program as laid out in the Revitalize American Manufacturing and Innovation (RAMI) Act of 2014. Performance relative to both sets of goals/objectives is necessarily measured in both qualitative and quantitative terms, and many of the institutes accomplishments previously addressed represent rich and highly descriptive qualitative and quantitative measure of program performance. The Department actively reviews or oversees the review of institute metrics at four levels: 1) the overall Manufacturing USA network level (this is done in coordination with the DoD's Manufacturing USA interagency partners), 2) at the DoD/funding agency level (per the statutory requirements of DoD ManTech Program), 3) at the individual institute level (in coordination with each institute), and 4) at the specific technology project level (via DoD technical expert involvement in the institutes). Broadly, the institutes themselves are charged by the DoD, the Administration and Congress with ensuring that key elements of their innovation ecosystems will be matured and made widely available by fostering collaborations between appropriate elements of that ecosystem. The following four categories of metrics have emerged as common focus areas:

1. Impact on U.S. Innovation Ecosystem
2. Financial Leverage/Sustainability
3. Education and Advanced Manufacturing Workforce Development
4. Technical Advancement

Specific metrics and the annual cycle for measuring progress against benchmarks are developed for each institute consortium and reflect that institute's unique technology capability, expertise, and organizational structure. The Department strives to ensure that the assessment process captures and articulates the benefits to national security based upon technological advancements and the industrial base.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603699D8Z / *Emerging Capabilities Technology Development*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	166.411	77.966	49.895	57.876	-	57.876	48.037	48.092	47.695	49.038	Continuing	Continuing
P795: *Emerging Capabilities Technology Development*	166.411	77.966	49.895	39.876	-	39.876	48.037	48.092	47.695	49.038	Continuing	Continuing
P713: *High Energy Laser*	-	0.000	0.000	18.000	-	18.000	0.000	0.000	0.000	0.000	Continuing	Continuing

Note

The Emerging Capabilities Technology Development (ECTD) Program Element (PE) supports a focus throughout the Office of the Deputy Assistant Secretary of Defense for Emerging Capability & Prototyping (DASD(EC&P)) on producing risk-reducing proof-of-principle prototypes and demonstrations of emerging technologies coordinated through interagency and joint partnerships. ECTD will support the Assistant Secretary of Defense for Research & Engineering (ASD(R&E)) under the mitigating new and emerging threats priority area with longer-term, mission-focused capability development that crosses functional domains to enhance Warfighter adaptability and resilience. The office, in collaboration with government labs, academia, and industry will execute projects that target specific mission capability gaps identified by the Combatant Commands (COCOMs), the Joint Staff and senior leadership in the Office of the Secretary of Defense.

A. Mission Description and Budget Item Justification

The ECTD funding supports projects that reduce the technology risk of emerging capabilities by advancing proof-of-principle prototypes in support of near and mid-term operational engagements and stability operations. The framework is guided by the ASD(R&E), DASD(EC&P), and the Rapid Reaction Technology Office's science and technology objectives and focus areas. With an emphasis on interagency and joint partnerships, ECTD develops initiatives to produce capability options that anticipate and inform formal joint and interagency requirements and acquisition processes. Individual projects generally span one to three years, typically at a cost of less than $4.000 million, and are demonstrated and released in spirals within the project timeline. The ECTD program focuses on rapid prototyping of emerging technologies, including electromagnetic spectrum-agile capability options; multi-domain, autonomous systems; counter-weapons of mass destruction; and dismounted soldier systems.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
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B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	40.949	49.895	29.903	-	29.903
Current President's Budget	77.966	49.895	57.876	-	57.876
Total Adjustments	37.017	0.000	27.973	-	27.973
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	38.000	-			
• SBIR/STTR Transfer	-0.983	-			
• Baseline adjustment High Energy Laser	-	-	18.000	-	18.000
• Baseline adjustment India Science & Technology transfer	-	-	10.000	-	10.000
• Other Internal Baseline Adjustment	-	-	-0.027	-	-0.027

Change Summary Explanation

The FY 2016 reprogramming entry of $38.000 million represents the net of $12.000 million for the Long Endurance Airborne Platform (LEAP) project to improve battlespace awareness in the U.S. Central Command (USCENTCOM) area of responsibility (AoR), $30.000 million to support the Missile Defeat Project to address operational needs in the U.S. Strategic Command (USSTRATCOM) and U.S. Pacific Command (USPACOM) AoRs, and a -$4.000 million below threshold reprogramming to Program Element 0603648D8Z to remunerate for funds extended to ECTD during 2016 on behalf of the Missile Defeat Project.

The FY 2018 baseline funding increase of $27.973 million reflects an increase of $18.000 million for High Energy Laser, $10.000 million for the baseline transfer of the India S&T program from Joint Capability Technology Development (Program Element 0603648D8Z), and a $0.027 million reduction to pay for higher priority DoD requirements.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603699D8Z / *Emerging Capabilities Technology Development*	Project (Number/Name) P795 / *Emerging Capabilities Technology Development*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P795: *Emerging Capabilities Technology Development*	166.411	77.966	49.895	39.876	-	39.876	48.037	48.092	47.695	49.038	Continuing	Continuing

A. Mission Description and Budget Item Justification

ECTD funding supports projects that reduce technology risk for emerging capabilities by advancing proof-of-principle prototypes to support near and mid-term operations. The framework is guided by the ASD(R&E), DASD(EC&P), and the Rapid Reaction Technology Office's science and technology objectives and focus areas. ECTD projects cross functional domains to transition needed capabilities that enhance Warfighter adaptability and resilience. With an emphasis on interagency and joint partnerships, ECTD develops initiatives to produce capability options that anticipate and inform formal joint and interagency requirements and acquisition processes. Individual projects generally span one to three years, typically at a cost of less than $4.000 million, and are demonstrated and released in spirals within the project timeline. The ECTD program focuses on rapid prototyping of emerging technologies in areas that include: electromagnetic spectrum-agile capability options; multi-domain, unmanned autonomous systems; counter-weapons of mass destruction capabilities; and, dismounted soldier systems.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Voidstar	1.775	1.545	-
Description: This project will demonstrate and deliver advanced Electronic Warfare (EW) capabilities on proven, tactical software-defined radio (SDR) technology. The capabilities and radio are vertically-scalable to operate on platforms with varying size, weight, and power (SWaP) constraints; and, horizontally-scalable to coherently operate across disparate platforms. Details of this project are classified.			
FY 2016 Accomplishments: This project was able to blindly detect, classify, geolocate, and recommend EW counter reactions to agile threat signals in non-real time using digital signal processing (DSP) and machine learning. Further details are classified.			
FY 2017 Plans: Voidstar will improve the capability for tactical units to provide (near) real-time counters to threat signals. When successful the Voidstar capability will transition to the Air Force. Further details are classified.			
Title: Long Range Engagement Weapon (LREW)	2.100	7.500	-
Description: This project will complete the engineering and design work required to assess a multi-role, long-range interceptor for maintaining air dominance. Details of this project are classified.			
FY 2016 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
The LREW project initiated systems design and engineering tasks and began kill chain architecture investigation. Further details are classified. ***FY 2017 Plans:*** LREW will complete systems design, engineering, and kill chain investigations in FY 2017. When successful, LREW will transition to multiple Services.			
Title: Raven Flash ***Description:*** The Raven Flash project will develop and demonstrate an adaptable, agile Electronic Warfare capability. Details of this project are classified. ***FY 2016 Accomplishments:*** The project defined a system architecture and a development path from a known operational concept of operations. It also established development partners roles, responsibilities, and contribution; and, initiated source materials optimization and commercialization of materials fabrication. ***FY 2017 Plans:*** The Raven Flash project will develop, characterize, and integrate source system components. FY 2017 efforts will enhance and integrate measurement and analysis sub-systems. Baseline effects testing against selected representative target classes will be conducted in accordance with established level-of-effect (LOE) metrics. ***FY 2018 Plans:*** Building on FY 2017 accomplishments, Raven Flash will conduct high-fidelity laboratory integration of component sub-systems and characterize selected target system(s) at a test range. This effort will demonstrate a high-fidelity laboratory prototype against surrogate target system.	3.212	3.330	2.920
Title: Advanced Composite Flywheel Energy Storage and Power System ***Description:*** This project will develop and demonstrate a composite flywheel energy storage and power system; and, evaluate its potential applications for underwater systems. This project will demonstrate energy and power densities from a composite flywheel system that meet or exceed current unmanned underwater vehicle battery technologies. ***FY 2016 Accomplishments:*** The project constructed an advanced composite flywheel energy storage and power demonstration module. Subsequent testing assessed energy harvesting, storage, supply, and recharge performance. Using FY 2016 funding, developmental work continues in FY 2017.	3.750	-	-
Title: Air Base Resilience Sensor	3.750	-	-

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Description: This project will develop an advanced sensor to enhance detection and tracking of threat systems while cueing engagements with defensive systems. Details of this project are classified. ***FY 2016 Accomplishments:*** The project completed systems design and engineering for an integrated sensor chip assembly (SCA) prototype. The SCA performance was tested at expected operating temperatures to validate against performance requirements. Deliverables included a SCA evaluation report to document project results. Using FY 2016 funding, developmental work continues in FY 2017.			
Title: Product Architectures, Design, and Manufacturing for Operational Responsiveness ***Description:*** This project demonstrated manufacturing cost and schedule gains by tightly coupling product architectures with manufacturing and design tools. Using adaptive manufacturing architectures and three dimensional printers this project iteratively designed, built, and tested a prototype unmanned aerial system (UAS) to demonstrate improvements over conventional manufacturing approaches. The project allows for iterative prototyping through additive manufacturing to accelerate development by orders of magnitude. The demonstration platform for this effort is a modular, rapidly designed, and reconfigurable UAS with modules built using additive manufacturing. The project also includes a system level design tool that allows the user to configure a new vehicle, predict its performance, and automatically generate the flight control laws for a new configuration. ***FY 2016 Accomplishments:*** This project is a continuation of an effort initiated in FY 2014. The project produced a prototype system and associated training materials for a structures design module. Final measures of operational responsiveness and training metrics were provided. The UAS architecture and the training materials are readily transferrable to operators for rapid design and deployment. In addition, the products transitioned to Naval Air Systems Command for further toolset development. The overarching adaptive design approach demonstrated with this UAS prototype was adopted by elements of the Joint Improvised-threat Defeat Agency (JIDA) and the U.S. Marines.	1.250	-	-
Title: Advanced Electronic Warfare Laboratory ***Description:*** This project will develop an extensible Advanced Electronic Warfare Laboratory (AEWL) technical framework that can be replicated at multiple government facilities to support emerging blue force Electronic Warfare (EW) subsystem and system prototypes in a realistic electromagnetic spectrum (EMS) environment. This effort includes the hardware and software implementation of the first instantiation of the AEWL technical framework. ***FY 2016 Accomplishments:***	0.450	3.354	2.152

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
The project analyzed and selected final AEWL system requirements, hardware and software design parameters and specifications, and initiated procurement of some subsystem components. Software emulation of a portion of the AEWL was completed. ***FY 2017 Plans:*** Procurement of hardware components and subsystems will continue. The transition partner will verify AEWL software and hardware subsystems' performance and conduct acceptance testing. ***FY 2018 Plans:*** Final integration of the hardware subsystems and acceptance testing of the integrated AEWL will be completed. Once operational, the initial instantiation of the AEWL will be transitioned to the U.S. Army for evaluation and use.			
Title: Advanced Data Link for Unmanned Aerial Systems ***Description:*** This project will develop and demonstrate an advanced datalink for Unmanned Aerial Systems (UAS). This capability gives warfighters increased battlespace awareness through increasing the range of existing surveillance theater assets. Details are classified. ***FY 2016 Accomplishments:*** The project designed, developed, and initiated procurement of the advanced data link subcomponents. ***FY 2017 Plans:*** This project will complete integration and testing of the prototype culminating in a final demonstration. The prototype will transition to the U.S. Navy for integration into currently fielded UAS.	0.400	5.100	-
Title: Joint Communications Architecture for Unmanned Systems (JCAUS) ***Description:*** This project developed a communication architecture for joint unmanned systems and a prototype communications module to accelerate the transition of advanced communications technology to unmanned systems. ***FY 2016 Accomplishments:*** The project developed technical specifications for the system requirements document and architecture system design document. Hardware and software development, integration, and testing will continue into FY 2017 leading to a final system demonstration. The developed architecture and communications module will transition to the Naval Sea Systems Command for integration into currently fielded and future joint unmanned ground systems.	1.300	-	-
Title: Forward Laser Acoustic InhibitoR (FLAIR)	1.700	1.000	-

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Description: This project developed and demonstrated a unique user-defined capability to significantly raise the acoustic background noise level in maritime environments. Details are classified. ***FY 2016 Accomplishments:*** The project designed and developed a prototype system for demonstration in a relevant environment. Details are classified. ***FY 2017 Plans:*** Further integration and testing of the prototype will be completed. FLAIR will transition to the U.S. Navy for further development. Details are classified.			
Title: Software Reconfigurable Radar ***Description:*** This project developed a prototype software reconfigurable radar comprised of application specific software executed on a common hardware architecture based primarily on commercial-off-the-shelf components. This project uses a modular, reconfigurable approach to hardware and software resulting in a multipurpose prototype, which reduces cost and development time of radar systems. ***FY 2016 Accomplishments:*** The project finalized system requirements based on a review of modern radar hardware system design and initiated procurement of system components. Hardware and software integration and testing will continue into FY 2017 leading to a final system demonstration. The demonstration results will be used to inform future joint Service program of record acquisition decisions.	1.500	-	-
Title: Long Endurance Airborne Platform (LEAP) ***Description:*** Long Endurance Airborne Platform (LEAP) provides a revolutionary, low-cost, low acoustic signature, and persistent aerial intelligence, surveillance, and reconnaissance (ISR) capability by converting a proven, fuel-efficient light sport aircraft into an unmanned aerial system (UAS). LEAP addresses the operational need for improved battlespace awareness in the U. S. Central Command (USCENTCOM) area of responsibility (AoR). ***FY 2016 Accomplishments:*** In 2016, this project developed additional classified payload and communication capabilities for special forces operations and other counter insurgency requirements. In addition, it increased platform endurance to extend range of operations and surveillance time beyond current Group 4 UAS capabilities. Testing and evaluation of the LEAP system was conducted outside the U.S. under 24 x 7 combat operations conditions. The project achieved objective vehicle cost, capability, and rapid reaction requirements. The LEAP system transitioned to the U.S. Special Operations Command for sustained operations.	12.000	-	-
Title: X-Lab	2.000	4.200	5.000

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Description: X-Lab will develop a robust architecture to query numerous extremely large data sets and provide solutions to challenging problems. Initial work focused on leveraging data sets to provide early indications of activities leading to a terrorist or state-sponsored attack. X-Lab will develop and assess analytic methods and tools for finding and correlating multiple subtle signatures. Early detection and warning of precursor activities can enable intervention, earlier localization of response, and earlier deployment of countermeasures. ***FY 2016 Accomplishments:*** The X-Lab architecture was expanded to include access to additional live and archived classified and unclassified data sets to address challenging problems. The X-Lab system demonstrated the first ever automated analysis of archived imagery and text data, and provided advance indications and warnings of a simulated attack in a demonstration for the Joint Staff and Joint Warfare Analysis Center (JWAC). ***FY 2017 Plans:*** The X-Lab architecture will be expanded to include access to more live and archived classified and unclassified data sets to increase applications and system performance. ***FY 2018 Plans:*** The X-Lab architecture will be expanded to include access to more live and archived classified and unclassified data sets to increase applications and system performance. Additional demonstrations focused on other Combatant Command problem sets will be conducted using these expanded data sets. When successful, the X-Lab capability will transition to JWAC in FY 2018.			
Title: Missile Defeat ***Description:*** The Missile Defeat effort will support the assessment and development of a suite of capabilities to address emergent strategic and tactical threats. The effort meets strategic goals of the Office of the Under Secretary of Defense for Acquisition, Technology & Logistics (OUSD(AT&L)). The Missile Defeat effort also addresses operational needs in the U.S. Strategic Command (USSTRATCOM) and U.S. Pacific Command (USPACOM) areas of responsibility (AoR). Project details are classified. ***FY 2016 Accomplishments:*** The Missile Defeat effort supported the development of the Missile Defeat Enterprise (MDE) and improved national response to specific threats in the USSTRATCOM and USPACOM AoRs by integrating DoD and intelligence community efforts. This was a congressional special interest item. Further details are at the classified level. ***FY 2017 Plans:***	26.000	0.000	-

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This project will transition to the new Program Element 0604132D8Z Missile Defeat Defense Technology Innovation for additional work in FY 2017.			
Title: Remote Weapon Station (RWS) Auto Prioritization, Targeting, and Operator Cueing (RAPTOR) ***Description:*** The Remote Weapon Station (RWS) Auto Prioritization, Targeting, and Operator Cueing (RAPTOR) project will develop a prototype for a crew-served weapon system that will semi-autonomously detect, track, prioritize, and engage multiple targets with operator determination. This is a joint effort in conjunction with representatives of the U.S. Army Armament Research, Development and Engineering Center (ARDEC), the Joint Non-Lethal Weapons Directorate (JNLWD), and the Office of Naval Research (ONR). These partner organizations will provide subsystems critical for RAPTOR functionality. The combined demonstration of multi-agency science and technology developments will serve to inform the Common Remotely Operated Weapon Station (CROWS) Program of Record. RAPTOR will also inform the development of a Joint Advanced Weapon Sensor System (JAWSS) Capability Development Document (CDD). ***FY 2016 Accomplishments:*** The project completed development of a crew-served, semi-autonomous Remote Weapon Station (RWS) capable of detecting, tracking, prioritizing, and engaging multiple targets. The final demonstration of the RAPTOR system in a simulated quick-response defense scenario was conducted in September 2016. In addition to the final demonstration, the RAPTOR system participated in four additional exercises with the U.S. Army Tank Automotive Research, Development, and Engineering Center (TARDEC). The results of the FY 2016 demonstrations and exercises will inform a transition decision to the U.S. Army.	1.400	-	-
Title: Software Defined Radio Frequency Test System (Seeker) ***Description:*** The Software Defined Radio Frequency (RF) Test System, known as Seeker, will develop a rapidly reconfigurable test infrastructure with multiple capabilities to address RF spectrum sharing, spectrum relocation, and emergent RF spectrum denial. The Seeker project is focused on missile defeat. Details of this project are classified. ***FY 2016 Accomplishments:*** The project continued hardware and software integration and testing. Two capability increments were completed with a demonstration conducted for each increment. Hardware and software integration and testing will continue into FY 2017 leading to a final system demonstration.	1.135	-	-
Title: Thunderstorm ***Description:*** This demonstration venue examines and explores emerging technologies and prototypes via a series of technology demonstrations and other activities conducted by the Rapid Reaction Technology Office within the office of the Deputy Assistant Secretary of Defense for Emerging Capability & Prototyping. Thunderstorm enhances interagency and international collaboration and provides the Department of Defense (DoD) and participating partners with an opportunity to evaluate and	2.500	2.500	2.500

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assess the capabilities of new and emerging technologies, primarily in the fields of air, space, and intelligence, surveillance, and reconnaissance (ISR). In addition, Thunderstorm provides an opportunity for technology developers to interact with operational commands and other government personnel to determine how specific efforts and systems may support or enhance warfighter capability needs. Technology developers are given the opportunity to demonstrate selected technologies in geographically and operationally relevant scenarios. Thunderstorm demonstration objectives, performance measures, lessons learned, post-demonstration assessments, and data evaluation serve to inform future DoD technology investments and identify new capabilities and new ways to employ existing capabilities. ***FY 2016 Accomplishments:*** Focus areas for FY 2016 Thunderstorm spirals included arctic challenges, dense urban and subterranean warfare, and physical security of critical port facilities. In FY 2016, Thunderstorm demonstrated 65 technologies during 3 events, including systems from 32 small businesses, and these events achieved cost avoidance to the DoD of $1.973 million. In addition, 14 technologies were referred to operational partners for follow-up or potential acquisition. Thunderstorm also completed a publications review in support of port security and assisted a maritime demonstration venue with evaluating counter unmanned undersea vehicles. ***FY 2017 Plans:*** Three Thunderstorm spirals are planned for FY 2017, building on the experience garnered from previous spirals. Focus areas will include the continuation of physical security of critical port facilities, dense urban and subterranean warfare, and other priorities identified through engagement with stakeholders. A demonstration will be conducted in coordination with the Stiletto maritime demonstration platform. ***FY 2018 Plans:*** The Thunderstorm focus will continue to reflect the most exigent challenges to DoD and provide a venue to explore new and innovative technological solutions. Focus areas will be based on need and priorities identified through engagement with stakeholders in the U.S. Navy, U.S. Coast Guard, U.S. Army, U.S. Marine Corps, U.S. Special Operations Command (USSOCOM), U.S. Southern Command (USSOUTHCOM), U.S. Central Command (USCENTCOM), the Intelligence Community, and other operational users.			
Title: Stiletto Maritime Demonstration Program	2.500	2.500	2.500
Description: Stiletto is a maritime technology demonstration and assessment asset developed as an experimentation platform to examine and explore emerging technologies and proof-of-principle prototypes. Stiletto supports a series of maritime technology demonstrations annually and other activities conducted by the Rapid Reaction Technology Office (RRTO) within the office of the Deputy Assistant Secretary of Defense for Emerging Capability & Prototyping (DASD(EC&P)). The program is guided by focus areas identified by Combatant Commands, military Service organizations, other defense organizations, and interagency partners. Stiletto includes an experimental, all carbon fiber 88-foot boat that serves as a maritime demonstration platform and associated			

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tools, processes, and equipment to assist in the assessment and development of prototypes. Stiletto supports the rapid transition of emerging technologies across the range of military operations, thereby increasing the speed of response to emerging threats. The boat supports special operations forces, expeditionary forces, and interagency users by exploring the military utility of new capabilities and reducing the risk of emerging technologies and concepts of operation. The Stiletto Maritime Demonstration Program offers a streamlined experimentation and demonstration process that encourages system developers to engage directly with the warfighter in the maritime environment to rapidly adapt technologies around operational needs. The Stiletto vessel is home-ported in Norfolk, Virginia. ***FY 2016 Accomplishments:*** Focus areas for the Stiletto Maritime Demonstration Program in FY 2016 included maritime electro-optical and infrared surveillance; counter unmanned underwater vehicles (C-UUV); and, maritime intelligence, surveillance, and reconnaissance (ISR) from unmanned aerial vehicles. In FY 2016, Stiletto demonstrated 68 technologies during 4 capability demonstrations, including systems from 20 small businesses, and achieved cost avoidance to the DoD of $4.025 million. Individual vendors saved an average $37 thousand of development cost per demonstration and 31 new CRADAs were signed between vendors and the Stiletto team for long term technology development. The Stiletto platform also supported U.S. Special Operations Command (USSOCOM) during Trident Spectre 16; the U.S. Marine Corps Warfighting Laboratory during the Unmanned Tactical Command demonstration at Quantico, Virginia; and, the Thunderstorm Spiral for physical security of critical port facilities. ***FY 2017 Plans:*** The Stiletto Maritime Demonstration Program will continue engagement with operational partners to determine urgent demonstration requirements for FY 2017. Four capability demonstrations are planned for FY 2017, including combatant craft integrated bridge systems, maritime disablement, precision engagement, and maritime electronic intelligence. ***FY 2018 Plans:*** The Stiletto Maritime Demonstration Program will continue to focus on emerging capabilities and threats. Engagement with stakeholders in the U.S. Navy, U.S. Coast Guard, U.S. Army, U.S. Marine Corps, USSOCOM, U.S. Southern Command (USSOUTHCOM), the intelligence community, and other operational users will identify needs and priorities to guide capability demonstrations.			
Title: Multi-Domain Demonstrations	1.000	1.000	-
Description: Multi-Domain Demonstrations leverage existing demonstration venues and sites across the military Services to evaluate emerging technologies and prototypes. Individual demonstrations are selected in the execution year in response to identified Combatant Commands needs, emerging threats, and opportunities. Multi-domain demonstrations focus on the integration of emerging capabilities across space, air, sea, and ground domains, with specific attention to the five key building blocks associated with the Third Offset Strategy. Sponsored demonstrations provide an opportunity for small businesses and			

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other non-traditional partners to assess emerging technologies through informal evaluations in realistic environments. The results of these evaluations enable improvements to prototype systems, inform the procurement process for future enhanced capabilities, and alert operational users of capabilities in development. ***FY 2016 Accomplishments:*** Demonstrations were conducted with the Joint Experimental Range Complex at Yuma Proving Grounds, Arizona, to evaluate low-cost, small business-oriented technologies in the area of hostile gunfire detection. Documentation of more than 300 systems demonstrated since 2003 were consolidated in the Defense Technical Information Center (DTIC) database. ***FY 2017 Plans:*** Multi-domain demonstrations in FY 2017 will continue to support the Office of the Deputy Assistant Secretary of Defense for Emerging Capability & Prototyping programs and DoD's focus on developing a Third Offset Strategy. Demonstrations will leverage existing venues across the military Services and DoD component organizations. Other priorities will be identified through engagement with stakeholders.			
Title: Defense Innovation Unit Experimental ***Description:*** Defense Innovation Unit Experimental (DIUx) supports the research, development, and evaluation of current state-of-the-art capabilities. DIUx leverages the venture capital community to identify non-traditional companies with emerging commercially based technologies. DIUx exercises all avenues to fund promising technologies, including merit-based prize competitions, incubator partnerships, and targeted R&D efforts. ***FY 2016 Accomplishments:*** In FY 2016, the DIUx completed two projects focused on social media analysis and network security support. A social media analysis project successfully piloted technology to highlight advances in machine learning algorithms and natural language processing that reduce analysis time through the use of automated content analysis, classification, categorization, and data visualization; and, enable improved human-to-machine interface and teaming. The proof-of-concept pilot demonstrated how these tools could assist analysts in shortening decision cycles to more effectively support theater operations. After the successful pilot DIUx transitioned the capability to U.S. Army Intelligence and Security Command. A network security support project successfully evaluated the ability of web-based software and associated platform to improve situational awareness of networked systems. The tool provided improved situational awareness, enhanced network monitoring, and management capabilities in support of specific mission critical applications. DIUx demonstrated and transitioned the capability to support joint Service missions.	3.000	-	-
Title: Low Cost Innovative Projects ***Description:*** Emerging Capabilities Technology Development (ECTD) funds supported projects requiring less than one million dollars for execution. ECTD selected, executed, and transitioned low cost projects in the areas of: autonomous vehicles; maritime	5.244	-	-

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irregular warfare capabilities; countering violent extremism; persistent surveillance; low-cost, small footprint operations; and, other emerging technology areas. These projects delivered proof-of-principle prototypes for evaluation or assessment by warfighters and other interagency users.

FY 2016 Accomplishments:

•Advanced Digital Radio Frequency Memory (DRFM): Deliverables included a coherent countermeasures (CoCM) virtual prototype using photonic technology to achieve a wide operational bandwidth, fast frequency tuning, and wide instantaneous bandwidth. Additionally, the prototype provided sophisticated digital signal processing and generation of advanced CoCM waveforms and techniques. The advanced DRFM transitioned to Naval Air Systems Command for further development.

•Unattended Sensor Radio: A tactical mesh radio network optimized to achieve the best data transmission rates in congested and contested environments. The radio network is also energy efficient for long endurance unattended ground sensor applications. The radio transitioned to Marine Corps Systems Command (MCSC) for integration into a classified program.

•Portable Combustor for Soldier Power: This project demonstrated a prototype dismount portable, 30-watt solid state combustor that generates electricity from high energy density liquid fuels. The portable combustor transitioned to Army Communications Electronics Research Development and Engineering Center for further development.

•Handheld Detector Portable Training Kit: The training kit is a portable, stand-alone training tool for any handheld counter-improvised explosive device (IED) and landmine detector using stereoscopic optical technology. The tool transitioned to Marine Corps Systems Command and demonstrated immediate feedback to users to improve quality of manual counter-IED and landmine detection.

•Electromagnetic Spectrum (EMS) Agility: This project conducted research and development leading to prototypes of enabling technologies for dynamic radio frequency spectrum sharing by Defense Department systems. Prototypes from this project transitioned to a range of users including Navy's Joint Service Explosive Ordnance Disposal office and Marine Corps Systems Command.

•Persistics Software Enhancement: This project developed and delivered systems that automatically integrate and analyze open source imagery data to predict adversary behavior and track weapons of mass destruction in denied areas. The capability transitioned to Pacific Command and Special Operations Command and further details are classified.

•Infrasonic Signal Association: This capability automatically integrates and analyzes available open source intelligence feeds to predict adversary behavior and track weapons of mass destruction in denied areas. This project transitioned to the Army and further details are classified.

•Terra Firma: Terra Firma is an expeditious method to determine the load bearing capacity of unimproved and semi-prepared (tactical) landing zones. Terra Firma transitioned to Air Force Special Operations Command.

•United Nations (U.N.) Peacekeeping Operations (PKO) Technology: The U.S. Southern Command (USSOUTHCOM) provided guidance on the types of technologies that could be used in multi-nation stabilization missions and developed a test-bed for recommended technologies. A pilot project demonstrated the utility of integrating proven DoD technologies to enhance

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multilateral peacekeeping operations, and improved DoD collaboration with the U.N. and other peacekeeping stakeholders. U.N. PKO prototypes transitioned to deployed forces in the U.S. Southern Command and U.S. Central Command areas of responsibility. •Understanding Russian Social Media Influence: This project provided information on key audiences of Russian propaganda and potentially influential actors that the U.S. and its allies can leverage to develop and execute a counter Russian propaganda strategy. This project transitioned to the U.S. European Command.			
Title: Proof-of-Principle Prototyping ***Description:*** This project focuses on cost-effective, limited duration efforts to design, develop, and deliver prototypes of cutting-edge land, sea, undersea, air, and space systems. This effort seeks to rapidly develop and demonstrate asymmetric capabilities that can help maintain the U.S. competitive advantage. The project provides an affordable venue to innovate new capabilities and increase speed to market through proof-of-principle and virtual prototyping. These prototypes will be delivered to Joint and Service users to evaluate operational capabilities under realistic conditions and against current adversaries or anticipated threats. Potential venues for prototype assessment include the Stiletto Maritime Demonstration Program, Thunderstorm integration exercises, and multi-domain demonstration venues across the Department of Defense (DoD). Knowledge and experience gained through these demonstrations will help develop new warfighting concepts and inform requirements and technical feasibility of future acquisition programs. Development of advanced prototypes will involve partnerships with industry, academia, and non-traditional DoD partners. Advanced rapid prototyping provides a mechanism to maintain a competitive advantage, impose asymmetric strategic costs on potential adversaries, and explore innovative, technology-enabled military capabilities. ***FY 2017 Plans:*** Projects will be selected in the year of execution to support DoD Research and Engineering Enterprise Strategic Priorities. Projects will focus on cost-effective, mission-focused efforts to design, develop, and deliver new concepts and technology prototypes aimed at supporting the Joint Force. Focus areas for prototyping projects include force protection, lethality, autonomous learning systems, manned-unmanned combat teaming, assisted human operations, warfighter resilience, command & control, mobility, and electronic warfare. ***FY 2018 Plans:*** Projects will be selected in the year of execution and will support DoD Research and Engineering Enterprise Strategic Priorities. Projects will focus on cost-effective, mission-focused efforts to design, develop, and deliver new concepts and technology prototypes aimed at supporting the Joint Force. Focus areas for prototyping projects include force protection, lethality, autonomous learning systems, manned-unmanned combat teaming, assisted human operations, warfighter resilience, command & control, mobility, and electronic warfare.	-	2.950	2.800
Title: Electromagnetic Spectrum Agility Focus Area	-	4.650	2.562

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Description: This focus area includes cost-effective, mission-focused projects to design, develop, and rapidly deliver new concepts and technology prototypes aimed at protecting DoD systems and extending capabilities across the electromagnetic spectrum. In the U.S. and allied nations, Department of Defense (DoD) communication and sensing capabilities are increasingly compromised by spectrum congestion and loss, as is evidenced by the recent radio frequency (RF) spectrum auction and the spectrum relocation fund. In other operational environments, emergent Electronic Warfare (EW) threats, technologies, and tactics contest the use of RF spectrum and erode U.S. capabilities in ways that are difficult to predict and counteract. This focus area helps address the dual challenges of anti-access and area denial though spectrum agility that supports the Third Offset Strategy by allowing our forces to operate when and where they are needed. Prototypes from this focus area will address spectrum sharing, spectrum relocation, and spectrum competition requirements, and will be evaluated under the electromagnetic (EM) conditions expected at home and abroad. Projects will anticipate emerging EW challenges and explore adaptive, agile solutions. Potential venues for prototype assessment include Stiletto Maritime Demonstration Program, Thunderstorm integration exercises, and multi-domain demonstration venues across the DoD. Knowledge and experience gained through these demonstrations will help develop new warfighting concepts and inform requirements and technical feasibility of future acquisition programs. Development of advanced prototypes will involve partnerships with industry, academia, and non-traditional DoD partners. These initial prototype efforts will help reduce the cost of future acquisition programs and stimulate efforts beyond traditional defense industrial base activities. Development of advanced prototypes will involve partnerships with industry, academia, and non-traditional DoD partners. ***FY 2017 Plans:*** This focus area will be used to develop concepts and designs through proof-of-principle and virtual prototyping that will result in next generation electronic warfare, communications, and RF sensing capabilities in one to three years. While project determinations are generally made in the year of execution, projects to be considered will identify and analyze EM threats and provide capabilities that will enable DoD systems to operate effectively in the congested EM environments at home and those expected in future contingency operations. Three to four prototype efforts are anticipated in FY 2017 leveraging Joint, Service, and interagency partnerships. ***FY 2018 Plans:*** Projects will be selected in the year of execution and will support DoD Research and Engineering Enterprise Strategic Priorities. Selected projects will focus on cost-effective, mission-focused efforts to design, develop, and deliver new concepts and technology prototypes aimed at protecting DoD systems and extending capabilities through agile electronic spectrum prototypes. Two to three prototype efforts are anticipated in FY 2018 leveraging Joint, Service, and interagency partnerships.			
Title: Distributed Sensing Concepts to Asymmetrically Counter Unconventional Weapons and Missile Threats Focus Area	-	3.219	3.130

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Description: This focus area addresses threats from weapons of mass destruction (WMD) and advanced cruise and ballistic missiles through low-cost, rapidly deployed distributed sensing concepts and enabling technologies. Projects leverage networked sensors and autonomous learning systems to asymmetrically defeat emerging threats. The focus area is aimed at developing prototype technologies and demonstrations of distributed networked sensors for: (1) Enhanced detection capabilities for chemical, biological, radiological, nuclear, and high yield explosives threats; (2) Persistent intelligence and target discrimination in anti-access/aerial denial (A2/AD) environments; (3) Advanced sensors and sensor technologies for detection, tracking, and cueing missile defenses. ***FY 2017 Plans:*** Plans for FY 2017 include pursuing development of concepts and designs that will result in innovative concept of operations (CONOPS) and prototype systems in one to three years. FY 2017 projects will include data mining for indications and warnings of a WMD or missile attack and unattended measurement and signature intelligence (MASINT) sensors to provide situational awareness of WMD activities in denied areas. Two to three prototype efforts are anticipated in FY 2017 leveraging Joint, Service, and interagency partnerships. ***FY 2018 Plans:*** Projects will be selected in the year of execution. Projects to be considered will support DoD Research and Engineering Enterprise Strategic Priorities and will focus on cost-effective, mission-focused projects to design, develop, and deliver new concepts and technology prototypes aimed at supporting the Joint Force with critical enablers in distributed networked sensors, unattended intelligence systems, force protection, human-machine collaborative decision making, and command & control. Two to three prototype efforts are anticipated in FY 2018 leveraging Joint, Service, and interagency partnerships.			
Title: Rapid Prototyping of Autonomous or Semi-Autonomous systems for Human-Machine Combat Teaming	-	2.650	2.320
Description: This focus area addresses the need to develop new operational capabilities; speed up the observe, orient, decide, and act (OODA) loop; and, enhance situational awareness through the teaming of humans with autonomous or semi-autonomous robotic or software enabled systems. The focus area is aimed at rapidly developing prototype technologies and demonstrations of systems to: (1) semi-autonomously detect, identify, track, prioritize, and engage targets with operator determination; (2) autonomously detect, classify threats or threat signals, then recommend defensive or offensive actions to the operator. Prototypes developed in this focus area will be delivered to Joint and Service users to evaluate operational capabilities under realistic conditions and against current adversaries or anticipated threats. Potential venues for prototype assessment include assets such as Thunderstorm integration exercises and multi-domain demonstration venues across DoD. Development of advanced prototypes will involve partnerships with industry and academia and permit operational users to gain insight into future technology-enabled strategies and tactics.			

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FY 2017 Plans: Plans for FY 2017 include pursuing development of concepts and designs that will result in innovative concept of operations (CONOPS) and prototype systems in one to three years. Projects will be selected in the year of execution, two to three prototype efforts are anticipated in FY 2017 leveraging Joint, Service, and interagency partnerships. ***FY 2018 Plans:*** FY 2018 projects will be selected in the year of execution. Projects to be considered will support DoD Research and Engineering Enterprise Strategic Priorities and will focus on cost-effective, mission-focused projects to design, develop, and deliver new concepts and technology prototypes aimed at supporting the Joint Force. The focus will be on low-cost, innovative capabilities. Two to three prototype efforts are anticipated in FY 2018 leveraging Joint, Service, and interagency partnerships.			
Title: Multi-domain Autonomous Learning Systems Focus Area	-	2.700	2.401
Description: This portfolio will focus on cost-effective, mission-focused projects to design, develop, and deliver technology prototypes to enhance the capabilities of multi-domain, autonomous systems to meet the Department's goal to rapidly drive innovation in aviation, space, maritime, and ground combat systems. Autonomous systems range from software to aid the intelligence analyst in processing, exploitation, and dissemination, through very complex autonomous air systems networked in tandem with unmanned ground or undersea vehicles. Related capabilities that enable autonomy are multiplying due to sensors that can understand the environment and software algorithms that can make a decision or seek human assistance. This focus area supports projects that experiment with increased delegation to autonomous systems, pushing commercial and laboratory developments to the warfighter and allowing for faster than human reaction. Through autonomy, the Department of Defense (DoD) will reduce the labor required to safely conduct missions. Prototypes will be delivered to Joint and Service users to evaluate operational capabilities under realistic conditions and against current adversaries or anticipated threats. Potential venues for prototype assessment include the Stiletto Maritime Demonstration Program, Thunderstorm integration exercises, and the Joint Experimental Range Complex (JERC). Knowledge and experience gained through those demonstrations will help develop new warfighting concepts and inform requirements and technical feasibility of future acquisition programs. ***FY 2017 Plans:*** Plans for FY 2017 include pursuing development of concepts and designs that will result in innovative concept of operations and prototype systems in one to three years. While project determinations are generally made in the year of execution, projects to be considered will look at science and technology to achieve autonomous systems with increased task delegation that reliably and safely accomplish complex tasks in all environments. Projects under consideration include low-cost, prototype systems with autonomous behaviors to accelerate kill chains. Three to four prototype efforts are anticipated in FY 2017 leveraging Joint, Service, and interagency partnerships. ***FY 2018 Plans:***			

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FY 2018 projects will be selected in the year of execution. Projects to be considered will support DoD Research and Engineering Enterprise Strategic Priorities and will focus on cost-effective, mission-focused projects to design, develop, and deliver new concepts and technology prototypes aimed at achieving autonomous systems that reliably and safely accomplish complex tasks, in all environments, or protect DoD assets from unmanned, autonomous threats. Three to four prototype efforts are anticipated in FY 2018 leveraging Joint, Service, and interagency partnerships.			
Title: Rapid Prototyping of Individual Warfighter Systems Focus Area ***Description:*** This portfolio will focus on expedited delivery of field ready prototypes to directly support dismounted soldier systems. Projects include capabilities for human assisted operations that increase soldier performance, resiliency, lethality, mobility, energy and power, communications, human-machine decisions making, and situational awareness. These systems will support the Joint Force and Combatant Command priorities, in addition to emerging needs and opportunities as they are identified. Technology development will counter emergent threats to the warfighter both while en-route to and operating within expeditionary environments alongside unified action partners. Prototypes will be delivered to Joint and Service users to evaluate operational capabilities under realistic conditions and against current adversaries or anticipated threats. Potential venues for prototype assessment include assets such as the Stiletto Maritime Demonstration Program, Thunderstorm integration exercises, and multi-domain demonstration venues across the Department of Defense (DoD). Knowledge and experience gained through those demonstrations will help develop new warfighting concepts and inform requirements and technical feasibility of future acquisition programs. These initial prototype efforts will help reduce the cost of future acquisition programs and stimulate efforts beyond traditional defense industrial base activities. ***FY 2017 Plans:*** Plans for FY 2017 include pursuing development of concepts and designs that will result in innovative concept of operations and prototype systems in one to three years. While project determinations are generally made in the year of execution, projects to be considered will look at dismounted soldier systems that support the Joint Force with critical enablers in capabilities for human assisted operations that increase soldier performance, resiliency, lethality, mobility, energy and power, communications, human-machine decisions making, and situational awareness Two to three prototype efforts are anticipated in FY 2017 leveraging Joint, Service, and interagency partnerships. ***FY 2018 Plans:*** FY 2018 projects will be selected in the year of execution. Projects to be considered will support DoD Research and Engineering Enterprise Strategic Priorities and will focus on cost-effective, mission-focused projects to design, develop, and deliver new concepts and technology prototypes aimed at supporting the Joint Force. Two to three prototype efforts are anticipated in FY 2018 leveraging Joint, Service, and interagency partnerships.	-	1.697	1.591
Title: India Science and Technology Focus Area	-	-	10.000

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Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603699D8Z / *Emerging Capabilities Technology Development*	**Project (Number/Name)** P795 / *Emerging Capabilities Technology Development*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Description: The India Science and Technology (S&T) Focus Area is a Secretary of Defense directed project designed to deepen and streamline defense cooperation between the U.S. and India. By sharing research resources, capabilities, and expertise, the United States and India can jointly develop technological innovations needed to enable our defense industrial bases to support our militaries now and in the future. Further, development of vibrant S&T cooperation is a key step in building an enduring partnership. ***FY 2018 Plans:*** The India Science and Technology Focus Area and related funding will continue to develop and execute cooperative S&T projects initiated in FY 2015 and FY 2016. Additional cooperative S&T areas targeted include: munitions development, advanced manufacturing, micro-power grids, and other identified project areas. In FY 2018, funding will be transferred from Joint Capability Technology Demonstration (JCTD) (Program Element 0603648D8Z) to enable proper alignment and execution of the allocated funds.			
Accomplishments/Planned Programs Subtotals	77.966	49.895	39.876

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

In FY 2018, generic performance metrics applicable to Emerging Capabilities Technology Development include transition of 40 percent of completing demonstrations program per year. In addition, project completions and success are monitored against schedules and deliverables stated in the proposals and statements of work. The metrics include items such as target dates, production measures, performance metrics, and demonstration goals. In FY 2016, Emerging Capabilities Technology Development achieved a transition rate of approximately 85 percent.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603699D8Z / *Emerging Capabilities Technology Development*	Project (Number/Name) P713 / *High Energy Laser*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P713: *High Energy Laser*	-	0.000	0.000	18.000	-	18.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

This initiative supports the U.S. Special Operations Command (SOCOM) effort to explore the operational capability for an AC-130 modified with a High Energy Laser (HEL). This funding enables analysis and risk reduction efforts to accelerate development of a HEL weapon system for SOCOM missions.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: AC-130 High Energy Laser (HEL)	-	-	18.000
Description: This is a DoD directed effort initiated in FY 2018. This project includes risk reduction efforts to help accelerate development and operational demonstration of an electric laser with a rechargeable magazine on an AC-130. Activities covered by this funding include modeling, simulation, testing subsystems, and coordination with industry to support a subsequent SOCOM HEL development program. Success for the subsequent program will be realized by integrating an HEL capability into the AC-130 Precision Strike Package (PSP). The subsequent program will provide special operations forces with a materiel solution capable of addressing current warfighter gaps, resulting in an immediate impact to operations by providing a high precision, low collateral damage, non-kinetic strike option. ***FY 2018 Plans:*** Plans for FY 2018 include modeling, simulation, system design, work on interface definitions, and subsystem testing. Risk reduction efforts will continue, including characterization of aircraft exit window optic effects and mitigation for optimal beam quality, validation of coelostat inertial stabilization and pointing (anti-jitter), and characterization of the bio-effects and hazards necessary to support program planning for the HEL system. After this initial risk reduction work the AC-130 HEL project will transition to Special Operation Command for further development.			
Accomplishments/Planned Programs Subtotals	-	-	18.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

N/A

D. Acquisition Strategy

N/A – SOCOM will support subsequent development and acquisition strategy.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603699D8Z / *Emerging Capabilities Technology Development*	**Project (Number/Name)** P713 / *High Energy Laser*

E. Performance Metrics

SOCOM defines specific performance metrics to evaluate the risk reduction effort and determine future investments. The project results are reviewed by a senior review group comprised of representatives from the Office of the Secretary of Defense, SOCOM, other Combatant Commands, and outside subject matter experts. The ultimate measure of success is transition to the SOCOM customer.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603716D8Z / *Strategic Environmental Research and Development Program (SERDP)*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	237.849	54.261	65.078	71.832	-	71.832	77.756	78.150	79.600	81.175	Continuing	Continuing
P470: *Strategic Environmental Research and Development Program (SERDP)*	237.849	54.261	65.078	71.832	-	71.832	77.756	78.150	79.600	81.175	Continuing	Continuing

A. Mission Description and Budget Item Justification

Congress established the Strategic Environmental Research and Development Program (SERDP) in 1990 (10 U.S.C. Section 2901-2904) to address Department of Defense (DoD) and Department of Energy (DOE) environmental concerns. It is conducted as a DoD program, jointly planned and executed by the DoD, DOE, and the Environmental Protection Agency (EPA), with strong participation by other Federal agencies, industry, and academia. SERDP`s objective is to improve DoD mission readiness and environmental performance by providing new scientific knowledge and cost-effective technologies in the areas of Environmental Restoration, Munitions Response, Resource Conservation and Resilience, and Weapons Systems and Platforms. SERDP does this by addressing high priority DoD environmental technology requirements. SERDP enhances military operations, improves military systems` effectiveness, enhances military training/readiness, sustains DoD's training and test ranges and installation infrastructure, and helps ensure the safety and welfare of military personnel and their dependents by eliminating or reducing the generation of pollution and use of hazardous materials and reducing the cost of remedial actions and compliance with environmental laws and regulations. As a secondary benefit, SERDP helps solve significant national and international environmental problems. The keys to a growing list of SERDP technological successes are the ability to respond aggressively and proactively to priority defense environmental needs; the pursuit of world-class technical excellence; and an emphasis on constant technology transfer.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	54.261	65.078	71.832	-	71.832
Current President's Budget	54.261	65.078	71.832	-	71.832
Total Adjustments	0.000	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603716D8Z / *Strategic Environmental Research and Development Program (SERDP)*	**Project (Number/Name)** P470 / *Strategic Environmental Research and Development Program (SERDP)*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P470: *Strategic Environmental Research and Development Program (SERDP)*	237.849	54.261	65.078	71.832	-	71.832	77.756	78.150	79.600	81.175	Continuing	Continuing

A. Mission Description and Budget Item Justification

Congress established the Strategic Environmental Research and Development Program (SERDP) in 1990 (10 U.S.C. Section 2901-2904) to address Department of Defense (DoD) and Department of Energy (DOE) environmental concerns. It is conducted as a DoD program, jointly planned and executed by the DoD, DOE, and the Environmental Protection Agency (EPA), with strong participation by other Federal agencies, industry, and academia. SERDP`s objective is to improve DoD mission readiness and environmental performance by providing new scientific knowledge and cost-effective technologies in the areas of Environmental Restoration, Munitions Response, Resource Conservation and Resilience, and Weapons Systems and Platforms. SERDP does this by addressing high-priority DoD environmental technology requirements. Technologies developed by SERDP enhance military operations, improve military systems' effectiveness, enhance military training/ readiness, sustain DoD's training and test ranges and installation infrastructure, and help ensure the safety and welfare of military personnel and their dependents by eliminating or reducing the generation of pollution and use of hazardous materials and by reducing the cost of remedial actions and compliance with environmental laws and regulations. As a secondary benefit, SERDP helps solve significant national and international environmental problems. The keys to a growing list of SERDP technological successes are the ability to respond aggressively and proactively to priority defense environmental needs; the pursuit of world-class technical excellence; and an emphasis on constant technology transfer.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Environmental Restoration	9.985	13.666	16.070
Description: Environmental Restoration (ER) reduces DoD's liabilities by developing technologies for the cost-effective detection, characterization, containment, and remediation of contamination in soil, sediments, and water.			
FY 2016 Accomplishments: New research initiatives focused on the highest priority DoD requirements to reduce DoD's liabilities by developing technologies for the cost-effective detection, characterization, containment, and remediation of contamination in soil, sediments, and water. Specific Statements of Need were released and proposals were selected that addressed: 1) Measurement and Enhancement of Abiotic Attenuation Processes in Groundwater, 2) Ecotoxicity of Perfluorinated Compounds, and 3) Improved Understanding of Particle Deposition from Low-Order Detonations of High Explosive Munitions. Details are available at www.serdp-estcp.org.			
FY 2017 Plans: New research initiatives will focus on the highest priority DoD requirements to reduce DoD's liabilities by developing technologies for the cost-effective detection, characterization, containment, and remediation of contamination in soil, sediments, and water.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603716D8Z / *Strategic Environmental Research and Development Program (SERDP)*	**Project (Number/Name)** P470 / *Strategic Environmental Research and Development Program (SERDP)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Specific Statements of Need were released and proposals selected that will address 1) Improved Strategies for Remediating Mixed Contaminants in Groundwater, 2) Development of Standardized Sampling and Analytical Techniques for Munitions Constituents, and 3) Improved Understanding of the Fate and Effects of Insensitive Munitions Constituents. ***FY 2018 Plans:*** New research initiatives will focus on the highest priority DoD requirements to reduce DoD's liabilities by developing technologies for the cost-effective detection, characterization, containment, and remediation of contamination in soil, sediments, and water. Specific Statements of Need were released that address 1) Improved Understanding of Per- and Polyfluoroalkyl Substance Source Zones, 2) In Situ and Ex Situ Remediation of Per- and Polyfluoroalkyl Substance Contaminated Groundwater, 3) Improved Understanding of Stormwater Impacts and Control on Sediment Recontamination and Recovery, and 4) Innovative Approaches for Monitoring and Implementing In Situ Remediation of Contaminated Aquatic Sediments.			
Title: Munitions Response (MR) ***Description:*** Munitions Response (MR) develops detection, classification, and remediation technologies for Unexploded Ordnance (UXO) to address the significant DoD liability in the Military Munitions Response Program. Investments are also made to improve active range clearance and to reduce generation of UXO during live fire testing and training operations. ***FY 2016 Accomplishments:*** New research initiatives focused on the highest priority DoD requirements in underwater UXO detection and classification and protocols to reduce the costs associated with detecting and remediating UXO underwater. A Statement of Need was released and proposals were selected to address these issues. Details are available at www.serdp-estcp.org. ***FY 2017 Plans:*** New research initiatives will focus on the highest priority DoD requirements in underwater UXO detection and protocols to reduce the costs associated with detecting and remediating UXO underwater. Specific Statements of Need were released and projects selected that address 1) Detection, Classification, and Remediation of Military Munitions Underwater and 2) Preliminary Design Study for Munitions Response Underwater Test Site. ***FY 2018 Plans:*** New research initiatives will focus on the highest priority DoD requirements in underwater UXO detection and protocols to reduce the costs associated with detecting, remediating, or managing UXO underwater. A specific Statement of Need was released that addresses Detection, Classification, and Remediation of Military Munitions Underwater.	5.048	6.508	7.835
Title: Resource Conservation and Resilience (RC)	26.369	29.285	30.487

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603716D8Z / *Strategic Environmental Research and Development Program (SERDP)*	**Project (Number/Name)** P470 / *Strategic Environmental Research and Development Program (SERDP)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Description: Resource Conservation and Resilience (RC) develops the science and technologies required to sustain training and testing ranges. ***FY 2016 Accomplishments:*** New research initiatives focused on the highest priority DoD requirements to develop the science and technologies required to sustain training and testing ranges and respond to requirements in the 2010 QDR, including the assessment of climate change impacts to DoD installations. Specific Statements of Need were released and proposals were selected for funding to address: 1) Changes in Pathogen Exposure Pathways under Non-Stationary Conditions and Their Implications for Wildlife and Human Exposure on Department of Defense Lands and 2) Improved Understanding of Wildland Fire Combustion Processes for Department of Defense Managed Ecosystems. Details are available at www.serdp-estcp.org. ***FY 2017 Plans:*** New research initiatives will focus on the highest priority DoD requirements to develop the science and technologies required to sustain training and testing ranges and respond to requirements in the 2014 QDR, including the assessment of climate change impacts to DoD installations. Specific Statements of Need were released and proposals were selected for funding to address: 1) Phenological Response to a Changing Climate on Department of Defense Lands and Waters: Implications for Management and 2) Long-Term Ecological Studies: Testing Previous Hypotheses and Conclusions. ***FY 2018 Plans:*** New research initiatives will focus on the highest priority DoD requirements to develop the science and technologies required to sustain training and testing ranges. Specific Statements of Need were released to address 1) Advanced Approaches for Managing Individual Species and Ecosystems Across Jurisdictional Boundaries in a Non-Stationary World and 2) Climate Change Vulnerability Assessment of Major Habitats on and Around DoD lands.			
Title: Weapons Systems and Platforms (WP) ***Description:*** Weapons Systems and Platforms (WP) develops technologies and materials that reduce the waste and emissions associated with the manufacturing, maintenance, and use of DoD weapons systems and platforms to reduce future environmental liabilities and their associated costs and impacts. ***FY 2016 Accomplishments:*** New research initiatives focused on the highest priority DoD requirements to develop technologies and materials that reduce the waste and emissions associated with the manufacturing, maintenance, and use of DoD weapons systems and platforms to reduce future environmental liabilities and their associated costs and impacts. Specific Statements of Need were released and proposals were selected for funding to address: 1) Data to Improve Understanding of the Source and Mechanism of Full Scale	12.859	15.619	17.440

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603716D8Z / *Strategic Environmental Research and Development Program (SERDP)*	**Project (Number/Name)** P470 / *Strategic Environmental Research and Development Program (SERDP)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Military Tactical Aircraft Engine Noise, 2) Reducing or Eliminating HAPs and VOCs from Polyurethane Rain Erosion Coatings, 3) Environmentally Sustainable Manufacturing for Energetic Formulations, and 4) Alternatives for Chromium and Nickel Plating in Repair Operations. Details are available at www.serdp-estcp.org. ***FY 2017 Plans:*** New research initiatives will focus on the highest priority DoD requirements to develop technologies and materials that reduce the waste and emissions associated with the manufacturing, maintenance, and use of DoD weapons systems and platforms to reduce future environmental liabilities and their associated costs and impacts. Specific Statements of Need were released and proposals were selected for funding to address: 1) Fluorine-Free Aqueous Film Forming Foam, 2) No/Low Global Warming Potential Alternatives to Ozone Depleting Refrigerants, and 3) Surface Morphology Modification by Non-Chemical Methods to Enhance Coating Adhesion and Mechanical Bonding of Metal Surfaces. ***FY 2018 Plans:*** New research initiatives will focus on the highest priority DoD requirements to develop technologies and materials that reduce the waste and emissions associated with the manufacturing, maintenance, and use of DoD weapons systems and platforms to reduce future environmental liabilities and their associated costs and impacts. Specific Statements of Need were released to address: 1) Advancing Emulsion Science for Application in Armed Forces Vessels, 2) Non-Chemical, Non-Media Removal Process for Thick, Elastomeric Specialty Coatings Used on DoD Weapon Systems, 3) Systems Approaches in Propulsion and Explosives Toward Replacing Materials Such as Ammonium Perchlorate (AP), RDX, and TNT, and 4) Development of Agile, Novel Expeditionary Battlefield Manufacturing Processes Using Recycled and Reclaimed Materials.			
Accomplishments/Planned Programs Subtotals	54.261	65.078	71.832

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance in this program is monitored at two levels. At the lowest level, each of the more than 160 individual projects is measured against both technical and financial milestones on a quarterly and annual basis. At a program-wide level, progress is measured against DoD's environmental requirements and the development

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603716D8Z / *Strategic Environmental Research and Development Program (SERDP)*	**Project (Number/Name)** P470 / *Strategic Environmental Research and Development Program (SERDP)*

of technologies that address these requirements as well as the transition of these technologies to either to demonstration and validation programs or to direct use in the field.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603727D8Z / *Joint Warfighting Program*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	31.044	4.852	7.848	6.349	-	6.349	7.039	7.140	7.315	7.509	Continuing	Continuing
P727: *Joint Warfighting*	31.044	4.852	7.848	6.349	-	6.349	7.039	7.140	7.315	7.509	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Joint Warfighting Program (JWP) is a pivotal resource that synchronizes two Department-wide domains, military requirements and acquisition, with shared analyses and actionable assessments. JWP supports partnership for customers including joint command staffs, the Joint Staff, and OSD elements responsible for oversight of Component programs that equip forces for joint missions. The account underwrites analyses and studies, limited-scope experiments, and partnerships that define joint capability gaps and develop actionable requirements for follow-on acquisition efforts. JWP specifically aims to assist joint-end-users by analyses that identify essential capability improvements as actionable joint military needs expressed as specific Key Performance Parameters (KKPs) and Key System Attributes (KSAs). These analyses and assessments deliver independent perspectives on ways to align Service and Agency investments and potential solutions for capability gaps created by evolving threats not aligned to single Component missions. This program element plays a major role in portfolio assessments aiming to identify critical gaps between Service-generated capabilities and affordable joint solutions. JWP funds venues for demonstration of emergent technology-based prototypes that enable joint customers to draft requirements based on realistic understanding of feasible solutions. JWP also underwrites staff analyses in the Acquisition, Technology & Logistics staff of the Office of the Secretary of Defense (OSD). Working with Service, OSD, the Joint Staff and joint command counterparts, the AT&L staff performs portfolio assessments focusing on joint warfighting environments in the future.

Typical projects funded with JWP include independent analysis and translation of capability gap assessments into actionable military needs statements, identification of candidate solutions via experimentation, translation of solution concepts into field demonstrations, and remedy of joint capability gaps in partnership with Defense agents for doctrine changes and technology development. JWP resources support analytic expertise on joint issues. In this activity, JWP underwrites small grants to invigorate employment of experimentation and analysis, to formulate strategies to resolve joint capability gaps, and to stimulate participation in the Department enterprises for joint experimentation and joint capability development. JWP resources also supportthe development of tools supporting joint analytic efforts.
The JWP funds contributes resources to examination of potential remedies for joint mission capability gaps. In many cases, JWP funds initiatives for process improvements serving all Components, but aligned with no single Service or Agency. These early assessments and studies of potential capability gap solutions can accelerate engineering development, subsequent field experiments, and capability demonstrations in field conditions. JWP often represents the first effort to define integrated and innovative solutions across the range of Doctrine, Organization, Training, Material, Leadership and Personnel-Facilities through cross-cutting analysis and studies in partnership with the OSD staffs serving AT&L, Policy and with elements of the Joint Staff. It evolves analytic development of Joint Military Requirements addressing evolving threats / missions On a modest funding base, JWP forges collaborative analysis efforts across OSD and joint staffs to address tough DoD-wide issues like ISR, cyber, EW and UAS.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603727D8Z / *Joint Warfighting Program*

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	4.982	7.848	8.357	-	8.357
Current President's Budget	4.852	7.848	6.349	-	6.349
Total Adjustments	-0.130	0.000	-2.008	-	-2.008
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.130	-			
• SRRB Reductions/Management Realignment	-	-	-2.008	-	-2.008

Change Summary Explanation

Also, FY16 is reflective of a congressional reduction for prior year carryover.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603727D8Z / *Joint Warfighting Program*	Project (Number/Name) P727 / *Joint Warfighting*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P727: *Joint Warfighting*	31.044	4.852	7.848	6.349	-	6.349	7.039	7.140	7.315	7.509	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Joint Warfighting Program (JWP) is a pivotal resource that synchronizes two Department-wide domains, military requirements and acquisition, with shared analyses and actionable assessments. JWP supports partnership for customers including joint command staffs, the Joint Staff, and OSD elements responsible for oversight of Component programs that equip forces for joint missions. The account underwrites analyses and studies, limited-scope experiments, and partnerships that define joint capability gaps and develop actionable requirements for follow-on acquisition efforts. JWP specifically aims to assist joint-end-users by analyses that identify essential capability improvements as actionable joint military needs expressed as specific Key Performance Parameters (KKPs) and Key System Attributes (KSAs). These analyses and assessments deliver independent perspectives on ways to align Service and Agency investments and potential solutions for capability gaps created by evolving threats not aligned to single Component missions. This program element plays a major role in portfolio assessments aiming to identify critical gaps between Service-generated capabilities and affordable joint solutions. JWP funds venues for demonstration of emergent technology-based prototypes that enable joint customers to draft requirements based on realistic understanding of feasible solutions. JWP also underwrites staff analyses in the Acquisition, Technology & Logistics staff of the Office of the Secretary of Defense (OSD). Working with Service, OSD, the Joint Staff and joint command counterparts, the AT&L staff performs portfolio assessments focusing on joint warfighting environments in the future.

Typical projects funded with JWP include independent analysis and translation of capability gap assessments into actionable military needs statements, identification of candidate solutions via experimentation, translation of solution concepts into field demonstrations, and remedy of joint capability gaps in partnership with Defense agents for doctrine changes and technology development. JWP resources support analytic expertise on joint issues. In this activity, JWP underwrites small grants to invigorate employment of experimentation and analysis, to formulate strategies to resolve joint capability gaps, and to stimulate participation in the Department enterprises for joint experimentation and joint capability development. JWP resources also supportthe development of tools supporting joint analytic efforts.
The JWP funds contributes resources to examination of potential remedies for joint mission capability gaps. In many cases, JWP funds initiatives for process improvements serving all Components, but aligned with no single Service or Agency. These early assessments and studies of potential capability gap solutions can accelerate engineering development, subsequent field experiments, and capability demonstrations in field conditions. JWP often represents the first effort to define integrated and innovative solutions across the range of Doctrine, Organization, Training, Material, Leadership and Personnel-Facilities through cross-cutting analysis and studies in partnership with the OSD staffs serving AT&L, Policy and with elements of the Joint Staff. It evolves analytic development of Joint Military Requirements addressing evolving threats / missions On a modest funding base, JWP forges collaborative analysis efforts across OSD and joint staffs to address tough DoD-wide issues like ISR, cyber, EW and UAS.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Support for Joint Capability Analysis	2.859	4.709	3.100
Description: JWP resources are dedicated to analytic support for joint costumers and OSD staff elements to conduct joint capability analysis and joint customers. JWP supports joint capabilities by promoting analyses and assessments to address			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603727D8Z / *Joint Warfighting Program*	**Project (Number/Name)** P727 / *Joint Warfighting*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
specific joint challenges specific. It employs rigorous analysis and experimentation methodologies in support of specific mission assignments. It supports joint command identification of capability gaps and selectively funds limited objective experiments experiment to understand a concept or technology that addresses a specific joint mission challenge. JWP also resources analytic analysis and studies on joint issues.These early assessments and studies of potential capability gap solutions can accelerate engineering development, subsequent field experiments, and capability demonstrations in field conditions. JWP often represents the first effort to define integrated and innovative solutions across the range of Doctrine, Organization, Training, Material, Leadership and Personnel-Facilities through cross-cutting analysis and studies in partnership with the OSD staffs serving AT&L, Policy and with elements of the Joint Staff. ***FY 2016 Accomplishments:*** Developed an Electronic Warfare (EW) strategy to address capability gaps informed by supporting EW analyses in Joint Airborne Electronic Attack, Electronic Protection techniques, passive targeting, and a comparison of US EW capabilities to threat signals. Supported three Joint Interagency Field Experiments, coordinated by the Naval Post Graduate School, for Combatant Commands to access the applicability of emerging technologies to address capability gaps and refine requirements. Conducted Non-traditional ISR Study to examine joint Battlefield awareness, cyber and force application capability portfolios for engaging targets in the highly contested environment; conducted analysis of collection effectiveness and determined bandwidth demand and throughput capabilities for the baseline architecture capacity; conclusions will inform follow-on Analysis of Alternatives efforts and enterprise ISR activities. Focused on COTS neutral networks, long endurance COTS VTOL UAVs, and autonomous drone swarms. ***FY 2017 Plans:*** Continue emphasis on analysis insights for acquisition decisions focused on capability development serving the needs of joint commanders and joint clients. Provide direct analytical support responding to emergent joint military staffs to identify capability gaps and military needs for material solutions. Support joint commanders to develop and refine capability requirements. Continue to partner with joint military staffs, encouraging experimentation cells to address mission capability gaps, explore potential solutions, and improve understanding of new technologies and concepts in response to evolving missions and military threats. Empower the joint military staffs to employ rigorous analysis and experimentation methodologies. ***FY 2018 Plans:*** Provide direct analytical support responding to emergent joint military staffs to identify capability gaps and military needs for material solutions. . Continue to partner with joint military staffs, encouraging experimentation cells to address mission capability gaps, explore potential solutions, and improve understanding of new technologies and concepts in response to evolving missions and military threats. Empower the joint military staffs to employ rigorous analysis and experimentation methodologies.			
Title: Analytic Development of Joint Military Requirements Addressing Evolving Threats / Missions	1.993	3.139	3.249

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603727D8Z / *Joint Warfighting Program*	**Project (Number/Name)** P727 / *Joint Warfighting*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Description: This segment underwrites innovative, responsive and timely analytic development of Joint Military requirements addressing evolving missions and threats. It supports joint capability development serving the needs of joint warfighters in partnership with senior acquisition staffs. It provides an independent source to examine potential remedies for mission capability gaps and can establish a framework for subsequent field experiments, capability demonstrations or accelerated acquisition. Joint warfare independent analysis often represents the first effort to define alternative solutions across the range of Doctrine, Organization, Training, Material, Leadership and Personnel-Facilities. On a modest funding base, JWP forges collaborative analysis efforts across OSD and joint staffs to address tough DoD-wide issues like ISR, cyber, EW and UAS. ***FY 2016 Accomplishments:*** Continued development of an architecture to enable evaluation of Electronic Warfare concepts and joint mission-level modeling, including the modeling of multiple EW weapon systems performance and compatibility in congested electromagnetic environments Developed and executed a Fly off experiment in a field environment with Naval Postgraduate School to evaluate industry's ability to produce a software defined radio as a replacement for the Joint Service PRQ-7 Combat Survival Radio system; conducted research and analysis in support of the Joint Service Combat Locator Evader (CSEL); effort included development of analysis of alternatives. Developed a requirements based global ISR investment methodology that identified and consolidated Combatant Command ISR baseline requirements shortfalls; integrated and correlated capability shortfalls with Services and Defense Agencies; established methodology and associated analytical construct and suite of tools to identify capability data bases for DOD rapid acquisition policy user risk assessment. . ***FY 2017 Plans:*** This segment will provide independent analysis of joint issues and capability gaps. It will provide responsive and timely capability development pathways and recommendations for rapid acquisition, field experiments conducted by joint military staffs and units. It will provide an independent source for enabling capability development suitable for joint experimentation undertaken by joint authorities. ***FY 2018 Plans:*** This segment will provide independent analysis of joint issues and capability gaps. It will provide responsive and timely capability development pathways and recommendations for rapid acquisition, field experiments conducted by joint military staffs and units. It will provide an independent source for analysis and enabe capability development suitable for joint experimentation undertaken by joint authorities.			
Accomplishments/Planned Programs Subtotals	4.852	7.848	6.349

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603727D8Z / *Joint Warfighting Program*	**Project (Number/Name)** P727 / *Joint Warfighting*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance is measured through metrics including (1) objective validation of enhanced CCMD capabilities to perform joint missions in their assigned theaters and areas of responsibility, (2) documented delivery effective joint operational concepts, (3) confirmed production of refined and validated capability descriptions.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603769D8Z / *Advanced Distributed Learning*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	-	0.000	10.384	11.211	-	11.211	11.186	11.241	11.597	11.812	Continuing	Continuing
001: *Advance Distributed Learning (ADL)*	-	0.000	10.384	11.211	-	11.211	11.186	11.241	11.597	11.812	Continuing	Continuing

A. Mission Description and Budget Item Justification

The ADL Initiative collaborates with the DoD, the Federal government, Industry, and Academia partners to shape the way people learn, grow, and perform. The ADL Program provides DoD, other Federal agencies, and international partners with innovative: (1) standards for training and education software, systems, and associated Web services that demonstrate the “art of the possible;” (2) prototypes and proofs of concept that harness the power of learning technologies, such as computer/ Web-based training, serious games, The ADL Initiative collaborates with the DoD, the Federal government, Industry, and Academia partners to shape the way people learn, grow, and perform.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	10.384	11.211	-	11.211
Total Adjustments	0.000	10.384	11.211	-	11.211
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Program transferred in from DHRA	-	-	11.211	-	11.211
• Realignment of Funds from O&M to RDT&E	-	10.384	-	-	-

Change Summary Explanation

FY 2017 adjustment of $+10.384 is the realignment of ADL funds from O&M to RDT&E.

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Advance Distributed Learning (ADL)	0.000	10.384	11.211
Description: ADL serves as the thought-leader for the DoD and other government agencies for learning science and learning			

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603769D8Z / *Advanced Distributed Learning*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
technologies, enabling innovation, finding efficiencies, guiding customers into the future, and creating a shared vision and strategy for ADL's partners. ***FY 2016 Accomplishments:*** N/A ***FY 2017 Plans:*** N/A ***FY 2018 Plans:*** Continue work with the DoD and interagency community for reducing costs and improving the effectiveness of training/ education by sharing distributed learning content and best practices, standardizing terminology and technologies, and facilitating implementation of efficient, effective, and interoperable distributed learning across DoD and the Federal Government; Continue to steward distributed learning policy, plans, strategy guidance, and associated communities of practice, including the Defense Advanced Distributed Learning Advisory Committee; Continue RDT&E projects focused on e-learning, mobile learning, learning analytics and performance modeling (e.g., Personal Assistant for Learning), web-based virtual worlds and simulations, interoperability infrastructure (e.g., Total Learning Architecture), and associated learning theory, in order to integrate innovative distributed learning science, technologies, trends, and methodologies into DoD education and training programs; Continue collaborative efforts with the Services, other government agencies, academia, industry, professional specifications and standards bodies, and international coalition partners for development and implementation of next-generation, interoperable distributed learning.			
Accomplishments/Planned Programs Subtotals	0.000	10.384	11.211

D. Other Program Funding Summary ($ in Millions)

N/A

Remarks

E. Acquisition Strategy

N/A

F. Performance Metrics

1. Conduct proof-of-concept demonstration of the Total Learning Architecture with military personnel.
2. Deliver and support xAPI conformance test suite to aid government acquisition of xAPI-enabled systems.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603769D8Z *I Advanced Distributed Learning*

3. Facilitate knowledge sharing and interoperability among DoD, other Federal Agencies, and supporting distributed learning stakeholders through specification development, policy stewardship, open source initiatives, and other coordination.
4. Evaluate the impact of Information Assurance issues on use of distance learning within DoD and other Federal Agencies.
5. Participate in Defense, government, coalition, and professional collaborations to influence distributed learning strategy, policy, standards, and use to enable more efficacious, efficient, and cost-effective implementation of training/education.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603781D8Z / *Software Engineering Institute (SEI)*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	-	13.687	14.264	15.047	-	15.047	15.156	15.241	15.272	15.611	Continuing	Continuing
P781: *Software Engineering Institute (SEI)*	-	13.687	14.264	15.047	-	15.047	15.156	15.241	15.272	15.611	Continuing	Continuing

A. Mission Description and Budget Item Justification

Software is a key to meeting the Department of Defense's (DoD's) increasing demand for high-quality, affordable, and timely national defense systems. Systemic software issues are significant contributors to poor program execution. Reliance on software-intensive mobile and net-based products and systems has increased (e.g., Joint Tactical Radio System, USS ZUMWALT (DDG-1000), Joint Strike Fighter, F-22, and Army Modernization). As stated in the January 2017 Defense Science Board Report, "Defense Research Enterprise Assessment," software, autonomy, and cyber are today's core challenges. With growing global parity in software engineering, the DoD must maintain leadership to avoid strategic surprise.

The Software Engineering Institute (SEI) Program Element (PE) addresses the critical need to research, develop, and rapidly transition state-of-the-art software technology, tools, development environments, and best practices to improve the engineering, management, fielding, evolution, acquisition, and sustainment of software-intensive DoD systems. The SEI's program of work coordinates across the DoD through Reliance 21, the overarching framework of the DoD's Science and Technology (S&T) joint planning and coordination process. This PE benefits every Community of Interest (COI) to some degree due to the ubiquitous nature of software, but particularly benefits: Command, Control, Communications, Computers, and Intelligence (C4I) which includes a computing and software sub-panel; Autonomy; Cyber; and Engineered Resilient Systems.

Software is more pervasive than ever, and computer programs are growing in size and complexity. Designing, managing, and securing integrated, complex, and large-scale mission-critical systems are abilities that the DoD and the Defense Industrial Base (DIB) have not yet mastered. To address this, the PE funds research and development within the SEI Federally Funded Research and Development Center (FFRDC).

The SEI FFRDC is the DoD's primary source for software research and development. It is an institute which enables the exploitation of emerging software technology by bringing engineering, management, and security discipline to software acquisition, development, and evolution. The SEI FFRDC focuses on software technology areas judged to be of the highest payoff in meeting defense needs.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603781D8Z / *Software Engineering Institute (SEI)*

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	15.173	14.264	15.441	-	15.441
Current President's Budget	13.687	14.264	15.047	-	15.047
Total Adjustments	-1.486	0.000	-0.394	-	-0.394
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.972	-			
• SBIR/STTR Transfer	-0.514	-			
• Other Adjustments	-	-	-0.394	-	-0.394

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603781D8Z / *Software Engineering Institute (SEI)*	Project (Number/Name) P781 / *Software Engineering Institute (SEI)*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P781: *Software Engineering Institute (SEI)*	-	13.687	14.264	15.047	-	15.047	15.156	15.241	15.272	15.611	Continuing	Continuing

A. Mission Description and Budget Item Justification

The SEI FFRDC was established in 1984 as an integral part of the DoD's initiative to identify, evaluate, and transition software engineering technologies and practices. The mission of the SEI is to provide the DoD with technical leadership and innovation through research and development to advance the practice of software engineering and technology. The SEI works across government, industry, and academia to improve the state of software engineering from the technical, acquisition, and management perspectives. The SEI engages in research and development of critical software technologies and tools and collaborates with the larger software engineering research community. It facilitates rapid transition of software engineering technologies into practice and evaluates emerging software engineering technologies to determine their potential for improving software-intensive DoD systems. Since its inception, the SEI has helped to transform the fields of software engineering and acquisition, network security, real-time systems, software architectures, and software-engineering process management.

This program has two main research thrusts with known military applications: 1) Software Engineering, Systems Verification and Validation, and Mission Assurance (formerly Mission Assurance) and 2) Information Assurance and Cyber Security.

SEI research focuses on the most significant and pervasive software and cybersecurity challenges within the DoD, such as the scalability and reliability of software assurance, supply chain risk management, validation of and trust in autonomous systems, human-computer and human-technology interaction, computing and communication at the tactical edge, and efficiency and performance of acquisition strategies and software development appropriate for a contested cyber environment.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Software Engineering Institute Advanced Technology Development in the Area of Software Engineering, Systems Verification and Validation, and Mission Assurance (formerly Mission Assurance)	9.033	9.414	9.802
Description: This research seeks to develop and rapidly prototype techniques to verify methods for identifying requirements, systems of systems architectures, and virtual integration of components. Furthermore, research in this area will pursue rapid prototyping and transitioning of capabilities that verify requirements for software assurance, analysis/control of unverified code and automated repair of damaged code. Software production and code analysis methods developed through this program will also improve the ability to predict how complex software systems will behave in untested environments. Increasingly, large numbers of lines of code will require a commensurate increase in sophisticated verification and validation mechanisms. ***FY 2016 Accomplishments:*** • Developed and demonstrated tools and techniques for seamless processing and data access in disconnected, intermittent, and low-bandwidth tactical edge environments.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603781D8Z / *Software Engineering Institute (SEI)*	**Project (Number/Name)** P781 / *Software Engineering Institute (SEI)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Developed a tool to perform code analysis, architectural requirement tradeoff risk analysis, and validation of software assessments. • Applied the SEI Software Assurance Framework to define practices for acquiring and developing software products. ***FY 2017 Plans:*** • Develop automatic tools and techniques to generate intelligible explanations of software-driven autonomous/robotic behaviors that will help to establish trust with human operators in critical situations. • Develop and demonstrate principles, tools, and techniques to improve efficiency of and accuracy in software-based cloud infrastructures. • Develop techniques and algorithms to efficiently balance workloads between the human operator and the software's machine-learning-based capabilities. • Develop and pilot a game theory approach to optimize acquisition behaviors. ***FY 2018 Plans:*** • Contribute to military-grade, scalable, secure autonomous systems by integrating technologies from verification, human prediction, and human-robot understanding. • Reduce risk for DoD systems by integrating commercial off-the-shelf (COTS) technology, legacy, and custom software into software architecture common control systems. • Enhance decision superiority with new algorithms and technologies that relate multiple patterns from all source data to provide quantified courses of action in tactical timeframes. • Enable DoD to manage software-intensive systems by facilitating better sustainment decisions. • Research, develop, and pilot quantitative software acquisition decision support tools focused on cost-effectiveness for DoD acquisition teams.			
Title: Software Engineering Institute Advanced Technology Development in the Area of Information Assurance and Cyber Security ***Description:*** Powerful machine learning algorithms can be subverted by malicious manipulation or falsification of data collected through normal channels. Algorithms must be trusted and effective in the presence of adversaries. This thrust seeks to defend against and minimize the impacts of information falsification attacks. Additionally, this thrust seeks to increase the security of network-centric autonomous systems. These systems are currently developed with a focus on function rather than security, which makes them particularly vulnerable to cyber-attacks. ***FY 2016 Accomplishments:*** • Worked with ASD(R&E) Research Directorate and relevant service representatives to define a sustainable long-term research plan, ensuring timely anticipation of information technology challenges for the DoD in the mid and long-term future.	4.654	4.850	5.245

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603781D8Z / *Software Engineering Institute (SEI)*	**Project (Number/Name)** P781 / *Software Engineering Institute (SEI)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Extended tools and expanded techniques for model-based engineering of software-reliant systems and the generation of assurance evidence. These tools will support automatic generation of secure code, automated code vulnerability discovery, and synthesis of assurance cases. • Enhanced and deployed scalable and validated methods and software support for the training and development of the cyber mission workforce. • Tested alternative data selection and visualization techniques in simulated environments to determine causes of anomalies and outliers in data analysis. ***FY 2017 Plans:*** • Create tools and techniques for automated assurance in mission-critical systems. Collect and analyze defect data to identify potential security issues early and to achieve cost reductions. • Perform vulnerability analysis to identify vulnerabilities in industrial control systems (ICS) and locate network cross-connections allowing cyber-attackers to move laterally through network domains from less protected non-critical systems to operationally critical systems. ***FY 2018 Plans:*** • Extend tools and techniques for model-based engineering of software-reliant systems and generation of assurance evidence with support for automatic generation of secure code, automated code vulnerability discovery, and synthesis of assurance cases. • Enhance and deploy scalable and validated methods and software support for the training and development of the cyber mission workforce. Includes developing methods for repeatable, automated assessment of cyber workforce performance in training.			
Accomplishments/Planned Programs Subtotals	13.687	14.264	15.047

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• BA 2, PE # 0602751D8Z, P278: *Software Engineering Institute Applied Research*	8.807	8.420	9.343	-	9.343	10.120	10.260	10.462	-	Continuing	Continuing

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603781D8Z / *Software Engineering Institute (SEI)*	**Project (Number/Name)** P781 / *Software Engineering Institute (SEI)*

E. Performance Metrics

•Transition of tools and practices for use in DoD programs of record to the DIB, and to a number of agencies and organizations sponsoring work.
• Number of publications in refereed journals and peer reviewed reports.
• Number of external research collaborations and interactions with the broader software engineering research community.
• Adoption of coding standards and process techniques by standards bodies, working groups, and software/systems engineering organizations

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603826D8Z / *Quick Reactions Special Projects (QRSP)*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	258.304	69.506	74.943	69.203	-	69.203	72.985	80.547	84.697	86.441	Continuing	Continuing
P826: *Quick Reaction Fund*	80.683	21.451	23.675	21.828	-	21.828	23.045	25.618	26.993	27.441	Continuing	Continuing
P828: *Rapid Reaction Fund*	164.854	44.348	47.350	43.418	-	43.418	45.943	50.892	53.626	54.881	Continuing	Continuing
P831: *Joint Rapid Acquisition Cell Support*	6.413	1.565	1.636	1.652	-	1.652	1.669	1.686	1.703	1.720	Continuing	Continuing
P833: *Strategic Multi-Layered Assessment (SMA) Support*	6.354	2.142	2.282	2.305	-	2.305	2.328	2.351	2.375	2.399	Continuing	Continuing

A. Mission Description and Budget Item Justification

The QRSP Program Element develops risk-reducing prototypes and conducts demonstrations designed to develop capabilities in anticipation of emerging adversary threats, while addressing immediate Combatant Commands (CCMD) needs. QRSP efforts support the Department's goal to provide a hedge against technical uncertainty by acting as an incubator for developing potentially game-changing capabilities and by fostering collaboration among other government agencies, DoD laboratories, academia, and the commercial sector. DoD's strategy recognizes a return to a more competitive environment with resurgence of near-peer competitors and adversaries who have studied and worked to counter U.S. technological capabilities. QRSP provides an agile mechanism to affordably counter emerging technological threats and help maintain the United States' competitive advantage. Specifically, QRSP enables the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)) and the Assistant Secretary of Defense for Research and Engineering (ASD(R&E)) to anticipate and respond to emergent DoD issues and time-sensitive threats by selecting projects within the year of execution. Project selection is guided by Department-level strategies and priorities, such as the building blocks for the Third Offset Strategy, Reliance 21, the Long Range Research and Development Program Plan, and CCMD Integrated Priority Lists (IPLs). QRSP efforts field new capabilities at low cost and in short time-frames, inform the requirements process, and inject innovative technologies into programs of record. The QRSP Program supports four major project codes that expedite development and transition of new capabilities to the warfighter. These project codes are: 1) Quick Reaction Fund (QRF), 2) Rapid Reaction Fund (RRF), 3) Joint Rapid Acquisition Cell (JRAC) support, and 4) Strategic Multi-Layered Assessment (SMA) Cell support. Focus areas within these project codes align to DoD science and technology priorities, including counter anti-access/area denial; counter weapons of mass destruction; target identification and tracking; surveillance, intelligence, and reconnaissance; low-cost precision engagement; counter-electronic warfare; and, autonomous systems.

The QRF Program objectives are to develop prototypes in response to emergent conventional warfare needs that take advantage of breakthroughs in rapidly evolving technologies. The QRF is executed by the Rapid Reaction Technology Office (RRTO). QRF projects focus on force protection to enhance anti-access and area denial capabilities, broad electronic warfare capabilities, mitigating hardware and software vulnerabilities, and autonomous learning systems for processing and analyzing intelligence streams. QRF initiates projects during the execution year and focuses on maturing technologies critically needed for the CCMDs by producing prototypes for demonstration and evaluation. QRF projects typically advance Technology Readiness Level (TRL) four to five technologies to transition them to an end user or CCMD at a TRL of seven or higher with a total project duration of 12 months. The QRF consistently exceeds the transition objective of 40 percent for demonstration programs (DoD Strategic Objective 3.5.2D).

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603826D8Z / *Quick Reactions Special Projects (QRSP)*

The RRF Program objectives, executed by RRTO, are to develop proof-of-principle prototypes to counter emerging irregular warfare threats, anticipate adversaries' exploitation of new technologies, and expedite delivery of effective, affordable, and critically needed capabilities to the warfighter. RRF initiatives support the DoD Research and Engineering Enterprise mission to develop, demonstrate, assess, and rapidly field innovative concepts and technologies that supply critical capabilities to meet time-sensitive operational needs. RRF leverages emerging capabilities, such as advanced algorithms and software intelligence, to enable virtual prototyping with agile capability delivery and technology insertion. RRTO leverages our traditional industrial bases and non-traditional suppliers in the commercial sector, academia, international arenas, and small businesses to address DoD needs as identified by CCMD, Military Service organizations, other Defense organizations, and interagency partners. Typical RRF programs are 6 to 18 months in duration and aim to mature a capability to demonstration. The RRF consistently exceeds the transition objective of 40 percent for demonstration programs (DoD Strategic Objective 3.5.2D).

The JRAC Program objectives focus on responding to Joint Urgent Operational Needs (JUONS) and Joint Emerging Operational Needs (JEONS) that have been submitted by CCMDs and validated by the Joint Staff. In addition, the JRAC's objectives are to manage the delivery of capabilities as requested by the CCMD in a timeframe acceptable to the CCMD. Efforts, in most instances, use contingency and other rapid acquisition authorities.

The SMA Cell objective is to support all CCMDs, Joint Force Commanders, and other government agencies by assessing complex operational and technical challenges, which require collaborative multi-agency and multi-disciplinary approaches. With input from across the United States Government, academia, and the private sector, the SMA Cell develops options to Joint Staff and CCMD-generated challenging problems that inform senior leadership. Each assessment is initiated at the request of CCMD senior leadership. Priorities for SMA Cell programs are set by the Joint Staff Deputy for Operations. Products are typically generated within six months and directly contribute to the decision-making process of the Joint Staff and CCMD's senior leadership.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	70.320	74.943	69.442	-	69.442
Current President's Budget	69.506	74.943	69.203	-	69.203
Total Adjustments	-0.814	0.000	-0.239	-	-0.239
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	1.400	-			
• SBIR/STTR Transfer	-2.214	-			
• Other Internal Baseline Adjustment	-	-	-0.239	-	-0.239

Change Summary Explanation

The FY 2017 to FY 2018 funding profile decrease reflects adjustments for Departmental priorities and requirements.

The FY 2018 baseline funding decrease is being applied to fund higher priority DoD requirements.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense											Date: May 2017	
Appropriation/Budget Activity 0400 / 3					R-1 Program Element (Number/Name) PE 0603826D8Z / *Quick Reactions Special Projects (QRSP)*				Project (Number/Name) P826 / *Quick Reaction Fund*			
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
P826: *Quick Reaction Fund*	80.683	21.451	23.675	21.828	-	21.828	23.045	25.618	26.993	27.441	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Quick Reaction Special Projects (QSRP) Program supports four separate project codes that provide rapid funding to expedite development and transition of new prototypical technologies to the warfighter. The QSRP Program provides the flexibility and agility to mitigate emerging threats and address needs that arise faster than the two-year budget cycle.

The Quick Reaction Fund (QRF) Program provides the Services, components, Combatant Commands (CCMDs), and force providers opportunities to capitalize on relatively mature technologies to rapidly develop and field-test promising new proof-of-principle prototypes that can have immediate impact on time-sensitive operational needs. QRF initiatives typically deliver a prototype application within 12 months of being funded.

The QRF Program focuses on projects that have the potential to address conventional, disruptive, and asymmetric warfare needs through rapidly developed and fielded hardware. More specifically, the QRF Program includes initiatives that serve to maintain a technical advantage over potential adversaries and reduce technical risk barriers in the following interest areas: counter anti-access and area denial capabilities; base protection; electromagnetic bandwidth and spectrum enhancement; persistent intelligence, surveillance, and reconnaissance; newly emerging national threats; human-machine collaborative decision making; and, counter-electronic warfare technologies.

In FY 2017 and FY 2018, the QRF Program will continue to identify and fund new, rapidly developed prototypes and technology demonstrations that respond to critical operational needs and emerging threats. Investments are made in the execution year for agile response to Department, CCMD, Service, and other government organization identified threats and opportunities.

Recent success stories and significant transitions of note include:
• Columbia: This project is an electronic countermeasure system designed to address a specific threat to U.S. forces. Details are classified. The Columbia effort delivered a size, weight, and power (SWaP) assessment and laboratory electromagnetic interference/electromagnetic compatibility (EMI/EMC) analysis of a sustainable, maintainable, self-contained capability that will mitigate the effects of an attack by an overwhelming number of threats - individually or simultaneously. Columbia transitioned to the Air Force in 2016.
• Dark Storm: This project successfully developed and fielded low-cost, innovative space situational awareness (SSA) capabilities. Data collected from six remote sites was transferred and consolidated at a central site to provide increased SSA. The full capability transitioned to a classified customer.
• Deer Hunting: As a follow-on to the initial prototype, this project automated a proven target discovery process that was demonstrated for the National Security Agency (NSA). The automation allowed Deer Hunting to scale and transition to other projects using a target agnostic approach. The classified capability transitioned to U.S. Central Command and other missions within the Department of Defense and Intelligence Community.
• Interruption of Wide-Area Sensing Capability (IWAS): Persistent, wide-area surveillance capabilities threaten U.S. Navy open-ocean supremacy. The IWAS project developed an electronic attack technique effective against wide-area surveillance sensors to disrupt their kill-chain. The project successfully demonstrated the electronic

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attack capability before transitioning it to Defense Advanced Research Projects Agency (DARPA) to support development of specific applications. Further details are classified.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: U.S. Central Command (USCENTCOM) Counter Islamic State of Iraq and the Levant (ISIL) Initiatives	3.739	3.000	-
Description: This project, in anticipation of emerging needs, will include rapidly developing prototypes that enable the U.S., in coordination with coalition partners, to expeditiously defeat ISIL. Efforts will support partnering with the military and other security forces of, or associated with, the Government of Iraq, including Kurdish, tribal security, and other local security forces. Prototypes will include defense articles, defense services, and related training to more effectively partner with the U.S. and other international coalition members to defeat ISIL. In support of the Counter-ISIL strategy, QRF will fund prototypes in these areas that can be completed in 12 months and be rapidly deployed to the warfighter. The RRTO will ensure the QRF efforts are not duplicative with other Counter-ISIL strategy efforts and will seek to leverage other such efforts. ***FY 2016 Accomplishments:*** This project identified, developed, and transitioned technical capabilities to support partnering with U.S. allies associated with the Government of Iraq, including Kurdish, tribal security, and other local security forces. Prototypes included defense hardware, services, and training tools. Specifically, this project developed a speech transcription prototype that can quickly identify, classify, and transcribe speech from multiple data channels. These efforts increased coalition capabilities to expeditiously defeat ISIL. ***FY 2017 Plans:*** Investment decisions in Counter-ISIL strategy initiatives during the budget year will respond to Department, CCMD, Service, and other government organizations priorities and as new threats emerge or new opportunities are presented. Research and coordination with organizations throughout the DoD, Federally Funded Research and Development Centers (FFRDCs), other government agencies, industry, and academia will help identify areas critical to counter-electronic warfare efforts. QRF anticipates funding four to five projects in FY 2017.			
Title: Robust Automatic Transcription of Speech	3.000	-	-
Description: Robust Automatic Transcription of Speech (RATS) technology was designed to determine if and when there is speech in a captured signal to dramatically increase the efficiency and speed of communications intelligence (COMINT) signals analysis. Once speech has been detected, the technology can identify speakers, languages, and keywords in real time across multiple channels. The focus of this effort is to support counter Islamic State of Iraq and the Levant (ISIL) missions. Transition partner applications integrate RATS technology with digital receiver platforms to automatically alert an analyst to new channels of interest, determine if a channel should be transmitted to the ground, scan other frequencies for desired signals, and control a digital receiver to dwell on the given channel. This project is a collaboration with Naval Air Systems Command Maritime Patrol and Reconnaissance Aircraft Program Office (PMA-290), focusing on near-term deployment and follow-on integration on Navy signals intelligence platforms.			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
FY 2016 Accomplishments: The RATS project integrated the RATS algorithms with digital receivers to automatically identify and triage speech signals of interest. RATS significantly increases analyst effectiveness while reducing the load on personnel analyzing incoming signals, allowing them to focus on the most relevant data and not the discovery of new speech signals that are difficult to manually find. There are currently not enough personnel, bandwidth, or aircraft to manually process all signals of interest for relevant speech, leading to important information being lost or ignored. In FY 2017, RATS will operationally deploy in support of U.S. Central Command and transition to Naval Air Systems Command Maritime Patrol and Reconnaissance Aircraft Program Office.			
Title: CyberPhantom ***Description:*** The effort is focused on the development of fully customizable cyber tools for open network exploitation. The solution leverages best practices of the U.S. Government's cyber workforce and expands the capability of the DoD to operate in cyber space with a unique blend of commercial-off-the-shelf (COTS) software integrated with new customized tools. Further details of this project are classified. ***FY 2016 Accomplishments:*** CyberPhantom is designed to enhance the Combatant Commands (CCMDs) capability to operate and exploit cyber information in near real-time. This capability provides the Warfighter with tools designed for open network exploitation for a fraction of the cost of existing programs. CyberPhantom was executed in coordination with the broader cyber community of interest and enhances the CCMDs' ability to conduct advanced open network exploitation within cyber space to support emerging mission requirements. This capability will transition to Cyber Command for a classified mission.	1.700	-	-
Title: Hammerhead ***Description:*** The Office of the Secretary of Defense, Acquisition, Technology, and Logistics is responding to the need for more available courses of action (COAs) in the event of certain space systems contingencies. Details are classified. ***FY 2016 Accomplishments:*** This program developed and demonstrated a prototype capability that can trigger a tailorable COA on demand. Details are classified. ***FY 2017 Plans:*** This project will continue development efforts and support multiple demonstrations. Details are classified. ***FY 2018 Plans:***	1.200	1.000	0.800

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
This project will conduct field testing and prototype improvements in FY 2018. Transition to the end user is expected in FY 2018. Details are classified.			
Title: Dark Storm ***Description:*** The program provides advanced Space Situational Awareness (SSA) capabilities. Dark Storm successfully addressed important knowledge gaps to further protect U.S. interests in space. Details are classified. ***FY 2016 Accomplishments:*** The program deployed Dark Storm hardware to six test sites and proved data transfer processes to transmit data to a central site. The central site included software to enable processing and integration of the data. The field equipment was hardened against weather and tampering. The Dark Storm capability transitioned to a classified customer in FY 2016.	1.800	-	-
Title: Hardware/Software (HW/SW) Assurance and Integrity Analysis ***Description:*** The Department of Defense (DoD) has developed a trusted systems strategy that is based upon mission assurance, comprehensive protection planning, industry standards and advancing DoD's capability to identify and mitigate HW/SW vulnerabilities through automated techniques and tools. This project supports research and development focus to coordinate and improve capabilities to current and future programs in acquisition, operational systems and infrastructure to improve availability. These HW/SW Assurance projects directly support all elements in the 2014 National Defense Authorization Act (NDAA) Section 937. It provides funding for the Department's capabilities to federate existing HW/SW assurance expertise, capabilities and facilities within the Services and Agencies, to address existing gaps, as well as emerging threats and vulnerabilities. The Federation detects, assesses, and prioritizes critical mission vulnerabilities to malicious software attacks and supply chain exploitation vulnerabilities, promulgate findings, and mitigate critical vulnerabilities in both SW and HW. This program established the Joint Federated Assurance Center (JFAC) which provides federation of hardware and software assurance expertise and capabilities to support program needs. Capabilities developed and demonstrated are transitioned in the Trusted and Microelectronics Program Elements 0604294D8Z BA4 and 0605294D8Z BA5, and enhance the hardware assurance capabilities of the JFAC. ***FY 2016 Accomplishments:*** The Joint Federated Assurance Center (JFAC), established to achieve the above objectives, achieved IOC. The JFAC NIPR website which contains information and training about assurance and assurance services across the Department became operational. The Concept of Operations (CONOPS) was completed and signed by all stakeholders. Draft standard operating procedures (SOPS) were developed and are in maintenance. The pilot central buy of SW assurance (SwA) tools was completed.	4.000	4.000	2.000

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
The pilot direct distribution of SwA tools directly to requesting engineers is in operation. Major DoD labs are mutually coordinating for prioritized support to DoD programs. ***FY 2017 Plans:*** Achieve plan for JFAC full operational capability (FOC) by conducting the Department-wide assurance capability and capacity gap analyses for software, hardware, and firmware assurance; update the JFAC SOPs to support programs; serve assurance needs of programs; expand upon and maintain software, hardware, and firmware assurance capability maps; survey software and hardware assurance needs of programs and other organizations; coordinate, automate, and implement enterprise licensing for DoD-wide automated distribution and management of SwA engineering tools; and implement outreach to programs and organizations for assurance planning, training, contracting, best practices, and vulnerability and defect remediation. ***FY 2018 Plans:*** This program will continue development, assessment, recommendation and promulgation of software test tools and techniques to programs. It will continue maturation of a federated approach to ensuring HW/SW tools, techniques, expertise, and R&D transition and support to acquisition and sustainment programs, and continue HW/SW capability identification, gap identification, assessment, prioritization and remediation. The program will continue SW assurance tool license acquisition, and using centralized inventory and operational management, promulgate licenses and tools directly to engineers in programs at the time needed.			
Title: Robust Tactical Data Link Modernization ***Description:*** This project developed new Link 16 improvements for increased anti-jam communication performance. This project also includes design for a real-time processor that fits into existing radio circuit card slots. Details of this project are classified. ***FY 2016 Accomplishments:*** In an operational demonstration this project validated significant anti-jam performance improvements for Link 16 and developed hardware to fit existing radio designs on tactical aircraft. The capability transitioned to the Air Force Program Executive Office for Command, Control, Communications, Intelligence, and Networks and the Navy Multi-Functional Information Distribution System (MIDS) program office.	2.688	-	-
Title: Project 419 ***Description:*** This project delivered a specific operational capability that addresses information needs. Using existing assets, Project 419 provides initial operations collection with a unique sensor system. The project provided the Combatant Commands and intelligence agencies an advanced capability with the potential to characterize critical undiscovered signals of interest. Details are classified. ***FY 2016 Accomplishments:***	2.650	-	-

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
This project demonstrated use of collected sensor data and information streams to develop and execute advanced algorithms to detect and prosecute high value signals of interest. This capability transitioned to a classified customer.			
Title: Low Cost Innovative Projects (Projects Less Than One Million Dollars Each) ***Description:*** Selected, executed, and transitioned three low cost projects. These projects delivered proof-of-principle prototypes for evaluation and assessment by warfighters and interagency users. ***FY 2016 Accomplishments:*** • Deer Hunting: A classified project to automate proven hard-target discovery processes and scale them for use across multiple agencies. These processes and techniques are target agnostic and therefore can be applied to any target set (hard targets or otherwise). The capability transitioned to U.S. Central Command and the intelligence community. • Activity-Based Intelligence: A classified project to correlate geospatial intelligence, human intelligence, signals intelligence, and other datasets based on geo-temporal and unique-attribute metadata. The capability transitioned to U.S. Strategic Command and the National Security Agency. • Multi-Agency Bioinformatics Platform: This project developed a user interface and analytics platform to support rapid ingestion and analysis of bioinformatics data and provide actionable reports. The platform is an open ended architecture to allow for interoperability within and outside the DoD. The initial prototype transitioned to the Defense Intelligence Agency, Defense Health Agency, and the Army Criminal Investigation Command.	0.674	-	-
Title: Anti-Access/Area Denial Focus Area ***Description:*** In FY 2017 and FY 2018, this Quick Reaction Fund (QRF) focus area will support projects to develop capabilities and countermeasures for emerging needs to monitor and, as needed, gain access to geographical areas that have been strategically denied by adversarial forces and technologies. The Rapid Reaction Technology Office (RRTO) will seek to leverage existing capabilities and ensure QRF efforts are not duplicative with other work within the Defense Department or with outside agencies. ***FY 2017 Plans:*** Anti-access/area denial investment decisions during the budget year will respond to Department, Combatant Command (CCMD), Service, and other government organization priorities to address increasing capabilities of near peer adversaries. Through coordination with the Department of Defense (DoD), Federally Funded Research and Development Centers (FFRDCs), other government agencies, industry, and academia, this focus area will help identify critical areas to address the dual challenges of getting into theater (the anti-access challenge) and operating under guided munitions threat (or the area-denial problem). QRF anticipates funding two to three prototypes in FY 2017. ***FY 2018 Plans:***	-	3.230	4.382

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
In FY 2018, QRF will continue efforts to identify and invest in capabilities that address anti-access/area denial challenges. These investments will be conducted to support, and in coordination with, DoD, CCMDs, Service, and other government organizations. QRF anticipates funding three to four prototypes in FY 2018.			
Title: Counter Emerging Electronic Warfare (EW) Technologies Focus Area ***Description:*** This focus area, in anticipation of emerging needs, will include the maturation of proof-of-principle prototypes that advance countermeasures against electronic warfare (EW) components and systems to protect forces and achieve electromagnetic spectrum agility. Operating in complex EW environments is critical to the success of the Third Offset Strategy. Through this focus area RRTO will identify, mature, and demonstrate capabilities that anticipate adversaries' EW technologies and enable advanced weapon systems hardened for complex EW threat environments. The Rapid Reaction Technology Office will ensure QRF efforts are not duplicative with other counter-electronic warfare efforts and will seek to leverage other such efforts. ***FY 2017 Plans:*** Investment decisions in counter-electronic warfare technologies during the budget year will respond to Department, CCMD, Service, and other government organizations' priorities as new opportunities and new threats emerge. Planned investments will help local communication and coordination to increase weapon systems' and forces' effectiveness in contested environments. RRTO will coordinate with organizations throughout the DoD, FFRDCs, other government agencies, industry, and academia to help identify critical areas to counter emerging electronic warfare threats. QRF anticipates funding three to four projects in FY 2017. ***FY 2018 Plans:*** In FY 2018, QRF will continue efforts to identify and invest counter-electronic warfare technologies that respond to DoD, CCMD, Service, and other government organizations priorities as new threats emerge or new opportunities are presented. QRF anticipates funding three to four projects in FY 2018.	-	4.197	5.297
Title: Human-Machine Collaborative Decision Making Focus Area ***Description:*** This focus area for FY 2017 and FY 2018, in anticipation of emerging needs, will include the development and advancement of rapidly developed proof-of-principle prototype technologies that focus on improving the indications and warning (I&W) for a variety of mission areas to include weapons of mass destruction and theater ballistic missiles. Projects may include techniques and methodologies that improve detection sensitivities, data-to-decision tools, and global situational awareness. The Rapid Reaction Technology Office (RRTO) will ensure the Quick Reaction Fund (QRF) efforts are not duplicative with other human-machine collaborative decision efforts and will seek to leverage other such efforts. ***FY 2017 Plans:***	-	2.727	3.871

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Investment decisions in human-machine collaborative decision making efforts during the budget year will respond to Department of Defense (DoD), CCMD, Service, and other government organization priorities. RRTO will consider new projects as new threats emerge or new opportunities are presented. To help identify areas critical to human-machine collaborative decision making, RRTO will leverage research and coordination with organizations throughout the DoD, FFRDCs, other government agencies, industry, and academia. QRF anticipates funding two to three projects in FY 2017. ***FY 2018 Plans:*** Investment decisions in human-machine collaborative decision making efforts during the budget year will respond to DoD, CCMD, Service, and other government organization priorities. RRTO will consider new projects as new threats emerge or new opportunities are presented. To help identify areas critical to human-machine collaborative decision making, RRTO will leverage research and coordination with organizations throughout the DoD, FFRDCs, other government agencies, industry, and academia. QRF anticipates funding two to three projects in FY 2018.			
Title: Persistent Intelligence, Surveillance, and Reconnaissance (ISR) Focus Area ***Description:*** In anticipation of emerging needs, this focus area for FY 2017 and FY 2018 will include developing ISR capabilities to improve ground, air, sea, and space situational awareness. Projects will develop prototypes and may explore new or improved methods for surveillance sensors to persistently operate within denied areas. This focus area also explores more effective and agile ISR architectures for rapidly processing, exploiting, and disseminating situational awareness intelligence, including in denied areas. QRF will leverage existing efforts and ensure projects are not duplicative with on-going persistent ISR work within the Defense Department or with outside agencies. ***FY 2017 Plans:*** Persistent ISR investment decisions during the budget year will respond to Department, CCMD, Service, and other government organization priorities. Projects will be considered as new threats emerge or new opportunities are presented. Research and coordination with organizations throughout the government, industry, and academia will help identify areas critical to developing future ISR payloads. QRF anticipates funding two to three projects in FY 2017. ***FY 2018 Plans:*** Persistent ISR investment decisions during the budget year will respond to Department, CCMD, Service, and other government organization priorities. Projects will be considered as new threats emerge or new opportunities are presented. Research and coordination with organizations throughout the government, industry, and academia will help identify areas critical to developing future ISR payloads. QRF anticipates funding two to three projects in FY 2018.	-	2.921	3.978
Title: High-throughput Deoxyribonucleic Acid (DNA) Sequencing (HTS) Technology Focus Area	-	2.600	1.500

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Description: The High-throughput DNA Sequencing (HTS) Technology Focus Area will leverage technological advances in gene sequencing and bioinformatics to fundamentally change the way DNA is used to support forensics. These projects will employ current hardware coupled with custom chemistries, data analysis algorithms, software, databases, and information transmission pipelines to enable more comprehensive analysis of trace, degraded, and mixed DNA samples. This comprehensive data analysis allows for correlating individual activities and histories; the ability to determine biogeographical ancestry; increasing confidence in assigning extended kinship identifications; and, greater accuracy in predicting phenotypic attributes such as facial characteristics, eye colors, skin tones/variations, or physical deformities. This focus area also includes support for HTS databases that are designed to ingest large DNA data flows efficiently, use processing power for searching and analyzing big data, and employ big data analytics to make predictive assessments that would otherwise go unnoticed. This focus area will encourage collaboration on biometrics and forensics projects within the DoD, with interagency partners, with our partners in industry and academia, and with international partners where applicable. This collaboration will help maximize shared investment and prevent redundant research. Deliverables are shared throughout the biometrics and forensics communities. ***FY 2017 Plans:*** This focus area will build upon prior work on mixture deconvolution, analysis of low-copy (degraded or trace) DNA, and the development of bioinformatics platforms that are device agnostic and allow analysis of DNA for multiple HTS applications. The goal of the mixture deconvolution is to allow for the identification of individual profiles from mixed samples with up to eight contributors. It will also explore the ability to identify common contributors across multiple mixtures. The low-copy project will attempt to extend the sensitivity of current sequencing technologies from a minimum sample size of over 100 picograms (approximately 12 human cells) down to less than 50 picograms. It will also work on protocols to analyze environmentally degraded samples. The bioinformatics platform will provide a comprehensive user interface to current HTS platforms. Finally, the program will initiate two feasibility studies. The first will assess the potential costs and pitfalls in investing in efforts to determine appearance (notably head and face shape) through DNA. The second will investigate how to identify if a DNA sample was modified or 'spoofed' to help ensure database integrity. ***FY 2018 Plans:*** The HTS Program will leverage its on-going work to identify promising lines of HTS research that are feasible, cost effective, and meet the specific requirements of the end user. Based on the outcomes of FY 2017, additional investments are expected in chemistry optimization, statistical refinement, and results interpretation. Future investments will include database development and optimizations designed to integrate appropriate analysis software tools as they are developed or modified. Transmission pipelines to access data, submit data, run analysis programs, and generate custom reports will be further defined based on needs			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
of the community. As more research becomes available to the life science community, the HTS program will work to identify new avenues of exploration.			
Accomplishments/Planned Programs Subtotals	21.451	23.675	21.828

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

In FY 2018, performance metrics applicable to the Quick Reaction Fund (QRF) include attainment of DoD Strategic Objective 3.5.2D. The title of this objective is "Maintain a Strong Technical Foundation Within the Department's Science and Technology (S&T) Program" and the metric for this objective is to transition 40 percent of completing demonstrations per year. Each QRF project typically has a period of performance of 12 months. All QRF projects are monitored for schedule deviation, transition outcome, and deliverables such as test reports, components, and equipment. For projects that were completed in FY 2016, the QRF achieved a transition rate of approximately 50 percent.

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COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
P828: *Rapid Reaction Fund*	164.854	44.348	47.350	43.418	-	43.418	45.943	50.892	53.626	54.881	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Quick Reaction Special Projects (QRSP) Program supports four separate project codes that provide rapid funding to expedite development and transition of needed capabilities to the warfighter. The QRSP Program provides the flexibility and agility to mitigate emerging threats and support current operations, including counter terrorism, by addressing needs that arise faster than the two-year budget cycle.

The Rapid Reaction Fund (RRF) is fully executed through the Rapid Reaction Technology Office (RRTO). RRTO was established to accelerate the development and transition of high-potential science and technology (S&T) projects through operationally useful virtual and proof-of-principle prototypes within the execution year of an identified need. The RRTO leverages the Department of Defense (DoD) S&T base and those of the other federal agencies, academia, and industry. The office also stimulates interagency coordination and cooperation, expedites delivery of prototype capabilities and concepts to counter anticipated and emerging threats, and provides feedback to the S&T community to guide long term development strategies. RRTO achieves this by anticipating adversaries' exploitation of technology, including available and emerging commercial capabilities, and rapidly responding to new threats and opportunities. Projects support high level Department strategies and objectives, such as the building blocks for the Third Offset Strategy, the Defense Innovation Initiative, and geographic Combatant Command (CCMD) priorities. Prototypes delivered and transitioned to operational users by RRTO demonstrate the feasibility of new technologies, enable integration into larger systems, and increase ‘speed to market’ by providing cost effective capabilities faster than typical acquisition cycles.

In prior years, RRTO, through RRF, explored novel methods and new approaches for persistent surveillance for counter-insurgency; developed alternate power sources for sensors and systems; provided low-cost capabilities for small-footprint operations; expanded human, social, and cultural knowledge relevant to military decision making; increased small unit situational awareness; advanced the interface between law enforcement and military operations; developed advanced biometrics and forensics capabilities; performed strategic multi-layer assessments; and, established a prototyping through non-traditional pathways outreach effort that facilitates better interactions with small, non-traditional companies developing emerging technologies.

In FY 2017 and FY 2018, RRF will continue to provide a hedge against technology risk by identifying and developing near-term capabilities to support irregular warfare operations. RRF projects support goals from the Under Secretary of Defense (Acquisition, Technology, & Logistics), the Assistant Secretary of Defense (Research and Engineering), and the Deputy Assistant Secretary of Defense (Emerging Capability & Prototyping). With project selection occurring during the execution year, the RRF’s current focus areas include: open source data analysis; autonomous systems and behaviors; urban characterization; prototypes for intelligence, surveillance, and reconnaissance; additive manufacturing to rapidly field prototypes; maritime technologies; and, wargaming for emerging threats and capabilities.

The typical length of an RRTO project falls within a 6 to 18 month range to more effectively respond to Warfighter needs.

Recent success stories and significant transitions of note include:

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• Next Generation Sequencing for Personnel Accounting Applications: This project successfully developed, demonstrated, and made operational a new DNA analysis process and supporting analytic software to conduct mitochondrial DNA analysis on highly degraded samples. This process allows familial matching on remains degraded by environmental conditions or contaminants that are recovered in support of the personnel accounting mission, or for the identification of high value individuals.
• Biometric Enabled Watchlist (BEWL) Dissemination Management Server (BMDS): This project successfully developed and demonstrated an automated BEWL dissemination prototype that improved the speed of delivering customized biometric watch lists by 38 times, while also significantly reducing errors. The Army Program Manager for Biometrics will incorporate this tool into the Automated Biometric Identification System architecture.
• Large Displacement Unmanned Underwater Vehicle (LDUUV) Common Control System (CCS): LDUUV CCS successfully developed and demonstrated initial integration of the common control system software with a representative LDUUV to inform future acquisition activities. This effort demonstrated command and control of LDUUVs from an unmanned air system workstation. The technical data package and final report have been delivered to the Navy's Unmanned Maritime Systems (UMS) Program Office (PMS 406) to inform acquisition activities.
• Flume: The final phase of the Flume software project provided assured delivery of data over existing networks used by U.S. Special Operations Command (USSOCOM). The final phase of development consisted of tailoring the software to U.S. Air Force Special Operations Command (AFSOC) missions. The system demonstrated automated data transport, accelerated throughput, and high reliability through intermittent connections. Flume has transitioned to AFSOC and other USSOCOM users.
• Forward Firing Flare: The Forward Firing Flare project delivered two ALE-47 chaff/flare launchers in the forward firing configuration for nonstandard aircraft. The products transitioned to assets deployed in support of U.S. Central Command (USCENTCOM).
• Intelligent Materials Sensor System (IMSS): The IMSS prototype uses a unique phosphorescent nanomaterial to provide target identification information when illuminated. Following a successful demonstration of this optically-transparent tagging mechanism USSOCOM and the U.S. Army contracted for procurement of the IMSS tags.
• Laser Threat Detection and Defeat: The project completed development of a phase one prototype system and demonstrated the ability to detect and locate indoor threats. Subsequent demonstrations at Trident Spector 16 validated detection outdoors and the system transitioned to defense criminal investigative organizations.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Low Cost Innovative Projects (Projects Less Than One Million Dollars Each)	33.298	-	-
Description: Selected, executed, and transitioned multiple low cost projects in the areas of: unmanned autonomous vehicles, electromagnetic spectrum agility, space resiliency, detection of explosives and weapons of mass destruction, deterrence of violent extremism, exploitation of commercial off-the-shelf technology, exploitation of communications technologies, small footprint operations, and other emerging technology areas. These projects delivered proof-of-principle prototypes for evaluation or assessment by warfighters and interagency users.			
FY 2016 Accomplishments: • Mesmer: The Mesmer project developed a software framework for detecting, redirecting, denying, or taking control of various unmanned aerial systems (UAS). Mesmer exploits digital radio protocols used by UASs. The technology transitioned to the U.S. Special Operations Command (USSOCOM) for integration into existing force protection systems.			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Orthos: The project developed customizable, concealable field-sets that communicate position, brief messages, or code words to multiple, multi-purpose cross-connected receiver platforms in challenging threat or degraded communications environments. Orthos transitioned to Special Operations Forces (SOF) warfighters from multiple components. • Vital Infrared Sensor Technology Acceleration (VISTA): This project developed a novel focal plane array sensor with a cryogenic cooler and electronics. The sensor package was demonstrated and transitioned to the Javelin's Lightweight Command Launch Unit (LW-CLU) and the F-35's Electro-Optics Distributed Aperture System (EODAS). • Optical System Protection: This project developed a prototype optical system that protected imaging sensors against high intensity lasers using a custom-designed phase mask to mitigate laser damage. A field unit was built and successfully tested to demonstrate the optical system's capabilities at visible wavelengths. This project transitioned to the Dahlgren Naval Surface Warfare Center High Energy Lasers. • Dragonfly: The project demonstrated automatic queuing and on-the-move processing in a small 360-degree infrared persistent surveillance prototype. The Dragonfly system can be incorporated aboard small unmanned aerial systems to provide detection and tracking of vehicle and dismount activity within a five kilometer radius. The Dragonfly capability transitioned to the Naval Special Warfare Groups (NSWG) and the Department of Homeland Security (DHS). • Passive Foliage Penetration (FOPEN): Passive FOPEN developed a capability to image targets under foliage using passive sensors on airborne platforms. Novel data-processing algorithms generate FOPEN products that were validated through simulations and real airborne data. After a successful operational demonstration, the real-time hardware and software were made available to U.S. Southern Command transition partners. • Solid State Neutron Detector (SSND): The project leveraged the single solid state neutron detector previously developed by the National Aeronautics and Space Administration (NASA) and the Department of Energy (DoE) to design, fabricate, and test a two neutron detector package with associated electronics. This technology, which reduces material cost and false alarm rate while providing a 10-fold increase in detection sensitivity, has met all objectives for success. The capability transitioned to the Joint Service Explosive Ordnance Disposal. • Project Viper: The project delivered a classified method for high priority underwater capabilities. The initial proof of concept was a success, proven using two undersea platforms. Viper enabled initiation of a follow-on phase of work. The capability transitioned to an operational user. Details of this project are classified. • Airborne Computer Vision: This project provides a vision-enabled autonomous flight management system. Airborne Computer Vision products transitioned to the U.S. Pacific Command for a classified mission and were evaluated for integration with V-22 Osprey, P-8A Poseidon, RQ-21 Blackjack, and Lockheed Stalker programs. • Advanced Inflatable Material Structures (AIMS): The AIMS project rapidly developed an inflatable material capable of providing unique performance characteristics, structural rigidity, and compatibility with specialty coatings, while maintaining lightweight, collapsible, and durable properties. This technology transitioned to the Naval Special Warfare Groups Three and Four for transition to multiple maritime platforms.			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Ajax: The Ajax project produced a comprehensive survey and lab demonstration of Fifth Generation (5G) wireless technologies. The survey will assist the DoD in identifying the technical challenges that it will face when 5G technologies are commercially deployed. The survey and lab demonstration results were provided to the Defense Threat Reduction Agency to be used as a technology roadmap. • Argonaut: The Argonaut project produced a complete survey of N-Channel receiver architectures and individual offerings from industry and various labs around the country to benchmark a receiver's performance for direction finding accuracy and price point. The effort significantly reduced the price for a target solution by identifying low cost N-Channel receivers with increased performance through signal processing. The architecture transitioned to the Army Intelligence Information Warfare Directorate. • Analytic Tools for the Objective Monitoring of Human Performance (ATOM-HP): The project integrated a series of commercial wearable sensors to objectively monitor an individual's level of fatigue and corresponding mission readiness based on mathematical models developed through the evaluation of clinical trials. The effort transitioned to the Office of Naval Research, Air Force Research Laboratory, Naval Health Research Center, and National Institutes of Health (NIH) for follow-on development of a more integrated sensor suite. • High Accuracy Video Object Classification (HAVOC): HAVOC developed an inexpensive, customizable, and highly accurate real-time automatic target recognition (ATR) system for rapid exploitation of full motion video (FMV). This technology transitioned to multiple Special Operations Forces (SOF) components and follow-on development resulted in a low size, weight, and power (SWAP) variant. • Model Enhanced Analysis, Design, & Execution (MEADE) predictive control system: MEADE successfully prototyped a software system and concept of operations that improved our ability to conduct analysis and planning at the operational level. The effort transitioned to the Joint Special Operations Command (JSOC) and three Theater Special Operations Commands (TSOCs) for immediate support to the counter-Islamic State of Iraq and the Levant effort. • Radio Frequency (RF) Interference Phase One: This project successfully developed and tested various millimeter-scale microwatt-class devices for RF interference purposes. The results of the initial phase were positive and work continues to field a prototype system. Details of this project are classified. • Scalable Effects Expeditionary Vehicle Interdiction (SEVI): This project successfully developed an expeditionary, custom-built, multi-rotor personal reconnaissance device and payload capable of autonomously interdicting a moving target. The prototype transitioned to the Naval Surface Warfare Command. Details of this project are classified. • Vanilla: This project successfully demonstrated the capability in an unmanned air vehicle (UAV) for a ten-day persistent flight with a 30 pound payload. The payload demonstrated was a radio repeater but it can be customized for the end user's needs. This technology transitioned to the Naval Special Warfare Development Group for immediate use. • Bugeyes: This project developed a three dimensional (3D), 360-degree filming and immersive training kit to support training for complex environments and dangerous missions. Bugeyes brings the realm of mixed reality full immersion into the classroom training experience. Bugeyes transitioned to U.S. Navy Special Warfare Command for use by Navy SEALs and was evaluated by the U.S. Army and Marine Corps Training Commands for integration into training.			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Mobile Enabled Networks (MEN) for Rapid Integrated Strategic Assessment (RISA): The project developed a field data collection capability for the RISA Water Security network. It used a mobile device network to upload timely user-generated data from a mobile device software application. MENRISA transitioned to the U.S. Army Geospatial Center. • The Event Notification System (TENS): The project developed a near-term emerging technology to enhance capabilities for recovery and protection of abducted personnel. TENS transitioned to the U.S. Northern Command. Details of this project are classified. • Directed Laser Focus: The project applied Optical Phase Conjugation (OPC) via digital holography, to tailor a laser beam's spatial energy distribution and optimize overall system performance when transmitting long distances through the atmosphere. This project was presented to the U.S. Special Operations Command (USSOCOM) users who confirmed the concept was highly relevant to various mission and began transition. • Swift Vision: The project developed a vision-enabled unmanned aerial system that facilitates a classified maritime mission. The capability transitioned to the U.S. Pacific Command. • Arctivate: The project successfully implemented the three-phase Arctivate operational model in select Middle East and North African countries to gather deeper insights about how local populations, especially cultural nodes such as youth, celebrities, and media, consume and exchange information. This project transitioned to the U.S. Africa Command and U.S. Central Command. • Threat Detection and Tracking on Social Media: The project developed analytical tools for detecting radicalization trajectories and linguistic markers for radical violence in social media. These tools help analysts identify individuals susceptible to radicalization. This project transitioned to the Joint Improvised Threat Defeat Agency (JIDA) and the National Security Agency (NSA). • Flexible Buoyant Body Armor: The project developed a flexible and buoyant body armor system. Within this effort multiple experiments were conducted to achieve National Institute of Justice ballistic protection levels three and four. This capability transitioned to the Air Force Research Laboratory. • Sea Ice Detection: The project successfully developed algorithms within the Rapid Image Exploitation Resource (RAPIER) framework to automatically detect and characterize ice in satellite synthetic aperture radar (SAR) data. The system allows processing of large numbers of SAR images to produce maps of ice with key ice properties including thickness, surface area, edges, age (multi-year, first year, etc.), and discrimination between ships and icebergs. The project transitioned to the U.S. Northern Command, U.S. European Command, and the U.S. Coast Guard. • Integrated Water Purification: The project developed a solar powered, high efficiency, low maintenance pumping system that can support austere forward operating bases, humanitarian assistance, and disaster response. The technology transitioned to the U.S. Army Geospatial Center and the U.S. Army Corps of Engineers. • Protocol Independent Networking: The project developed a network interface capable of spanning a rack of equipment to provide an extremely low latency and high data rate network within the system. The technology transitioned to the U.S. Navy for integration into submarine electronic warfare systems.			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Black Ink: The project developed a classified submarine warfare enabling technology. The technology transitioned to the U.S. Navy for implementation in submarine sensor systems. • Illicit Networks Courseware: The project developed a platform for wargaming global security challenges presented by illicit networks. The technology transitioned to the National Defense University for collaboration with Service component professional military education. • Spyglass: The project developed a graph database that can enhance the detection and monitoring of illicit transshipments via containers. The technology transitioned to the Joint Interagency Task Force – South to help understand the cargo container threat vector and increase the probability of inspecting containers associated with illicit contraband. • Advanced Airlift Airship Technology: The project fulfilled a congressional requirement to identify and assess key airship technologies, and to estimate the costs and time required for airship technology demonstrations. • Life Cycle Cost Assessment Review of Alternative Satellite Constellation Space Systems Architecture: The project provided an independent assessment of the credibility of program life cycle cost (LCC) estimates for acquiring, launching, operating, and sustaining a small satellite constellation. The results of this assessment are informing satellite development and procurement activities. Details are classified. • Bluebolt: The project demonstrated an integrated proof-of-principal prototype electronic warfare (EW) technique against targets of interest in the Pacific Theatre. The effort transitioned to the U.S. Pacific Command (USPACOM). Details are classified. • Project Firefly: This effort delivered the aero-body and rocket engine designs for a transonic (speed of Mach 0.8) micro-Unmanned Aerial Vehicle (UAV). The developed prototype transitioned to the Air Force for flight control hardware integration and testing. • Geo-Enhanced Network Intelligence Environment (GENIE): The project enabled estimation of geolocation from location-indicative terms and metadata features through the capabilities of the GENIE suite of automated machine learning algorithms. The effort transitioned to the Defense Intelligence Agency (DIA) for integration into the Department of Defense (DoD) Intelligence Information System (DODIIS). • Jungle and Urban Non-Global Positioning System (GPS) Orientation (JUNO): The project incorporated bionic power leg brace sensors into dead reckoning algorithms developed for navigation in GPS denied and degraded environments. The prototype transitioned to the Space and Naval Warfare (SPAWAR) Systems Center Pacific (SSC Pacific) for integration into the Pacific's Battlefield Objective Navigation Display (BOND) application for dismounted infantry. • Telemetry Buoy Undersea Communications System (TBUCS): This effort prototyped a redesigned sonobuoy to communicate below water via a Hydro-Acoustic Information Link (HAIL) and above water via Ultra High Frequency (UHF) line of sight or Iridium satellite. This allows submersibles, surface craft, and aircraft to communicate with each other in real time. The prototype transitioned to the U.S. Special Operations Command (USSOCOM) Naval Special Warfare Command (NSW). • Ultra Wideband Soldier Radio: This project developed a miniature ultra-wideband radio front-end capable of operating over a range from very high frequency (VHF) to 6 GHz. The range provided by this front-end allows for multiple radios to be replaced by a single software defined radio.			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Solid State X-Ray: This effort developed a compact solid-state pulsed X-Ray generator for use by Explosive Ordnance Disposal (EOD) personnel. The prototype improves the current capability available to EOD technicians by providing improved X-Ray pulse efficiency, battery performance, and image quality. This effort transitioned to the Joint Service Explosive Ordnance Disposal (JSEOD). • Black Urchin: The project delivered a maritime ruggedization, collection, and exfiltration (EXFIL) system designed for close-in access to targets of interest. This technology transitioned to the Naval Special Warfare Command (NSW) and two members of the Intelligence Community. The details of this project are classified. • Special Operations Forces (SOF) Combat Diver Communications: The project developed and demonstrated an underwater non-detectable communications system for integration into the Naval Special Warfare Command (NSW) Surface vehicles, SEAL Delivery Vehicles (SDVs), Diver Propulsion Vehicles (DPV), and Unmanned Underwater Vehicles (UUVs). The UUVs act as a communications node between SDVs and Combat Diving elements to provide near real-time communications and situational awareness (SA). This technology transitioned to the Naval Special Warfare Command.			
Title: Strategic Multi-Layered Assessment (SMA) Cell	2.200	2.200	2.100
Description: The SMA Cell provides planning support to Combatant Commands (CCMDs) and U.S. Government agencies; and, provides actionable assessments for complex operational and technical challenges to help maintain our competitive advantage in an increasingly complex global environment. SMA efforts leverage multi-agency, multi-disciplinary approaches to address requirements that are not within the customer organization's core competency. SMA assessments are framed during the execution years and are in response to specific tasking from senior leadership in the CCMDs. The SMA Cell identifies options from across the U.S. Government, academia, and the private sector. SMA efforts are facilitated by the Joint Chiefs of Staff/J3 Operations and are executed by the Rapid Reaction Technology Office. ***FY 2016 Accomplishments:*** Support for the Commander of the U.S. Army Special Operations Command Central continued in FY 2016 with a short term 'proof-of-concept' effort to evaluate and assess options that include the 'Cognitive Spaces' along with narrative-based Information Operations (IO). The IO objectives were to disrupt the Islamic State of Iraq and the Levant (ISIL) leadership's ability to command and control forces; neutralize their ability to maintain or increase moral, political, and financial support; prevent recruitment of foreign fighters; and, ultimately, to psychologically isolate ISIL leadership. The effort assessed the value of 'integrated neuro-cognitive-narrative maneuver' approaches to produce messages that are more likely to have intended effects and less likely to have undesirable, unintended, or collateral effects. The effort also sought to deliver messages more effectively and efficiently by developing campaigns that undercut adversary effects (e.g. leadership fragmentation, organizational fracture, separating population from the organization) and achieve positive coalition effects. The results of the 'proof-of-concept' were presented to the Army Strategic Land Power Task Force. The task force is continuing to expand options identified by SMA.			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
At the request of the Commander of the U.S. Central Command (CENTCOM), the SMA stood up a reach back support cell to respond to questions generated by the Command. The SMA efforts are designed to respond rapidly (days to weeks) to population focused requests from Commanders in the region, provide feedback regarding the impact from potential options, and provide inputs on messaging and counter-messaging options. This will entail maintaining the current subject matter expert and technical teams as part of a reach back cell. Options will be evaluated by qualitative assessments including subject matter expert elicitation and quantitative assessments, including modeling and simulation. Annually, the reach back cell will respond to 10-15 questions from the senior Combatant Command leadership. ***FY 2017 Plans:*** The SMA Cell will continue to work with the Commander of the U.S. Central Command via the reach back cell to support ongoing operations in the region. The SMA Cell will also continue to actively work with the CCMDs and the Joint Staff to identify challenging problems that are not within the traditional areas of DoD expertise. These problems will be in direct support of CCMD senior leadership and may include areas such as: counter terrorism, transnational criminal organizations, counter weapons of mass destruction (state and non-state), counter global or regional social and cultural assessments, regional stability assessments, and individual state or national level deterrence studies. ***FY 2018 Plans:*** The SMA Cell will continue to actively work with the CCMDs and the Joint Staff to identify challenging problems that are not within the traditional areas of DoD expertise. These problems will be in direct support of CCMD senior leadership and may include areas such as: counter terrorism, transnational criminal organizations, counter weapons of mass destruction (state and non-state), counter global or regional social and cultural assessments, regional stability assessments, and individual state or national level deterrence studies.			
Title: Biometrics and Forensics Science and Technology for Identity Dominance ***Description:*** Biometrics and Forensics Science and Technology projects field prototypes to address emerging technology gaps that limit our ability to quickly and accurately identify anonymous individuals who threaten our physical and virtual assets. The overall goal of these projects is to reduce future operational risk to warfighters. New technologies demonstrated through this program will allow warfighters to identify bad actors or counter adversaries' attempts to mitigate our current technologies. These projects leverage techniques such as proof-of-principle prototyping, increased use of small businesses, and increased competition between vendors. Biometrics and forensics projects will mature emerging technologies that support identity operations and forensic capabilities required by Commanders and warfighters in ongoing and future military activities. These efforts leverage the Reliance 21 model to encourage collaboration on biometrics and forensics projects within the DoD, with interagency partners, with our partners in industry and academia, and with international partners where applicable. This model will help maximize collaborative investment and prevent redundant research. Deliverables are shared throughout the biometrics and forensics communities.	3.700	3.500	3.300

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018

FY 2016 Accomplishments:

The biometric and forensics portfolio continued to mitigate gaps identified by commanders and operational users. Biometrics and forensics efforts improved capabilities in the areas of increasing standoff distance for collection of biometric data, collection of biometric data from non-cooperative subjects, improving the matching accuracy of non-ideal biometric data, accelerating collection speed of forensic data through the ongoing development of the advanced file carving system, increasing accuracy of forensic analysis, and shifting analysis to the field from a laboratory environment.

The biometric portfolio successfully demonstrated and transitioned three prototypes in FY 2016. Biometric successes include a pilot capability of the first-ever rules-based classified biometric matching system; The Victim Identification for Disaster Assistance (VIDA) tool, a mobile phone application to support DoD and partner nations' post-disaster activities such as helping to reunite displaced personnel and families, tracking emergency medical and humanitarian services, and identifying victims; and, the final phases of technology transfer for the Biometric Enabled Watch List (BEWL) Dissemination Management Server, which improved the speed of delivering customized biometric watchlists by 38 times while also significantly reducing errors. These prototypes transitioned to DoD and other partners including the Army's Program Manager-Biometrics and the Services through the Pacific Disaster Fund.

The forensics portfolio developed two successful prototypes. In FY 2016, RRTO demonstrated a new capability to identify the make and model of an imaging device (camera, video recorder, etc.) from the digital image it produced. The portfolio also developed a new mitochondrial Deoxyribonucleic Acid (DNA) prototype that greatly increased the ability to perform kinship analysis on extremely degraded DNA samples, facilitating identification of over 1,200 remains of fallen Service members from prior conflicts. These prototypes transitioned to DoD and other partners including the Army's Defense Forensics Science Center, Armed Forces Medical Examiner System, Federal Bureau of Investigation, and other agencies.

FY 2017 Plans:

This portfolio will complete and deliver three new capabilities in FY 2017. The first capability will be a handheld, rapid, automatic explosive detector called ExploDisk. This device will not only check for the presence of seven common explosives, its novel use of cellphone camera technology will mitigate human error in color determination; a common weakness with current technologies. This capability can also support the identification of illegal drugs by using different disposable analysis 'chips'. The second capability is a novel DNA analysis protocol that will extend kinship analysis from the current limit of second generation (grandparents or siblings) to the fourth generation (great-great grandparents or cousins). This capability is critical to support the identification of remains lost from World War II and Korea as their direct relations may die before the service members' remains are located. The final effort leverages FY 2016 funds to finish development and deliver an advanced file carving system. This system will accelerate the extraction and categorization of files of interest from large data stores while simultaneously screening

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
out useless junk files. Depending on the file types, this carver will accelerate the process 25 percent to 80 percent over prior carving systems. ***FY 2018 Plans:*** The biometrics and forensics science and technology portfolio will continue to mitigate gaps identified by commanders and operational users and improve capabilities in the areas of biometrics and forensics. The portfolio will continue work on four projects schedule for FY 2018 delivery. The program's Face Acquisition Recognition of IDentities (FAR-ID) project will work toward developing technologies that can accurately perform unconstrained face matching out to 800 meters, greatly expanding the ability to detect and categorize potential threats before they can do harm to U.S. Forces. The portfolio is also co-funding three digital forensic projects. The first project will develop and demonstrate a software prototype that will allow analysts to identify linkages to related data on other devices or cloud servers used by the devices' owner. The Forensic Acquisition Tool for Cloud-Based Data software prototype will allow analysts to extract data from cloud-based service providers in a forensically sound manner. This tool will help analysts maintain data validity prior to analysis. The third project will develop a prototype to identify hand writing on scanned documents containing background images or text. This tool is the first step in developing an automated method of analyzing handwritten documents. Projects for biometrics and forensics portfolios will be selected after coordination throughout DoD and across other U.S. Government departments and agencies to maximize collaborative investment and prevent unnecessary redundant research.			
Title: Faster Short Tandem Repeat (FaSTR) Human Deoxyribonucleic Acid (DNA) Profiling System	1.500	0.000	0.000
Description: To date, rapid DNA analysis systems have relied on pneumatics and mechanical valves for microfluidic movement which results in bulky hardware and assay times greater than 60 minutes. The FaSTR DNA instrument exploits centrifugally-driven microfluidics to eliminate mechanical valves and pressure-driven flow, and allows commercial off the shelf electronics to facilitate sample preparation, polymerase chain reaction, and integration with electrophoresis (the movement of charged particles in a fluid or gel under the influence of an electric field). This paradigm shift for microfluidic technology radically reduces the form factor, analysis time, and cost of the system. The FaSTR project will produce the first truly portable, rapid DNA analysis instrument capable of generating DNA profiles from "sample in" to "answer out" in less than 30 minutes and provide a match probability of 1 in 55 billion people. ***FY 2016 Accomplishments:*** The FaSTR project continued work to deliver fully integrated operational prototypes in FY 2018 that will demonstrate the full feasibility of the technology. During FY 2016, the project optimized nine Short Tandem Repeat DNA panels (selected from the Federal Bureau Investigation (FBI) Combined DNA Index System (CODIS) Core Loci) and associated chemistries capable of generating a profile with random match probabilities of one in 55 billion people, significantly exceeding the initial goal of one			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
in five million people. Additionally, the project combined all three DNA processing steps onto the integrated analysis chip and demonstrated the device's ability to produce an accurate DNA profile in less than 60 minutes. ***FY 2017 Plans:*** During FY 2017, the FaSTR project will continue the development of three FaSTR prototypes leading to operational testing in FY 2018. The final prototypes will weigh less than 10 pounds, have a total size less than 600 cubic inches, and have a low rate production cost below $10,000 for the unit and $50 for per sample consumables. These metrics represent substantial improvement over current rapid DNA technologies in terms size and weight (>90 percent reduction), analysis speed (67 percent reduction), and cost (>90 percent reduction). ***FY 2018 Plans:*** The FaSTR project will complete development and initial testing to allow the devices to transition to the U.S. Special Operations Command for operational testing. Test results, technical and training materials, and initial low rate production manufacturing technical specifications will be included in the deliverables.			
Title: Prototyping Through Non-Traditional Pathways	3.650	3.500	3.000
Description: Prototyping Through Non-Traditional Pathways leverages technology and emerging products developed by small, innovative businesses in the commercial sector. Ideas from non-traditional emerging technology companies are matched against Department of Defense (DoD), Combatant Commands (CCMDs), Service, and other government organizations' priorities. Promising solutions are selected for further test and evaluation and, if successful, rapid prototyping or fielding to transition commercial ideas with military utility. These efforts support the Department's objectives of promoting effective competition, increasing speed to market, implementing technological and organizational innovation, and fielding affordable capabilities through innovation from commercial research and development. ***FY 2016 Accomplishments:*** During FY 2016, the Prototyping Through Non-Traditional Pathways conducted three reviews. Each review focused on identifying ideas in a specific topic area that can transition to meet joint operational needs through rapid prototyping. Government organizations help identify driving needs for each review and in FY 2016 the program supported Deputy Assistant Secretary of Defense, Emerging Capability & Prototyping DASD(EC&P); Special Operations Forces Acquisition, Technology, & Logistics; and, DoD Cyber Strategy. Through these efforts the Rapid Reaction Technology Office demonstrated an advanced 32-bit microcontroller on a silicon flexible substrate. The microcontroller leverages flexible hybrid electronics manufacturing to provide a multi-use technology for a variety of applications including machine assisted human operations, advanced unmanned systems, and network-enabled autonomous weapons. This proof-of-principle prototype transitioned to Air Force Research Laboratory for adaption in multiple future rapid prototyping efforts. In addition to flexible electronics, ideas from ten other companies were			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
selected for further testing and evaluation including technologies to rapidly close wounds with biological compatible glue, a predictive natural language processing tool, machine learning and data analytics platform, and a geospatial intelligence tool. ***FY 2017 Plans:*** Prototyping Through Non-Traditional Pathways investment decisions are made during execution years in response to emerging needs from DoD, CCMDs, Service, and other government organizations, and opportunities presented by non-traditional commercial companies. Innovative ideas are considered through the filter of Assistant Secretary of Defense for Research and Engineering's (ASD(R&E)) focus areas and other DoD priorities. In FY 2017, the program anticipates proposals to address challenges for autonomous learning systems, information flow and data analysis, virtual prototyping, exploitation of communications technologies, advanced electronic sensors, machine assisted human operations, capabilities to respond to future electric warfare threats, and other emerging technology areas. RRTO will support three to four need-focused reviews and anticipates 10 to 15 subsequent evaluations with the potential for prototyping efforts. These reviews will be executed with DoD users and interagency partners including DASD(EC&P), ASD(R&E) Cyber Strategy, Army Night Vision Sensors Directorate, and Defense Threat Reduction Agency's Joint Improvised-Threat Defeat Organization. ***FY 2018 Plans:*** Prototyping Through Non-Traditional Pathways anticipates four to six reviews in FY 2018, and 15 to 20 resulting tests and evaluations with potential for future prototypes. Focus areas will be informed by DoD users and interagency partners based on priorities identified in the execution year. These reviews will be executed with DoD users and interagency partners including DASD(EC&P), U.S. Army Maneuver Support Center of Excellence, U.S. Special Operations Command Science & Technology (S&T), and the U.S. Marine Corps.			
Title: Open Source Data Analysis and Applications Focus Area	-	6.925	6.235
Description: Open Source Data Analysis and Applications projects include the development of capabilities, software, and tools to analyze open source information. The data can be structured or unstructured and will include inputs from a broad spectrum of sources. Where possible these projects will exploit advanced learning systems and commercial technologies to provide solutions to emerging challenges in tracking targets, big data analytics, and extracting indications and warnings. Technologies developed within this focus area will reduce cost and analyst requirements to provide meaningful intelligence in support of the counter Islamic State of Iraq and the Levant (ISIL), counter weapons of mass destruction, and counter improvised explosive device missions. ***FY 2017 Plans:*** The Rapid Reaction Fund (RRF) investment decisions for Open Source Data Analysis and Applications projects are made during the execution years in response to the Department of Defense (DoD), Combatant Commands (CCMDs), Service, and other government organizations' priorities. RRF will support development of virtual prototypes and new open source data analysis tools and applications to provide a hedge against emerging, irregular, and asymmetric threats. The program anticipates supporting			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
eight to ten projects in FY 2017. Deliverables will leverage emerging technologies, such as autonomous learning systems, to exploit open source information and reduce analyst requirements to provide actionable intelligence. ***FY 2018 Plans:*** The RRF investment decisions are made during the execution years in response to DoD, CCMDs, Service, and other government organizations' priorities and as new threats emerge or new opportunities are presented. The program anticipates supporting six to eight projects in FY 2018. Deliverables will leverage emerging technologies to exploit open source information and reduce analyst requirements to provide actionable intelligence.			
Title: Autonomous Systems and Behaviors Focus Area ***Description:*** Autonomous Systems and Behaviors projects demonstrate capabilities to enhance joint forces, reduce the time to make critical decisions, and protect warfighters through increased use of autonomous and human-machine collaborative systems. Example projects include power systems to facilitate increased performance of unmanned systems, enhanced capabilities for multiple autonomous systems to cooperatively interact, autonomous operation in complex terrain, development of sensors for integration aboard unmanned platforms, improvements to data ex-filtration from unmanned sensors, human-machine collaborative decision making, and 'red teaming' to counter emerging unmanned threats from potential adversaries. These projects will also examine common software platforms to reduce development cost, increase collaboration among manned and unmanned vehicles, increase agility through rapid customization of autonomous systems' architectures, and inform requirement decisions for the autonomy community of interest to design affordable systems. ***FY 2017 Plans:*** RRF investment decisions for Autonomous Systems and Behaviors are made during the execution years in response to DoD, CCMDs, Service, and other government organizations' priorities. Selected projects will support development of components, payloads, and autonomous aerial, surface, and subsurface systems. RRF anticipates supporting four to six projects in FY 2017. ***FY 2018 Plans:*** RRF investment decisions for Autonomous Systems and Behaviors are made during the execution years in response to DoD, CCMDs, Service, and other government organizations' priorities. Selected projects will support development of components, payloads, and autonomous aerial, surface, and subsurface systems. RRF anticipates supporting four to six projects in FY 2018.	-	5.525	5.135
Title: Urban Characterization Focus Areas ***Description:*** Future military operations will likely occur in a broad range of urban environments with complex radio frequency (RF), topological, situational awareness, and mobility challenges. Urban Characterization Focus Area projects will identify, analyze, and describe typical urban areas for modeling, simulation, and planning purposes. These efforts will inform and enable	-	3.328	2.788

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603826D8Z / *Quick Reactions Special Projects (QRSP)*	**Project (Number/Name)** P828 / *Rapid Reaction Fund*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
development of intelligence, surveillance, and reconnaissance (ISR); electronic warfare and cyber; kinetic and non-kinetic effects; and, other capabilities needed for future military operations in a wide range of urban areas. ***FY 2017 Plans:*** The RRF investment decisions for urban characterization projects are made during the execution years in response to DoD, CCMDs, Service, and other government organizations' priorities. As new threats emerge and new opportunities are presented RRF will select projects to demonstrate capabilities for Urban Characterization. RRF anticipates supporting four to six projects in FY 2017. Deliverables will include virtual prototypes, modeling, and simulations to support planning efforts. ***FY 2018 Plans:*** The RRF investment decisions for Urban Characterization projects are made during the execution years in response to DoD, CCMDs, Service, and other government organizations' priorities. As new threats emerge and new opportunities are presented RRF will select projects to demonstrate capabilities for Urban Characterization. RRF anticipates supporting three to five projects in FY 2018. Deliverables will include virtual prototypes, modeling, and simulations to support planning efforts.			
Title: Rapid Prototyping for Intelligence, Surveillance, and Reconnaissance (ISR) Focus Area	-	4.942	4.542
Description: ISR sensors are critical for providing asymmetric compensation against larger, near-peer adversaries. However, ISR systems span a wide range of sensing modalities and generally produce very large data sets that are difficult to analyze, which challenges rapid innovation in response to emerging threats. Efforts in this focus area will increase speed to market for better sensors and tools to more effectively analyze or visualize ISR data. Projects include improved surveillance sensors, tools to facilitate analysis of large data sets, methods to harvest meaningful intelligence from open and classified sources, and establishment of more effective processing, exploitation, and dissemination capabilities. RRF sponsored prototypes will facilitate integration of advance ISR capabilities into new and existing systems. These prototypes will help increase the effectiveness of ISR architectures and reduce the human analyst requirements to produce actionable intelligence. ***FY 2017 Plans:*** RRF investment decisions for ISR prototypes are made during the execution years in response to Department, CCMDs, Service, and other government organizations' priorities and as new threats emerge or new opportunities are presented. Research and coordination with organizations throughout DoD and other government agencies will help identify areas critical to developing future ISR capabilities. RRF anticipates supporting five to seven projects in FY 2017. Deliverables will include prototype systems and software for a variety of platforms, as well as analytical capabilities developed to reduce the analyst burden needed to process large sets of ISR data. ***FY 2018 Plans:***			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603826D8Z / *Quick Reactions Special Projects (QRSP)*	**Project (Number/Name)** P828 / *Rapid Reaction Fund*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
RRF investment decisions for ISR prototypes are made during the execution years in response to Department, CCMDs, Service, and other government organizations' priorities and as new threats emerge or new opportunities are presented. RRF anticipates supporting five to seven projects in FY 2018. Deliverables will include prototype systems, analytical capabilities, and software for a variety of platforms.			
Title: Additive Manufacturing Focus Area ***Description:*** This focus area will develop the enabling capabilities and key technologies required to advance additive manufacturing technology to meet specific warfighter needs. Additive manufacturing projects are those that use processes in which successive layers of material are laid down under computer control to create functional three dimensional products. Additive manufacturing allows for rapid prototyping and iterative innovation, removing barriers for technology insertion. Due to increased speed from design to prototype, reduced cost, and reduced waste additive manufacturing provides a unique supporting capability for the Third Offset Strategy. Additive manufacturing capabilities are rapidly developing in industry and other government agencies. The Rapid Reaction Technology Office will leverage commercial innovation and emerging capabilities of the Federally Funded Research and Development Centers (FFRDCs), government laboratories, and academia to develop proof-of-principle prototypes focused on warfighter needs. Projects include spare part replacement, jet engine repair, custom hardware enclosures, and three-dimensional (3-D) models. Projects have the potential to significantly reduce the supply chain inefficiencies by storing parts as software and manufacturing on demand, and using rapid prototyping to reduce time and cost of design. Projects can also reduce amount of labor required to produce functioning prototypes. Deliverables will inform enhancement decisions and concept of operations development. ***FY 2017 Plans:*** Rapid Reaction Fund (RRF) investment decisions are made during the execution years in response to Department, Combatant Commands (CCMDs), Service, and other government organizations' priorities and as new threats emerge or new opportunities are presented. For additive manufacturing projects this agility allows RRTO to leverage new capabilities developed by commercial industry. Research and coordination with organizations throughout Department of Defense (DoD) and other government agencies will help identify needs that could be addressed by future capabilities within the additive manufacturing field. RRF anticipates supporting six to eight projects in FY 2017. ***FY 2018 Plans:*** RRF investment decisions are made during the execution years in response to Department, CCMDs, Service, and other government organizations' priorities and as new threats emerge or new opportunities are presented. RRTO will select future additive manufacturing projects based on priorities throughout DoD and other government agencies, and new opportunities for additive manufacturing. RRF anticipates supporting six to eight projects in FY 2018.	-	5.345	5.019
Title: Maritime Dominance Technology Focus Area	-	7.819	7.291

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603826D8Z / *Quick Reactions Special Projects (QRSP)*	**Project (Number/Name)** P828 / *Rapid Reaction Fund*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Description: This focus area will develop the enabling capabilities and key technologies required to maintain maritime dominance, drawing on the recommendations of the Long-Range Research and Development Program Plan under the Defense Innovation Initiative and previous Future Year Defense Plan. Major drivers in the maritime domain include the development of extra-large, large, and small families of multi-mission unmanned undersea vehicles (UUVs), and the rapid growth of commercial undersea activity. The DoD is exploring emerging concepts for ubiquitous undersea communications, command and control, and large-scale UUV capabilities. To enable these concepts, RRF will focus on developing capabilities and technologies such as undersea power production, storage, and distribution; enhanced signal processing; autonomy; undersea situational awareness, and navigation; sensors; undersea communications; and, advanced materials development and production. ***FY 2017 Plans:*** The RRF investment decisions for Maritime Dominance Technology focus area are made during the execution years in response to Department, CCMDs, Service, and other government organizations' priorities. As new threats emerge or new opportunities are presented RRF will select projects to demonstrate new payloads, better sensors, and new undersea systems to enhance deterrence. RRF anticipates supporting eight to ten projects in FY 2017. ***FY 2018 Plans:*** The RRF investment decisions for Maritime Dominance Technology focus area are made during the execution years in response to Department, CCMDs, Service, and other government organizations' priorities. As new threats emerge or new opportunities are presented RRF will select projects to demonstrate new payloads, better sensors, and new undersea systems to enhance deterrence. RRF anticipates supporting six to eight projects in FY 2018.			
Title: Wargaming in Support of Emerging Capabilities Focus Area ***Description:*** To support wargaming for assessing the susceptibility and vulnerability of emerging capabilities, The Rapid Reaction Technology Office (RRTO) funds efforts to explore new capabilities in a competitive environment. RRTO will leverage the innovative capabilities of the Federally Funded Research and Development Centers (FFRDCs), government laboratories, academia, and industry to develop a construct that current or future systems can be gamed against in a distributed table-top environment employing traditional and non-traditional players. Deliverables will inform enhancement decisions and concept of operations development. ***FY 2017 Plans:*** The Rapid Reaction Fund (RRF) investment decisions for wargaming are made during the execution years in response to Department, CCMD, Service, and other government organizations' priorities and as new threats emerge or new opportunities are presented. Projects will include wargame efforts employing government laboratory scientists, subject matter experts, and students of science, technology, engineering, and math (STEM) disciplines to explore unconventional approaches to counter	-	4.266	4.008

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603826D8Z / *Quick Reactions Special Projects (QRSP)*	**Project (Number/Name)** P828 / *Rapid Reaction Fund*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
DoD technologies. Deliverables will include recommendations on system operational employment, potential vulnerabilities, and likely countermeasures taken by the threat as well as potential counter-countermeasures to increase functionality or operational effectiveness of the system. RRF anticipate supporting five to six projects in FY 2017. ***FY 2018 Plans:*** RRF investment decisions for wargaming are made during the execution years in response to Department, CCMDs, Service, and other government organizations' priorities and as new threats emerge or new opportunities are presented. Deliverables will include recommendations on system operational employment, potential vulnerabilities, and likely countermeasures taken by the threat as well as potential counter-countermeasures to increase functionality or operational effectiveness of the system. RRF anticipates supporting five to six projects in FY 2018.			
Accomplishments/Planned Programs Subtotals	44.348	47.350	43.418

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

In FY 2018, performance metrics applicable to the Rapid Reaction Fund (RRF) include attainment of DoD Strategic Objective 3.5.2D. The title of this objective is "Maintain a strong technical foundation within the Department's Science and Technology program" and the metric for this objective is the transition of 40 percent of completed projects per year. In addition, project performance metrics are specific to each effort and include measures identified in each specific project plans. Project completions and successes are monitored against schedules and deliverables stated in the proposals and statements of work. The metrics include items such as target milestone dates, specific performance measures, fielding dates, and demonstration goals. For projects completed in FY 2016, the RRF achieved a transition rate of approximately 70 percent.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603826D8Z / *Quick Reactions Special Projects (QRSP)*	Project (Number/Name) P831 / *Joint Rapid Acquisition Cell Support*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P831: *Joint Rapid Acquisition Cell Support*	6.413	1.565	1.636	1.652	-	1.652	1.669	1.686	1.703	1.720	Continuing	Continuing

A. Mission Description and Budget Item Justification

This funding includes support for the Joint Rapid Acquisition Cell (JRAC) to enable management and tracking of Combatant Command (CCMD) identified and Joint Staff validated immediate warfighter needs. The JRAC is responsible to:
(1) Coordinate review of validated Joint Urgent Operational Needs (JUON) and Joint Emergent Operational Needs (JEON) and assign responsibility to appropriate DoD Components for timely funding and resolution.
(2) Serve as the review and approval authority for the DoD Components' strategy to fund and mitigate the identified JUON/JEON capability gap.
(3) Continually assess actions taken by the DoD Components to resolve JUONs/JEONs and recommend to the Under Secretary of Defense for Acquisition, Technology, and Logistics any changes determined appropriate to improve their responsiveness to JUONs/JEONs.
(4) Provide periodic reports to the Secretary of Defense on new and outstanding JUONs/JEONs.
(5) In coordination with Under Secretary of Defense Comptroller (USD(C)), manage the Rapid Acquisition Fund (RAF) to allocate resources to priority unfunded JUONs/JEONs.
(6) In coordination with the Office of the Chairman of the Joint Chiefs of Staff and the USD(C), make programmatic, budget, and acquisition recommendations for JUONs and identify capability gaps to the Secretary of Defense.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Joint Rapid Acquisition Cell (JRAC) Management Support	1.565	1.636	1.652
Description: This funding is utilized to support the staff manning of the JRAC to enable management and tracking of CCMD identified and Joint Staff validated immediate warfighter needs.			
FY 2016 Accomplishments: Supported the JRAC to enable management and tracking of immediate CCMD warfighter requirements. Warfighter needs were validated by the Joint Staff.			
FY 2017 Plans: Continue support for the JRAC management and tracking of CCMD initiatives. Continue validation of the warfighter needs by the Joint Staff.			
FY 2018 Plans:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603826D8Z / *Quick Reactions Special Projects (QRSP)*	**Project (Number/Name)** P831 / *Joint Rapid Acquisition Cell Support*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Continue support for the JRAC management and tracking of CCMD initiatives. Continue validation of the warfighter needs by the Joint Staff.			
Accomplishments/Planned Programs Subtotals	1.565	1.636	1.652

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

NA – Capabilities acquired to fulfill Joint Urgent Operational Needs (JUON) and Joint Emergent Operational Needs (JEON) are provided by other DoD components.

E. Performance Metrics

Joint Rapid Acquisition Cell performance metrics are specific to each JUON/JEON and include measures identified in the management approach for each action. In addition, JUON/JEON completions and successes are monitored against schedules and deliverables stated in the management approach. The metrics to which JRAC support correlates is to the number of full time personnel identified in the JRAC support contract with associated pay rates and shall not exceed the specified amounts or hourly rates and/or firm fixed price.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603826D8Z / *Quick Reactions Special Projects (QRSP)*	Project (Number/Name) P833 / *Strategic Multi-Layered Assessment (SMA) Support*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P833: *Strategic Multi-Layered Assessment (SMA) Support*	6.354	2.142	2.282	2.305	-	2.305	2.328	2.351	2.375	2.399	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Strategic Multi-Layered Assessment (SMA) Cell supports all Combatant Commands (CCMDs), Joint Force Commanders, and other government agencies by assessing complex operational and technical challenges, which require collaborative multi-agency and multi-disciplinary approaches. With input from across the U.S. Government, academia, and the private sector, the SMA Cell develops options to CCMD-generated challenging problems and informs the command's senior leadership. Each SMA effort is initiated at the request of senior CCMDleadership. Priorities for SMA problems are set by the Joint Staff Deputy Director for Global Operations. Products are typically produced within six months and directly contribute to the decision making process of CCMD's senior leaders. SMA is also supported by the Rapid Reaction Fund (RRF).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Assessing 'Gray Zone' Conflicts for the U.S. Security Coordinator (USSC), U.S. European Command (USEUCOM), and U.S. Special Operations Command (USSOCOM)	2.142	2.282	-

Description: The SMA Cell started a strategic analysis effort in FY 2015 at the request of the USSC for Israel and the Palestinian Authority. The effort evaluates strategic risks and identifies knowledge gaps to provide an increased understanding of potential security environments and their implications for Palestinian security sector reform. USEUCOM subsequently asked SMA to apply the same methodology to identify emerging Russian threats and opportunities in Eurasia. Collectively, these two efforts focus on developing strategies and responses for 'Gray Zone' conflicts.

FY 2016 Accomplishments:

The SMA Cell, at the request of the Commander of the U.S. Special Operations Command, continued an effort to assess how the U.S. Government can diagnose, identify, and assess indirect strategies, and develop responses against associated types of 'Gray Zone' conflicts. Specifically, if the U.S. Government is to respond effectively to the threats and opportunities presented in the increasingly gray security environment, it requires a more detailed map of the space between peace and war than it currently possesses. The project provided a more rigorous and comprehensive articulation of the space between militarized conflict and peace. The project team conducted a quantitative analysis of historical examples of gray conflicts and contemporary manifestations and geopolitical drivers. The team assessed specific U.S. experience with 'Gray Zone' conflicts and what strategies and tactics have been most and least successful as instruments of U.S. policy. The team also explored conceptual, procedural, and physical capabilities necessary for navigating this gray space. The SMA team identified how the various elements of power need to be coordinated to effectively respond to 'Gray Zone' conflicts. For example, by examining the interests, resources, and capabilities of violent extremist organizations and transnational criminal organizations in 'Gray Zone' regions. The SMA team also investigated how violent non-state actors (VNSAs)/violent extremist organizations (VEOs) and

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603826D8Z / *Quick Reactions Special Projects (QRSP)*	**Project (Number/Name)** P833 / *Strategic Multi-Layered Assessment (SMA) Support*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
state actors create 'Gray Zones' differently. The SMA team employed a variety of empirical approaches to this effort, involving simulation, geospatial, case-study, and statistical methodologies. Products from the effort have been provided to USSOCOM, and all other CCMDs. ***FY 2017 Plans:*** The SMA Cell will continue its efforts to assess and respond to 'Gray Zone' conflicts in FY 2017 and transition the products to the USSOCOM Commander. The cell will continue to actively collaborate with CCMD senior leadership and the Joint Staff leadership to identify challenging problems that are not within the traditional areas of DoD expertise. These problems will help increase our understanding of 'Gray Zone' conflicts and identify potential responses. USSOCOM is leveraging these efforts to support a senior leader forum on 'Gray Zone' indications and warnings and USEUCOM has established a Russian deterrence effort that benefits from SMA's work. Additional products will directly support other CCMDs and government agencies.			
Title: Strategic Multi-Layered Assessment (SMA) Cell ***Description:*** The SMA Cell provides planning support to Combatant Commands (CCMDs) and U.S. Government agencies and provides actionable assessments for complex operational and technical challenges to help maintain our competitive advantage in an increasingly complex global environment. SMA efforts require multi-agency, multi-disciplinary approaches to address requirements that are not within the customer organization's core competency. The SMA Cell identifies options from across the U.S. Government, academia, and the private sector. SMA efforts are facilitated by the Joint Chiefs of Staff/J3 Operations and are executed by the Rapid Reaction Technology Office. ***FY 2018 Plans:*** The SMA Cell will continue to actively work with the CCMDs and the Joint Chiefs of Staff to identify challenging problems that are not within the traditional areas of DoD expertise. These problems will be in direct support of CCMD senior leadership and may include areas such as: counter terrorism, transnational criminal organizations, counter weapons of mass destruction (state and non-state), counter global or regional social and cultural assessments, regional stability assessments, and individual state or national level deterrence studies.	-	-	2.305
Accomplishments/Planned Programs Subtotals	2.142	2.282	2.305

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603826D8Z / *Quick Reactions Special Projects (QRSP)*	**Project (Number/Name)** P833 / *Strategic Multi-Layered Assessment (SMA) Support*

E. Performance Metrics

SMA performance metrics are specific to each effort and include measures identified in the specific project plans. In addition, project completions and successes are monitored against schedules and deliverables stated in the execution documents. Each project's results are reviewed by a senior review group that is comprised with representatives from the Office of the Secretary of Defense, the Joint Chiefs of Staff, the Combatant Commands, and outside subject matter experts. The ultimate measure of success is adoption and transition of SMA products by the CCMD and supporting entities. In FY 2016, SMA products transitioned to U.S. Special Operations Command Commander and U.S. European Command.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603833D8Z / *Engineering Science and Technology (S&T)*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	0.000	17.904	17.659	25.395	-	25.395	19.884	19.852	14.946	15.260	Continuing	Continuing
P401: *DoD Modeling and Simulation Management Office*	0.000	3.296	3.158	10.519	-	10.519	4.927	5.102	5.186	5.200	Continuing	Continuing
P402: *Systems Engineering Research Center*	0.000	4.869	4.760	4.930	-	4.930	4.979	4.875	4.881	5.030	Continuing	Continuing
P403: *Engineered Resilient Systems*	0.000	9.739	9.741	9.946	-	9.946	9.978	9.875	4.879	5.030	Continuing	Continuing

A. Mission Description and Budget Item Justification

This Program Element (PE) addresses Defense Research and Engineering priorities to advance engineering state of the practice, and address complex defense systems challenges through development of engineering capabilities to improve acquisition quality. Engineering science and technology, including modeling and simulation (M&S), systems engineering (SE) research, and engineering capabilities for resilience, supports the cost-effective acquisition of complex systems in support of the full range and scope of Department of Defense (DoD) missions and operations.

M&S is a key enabler of DoD capabilities; underpins innovative solutions meeting real-world national security challenges; acts as a force multiplier; saves resources; and saves lives. The DoD Modeling and Simulation Management Office (MSMO), designated by the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)) to be the focal point and advocate for DoD M&S, enhances the DoD M&S Enterprise by (1) enabling cooperation and collaboration in identifying, developing and sustaining modeling and simulation solutions; and (2) promoting technology solutions, including common M&S architectures, standards, and services that improve interoperability, reuse, and cost effectiveness of DoD M&S.

SERC is a University Affiliated Research Center (UARC) established in 2008 as a strategic resource to further systems research and increase its impact on the Department's ability to meet its mission. Greatly improved SE methods, processes and tools are essential to the DoD strategy to field systems that are agile, affordably sustainable, flexible, and ready for a full range of contingencies in the face of declining budgets and a shrinking workforce. The SERC consists of a network of 23 research universities from across the U.S. that work collaboratively to bring the best talent in the nation to bear on DoD's systems engineering research problems.

Engineered Resilient Systems (ERS) addresses the need for achieving more affordable and mission-resilient warfighting systems designed within a shorter time frame by conducting research and development and new concepts for implementing an integrated suite of modern computational engineering tools, modeling capabilities, and tradespace assessment and visualization tools within an architecture aligned with acquisition and operational business processes. These integrated tools will operate within a framework that supports data-driven decision-making in an innovative environment that enables advanced knowledge management and multi-community collaboration, including data retention and lessons learned.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603833D8Z / *Engineering Science and Technology (S&T)*

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	18.341	17.659	19.413	-	19.413
Current President's Budget	17.904	17.659	25.395	-	25.395
Total Adjustments	-0.437	0.000	5.982	-	5.982
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.437	-			
• Other	-	-	5.982	-	5.982

Change Summary Explanation

The FY 2017 baseline adjustment of $9.035M was added for Engineering Resilient Systems to focus on mission-relevant trade-space analysis and cost reduction pre-milestone B.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603833D8Z / *Engineering Science and Technology (S&T)*	Project (Number/Name) P401 / *DoD Modeling and Simulation Management Office*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P401: *DoD Modeling and Simulation Management Office*	0.000	3.296	3.158	10.519	-	10.519	4.927	5.102	5.186	5.200	Continuing	Continuing

A. Mission Description and Budget Item Justification

Modeling and Simulation (M&S) supports the full range and scope of Department of Defense (DoD) missions and operations. M&S is a key enabler of DoD capabilities; underpins innovative solutions meeting defense and national security challenges, and saves resources. The Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)), under the authority of DoD Directive 5134.01, designated the DoD Modeling and Simulation Management Office (MSMO) to be the focal point and advocate for Defense M&S to enhance the Defense M&S Enterprise by (1) enabling cooperation and collaboration in identifying, developing and sustaining modeling and simulation solutions; and (2) promoting technology solutions, including common M&S architectures, standards, and services that improve interoperability, reuse, and cost effectiveness of DoD M&S. MSMO executes its efforts in accordance with the USD(AT&L)-promulgated DoD Directive 5000.59, "Management of Modeling and Simulation" and DoD Instruction 5000.70, "Management of DoD Modeling and Simulation (M&S) Activities;" and other DoD Issuances, including DoD 4120.24-M, "DoD Standardization Program (DSP) Policies and Procedures" and DoD Instruction 3200.14, "Principles and Operational Parameters of the DoD Scientific and Technical Information Program."

MSMO is responsible for:
• Planning, coordinating, and managing funds to support enterprise-level M&S activities that guide the Defense M&S Community to achieve the DoD Strategic Vision for M&S.
• Bringing together M&S stakeholders to advise and assist on finding solutions for removing the barriers to interoperability, reuse, commonality, efficiency, and effectiveness.
• Developing, coordinating, and advocating for policy/guidance, technology, standards, best practices, and strategic planning processes that promote interoperability and reuse across the Department.

MSMO also serves as DoD's:
• Focal point and advocate for coordinating M&S information exchanges and interactions within DoD, with other U.S. Government departments and agencies, international allies, industry, and academia to promote sharing of information and practices, synergy of efforts, and M&S as a key enabler of all organizations' missions.
• Lead Standardization Activity (LSA) for managing M&S standards and methodologies.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: DoD Modeling and Simulation Management Office (MSMO)	3.296	3.158	10.519
Description: MSMO, as the USD(AT&L)-designated focal point for Defense modeling and simulation (M&S), is responsible for maintaining and enhancing policies, standards, technology, and collaboration to ensure the efficiency and effectiveness of the M&S that supports the full range and scope of Defense missions and operations.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603833D8Z / *Engineering Science and Technology (S&T)*	**Project (Number/Name)** P401 / *DoD Modeling and Simulation Management Office*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018

MSMO: (1) conducts management and technical support for the Department's current and long-term M&S needs; (2) responds to opportunities to leverage relevant DoD Information Technology (IT) enterprise capabilities and DoD-, Industry-, and Academia-developed M&S technologies; and (3) advocates an enterprise approach for the future of DoD M&S, maintaining strong engagement and ties with Defense and external community stakeholders.

FY 2016 Accomplishments:

Policy and Guidance:

• Supported the development of a plan for promulgating/updating DoD policy for integrated red and blue force modeling, simulation, and analysis (MS&A) as part of the Department's Better Buying Power 3.0 initiative, and advocated for the use of the DMSCO-developed Integrated Threat Analysis Simulation Environment (ITASE) as an enabling tool to support MS&A.

Standards:

• Chaired the M&S Standardization Activities Advisory Group resulting in DoD adoption of 12 voluntary, consensus standards developed by non-government standards bodies.

• Developed an initial version of the Defense M&S Reference Architecture to document best practices, principles, and standards to guide M&S use of emerging technologies and enterprise IT services.

Technology:

• Developed, enhanced, and advocated the M&S enterprise suite of tools.

• Chaired the Cyber M&S Technical Working Group (CyMSTWG), and facilitated the CyMSTWG's subgroups working cyber range and cyber threat issues.

Collaboration:

• Represented U.S. interests in International M&S activities:

– Chaired TTCP Joint Systems & Analysis Group (JSA), Technical Panel (TP) 2 on M&S, as well as led or participated in subordinate TP 2-sponsored action areas.

– Served as the US Principal Voting Member for NATO M&S Group (NMSG) and participated in NMSG-sponsored task groups.

– Initiated development of a DoD-level Information Exchange Agreement (IEA) with the United Kingdom to provide a broader, more flexible opportunity for the Services and DoD organizations to exchange information on M&S activities, as desired.

FY 2017 Plans:

Policy and Guidance:

• Initiate and publish updates to DoD Instruction 5000.61 (DoD M&S Verification, Validation, and Accreditation).

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603833D8Z / *Engineering Science and Technology (S&T)*	**Project (Number/Name)** P401 / *DoD Modeling and Simulation Management Office*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Initiate and complete a Department-wide assessment of simulation capabilities to support resource decisions in DoD M&S development and use. Standards: • Serve as the Lead Standardization Activity for M&S Standards and Methodologies, and/or lead and participate in Defense Standardization Program Office and Joint Enterprise Standards Committee activities. • Refine the Defense M&S Reference Architecture to maintain consistency with changes to the overall DoD IT policies and infrastructure. Technology: • Develop, enhance, and advocate the M&S enterprise suite of tools. • Chair M&S Community of Interest, Cyber M&S Technical Working Group, and M&S Architecture Working Group. • Perform technology watch/horizon scanning related to M&S emerging capabilities. Collaboration: • Represent the U.S. interests in International M&S activities: – Serve as the Chair of the NATO M&S Group (NMSG) and participate in NMSG task groups. – Participate in activities of the Simulation Interoperability Standards Organization. • Collaborate with interagency organizations, as required.			
FY 2018 Plans: Government-Owned Integrated M&S: • Leveraging the FY2017 assessment, develop and prototype use cases illuminating acquisition decision issues using Blue and Red models in an appropriate simulation environment in a joint concept. Policy and Guidance: • Initiate and publish a DoD M&S Strategy to guide the Department's planning for and investing in M&S capabilities and tools. • Assist Services and Defense Agencies in development of their Verification, Validation, and Accreditation (VV&A) plans. Standards: • Serve as the Lead Standardization Activity for M&S Standards and Methodologies, and/or lead and participate in Defense Standardization Program Office and Joint Enterprise Standards Committee activities and International standards activities such as NATO Standardization Agreements for M&S.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603833D8Z / *Engineering Science and Technology (S&T)*	**Project (Number/Name)** P401 / *DoD Modeling and Simulation Management Office*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Refine the Defense M&S Reference Architecture to maintain consistency with changes to the overall DoD IT policies and infrastructure. Technology: • Develop, enhance, and advocate the M&S enterprise suite of tools. • Chair M&S Community of Interest, Cyber M&S Technical Working Group, and M&S Architecture Working Group. • Perform technology watch/horizon scanning related to M&S emerging capabilities. Collaboration: • Represent U.S. interests in International M&S activities: – Serve as the Chair of the NATO M&S Group (NMSG) and participate in NMSG task groups. • Collaborate with interagency organizations, as required.			
Accomplishments/Planned Programs Subtotals	3.296	3.158	10.519

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance in this program is monitored in the following ways:

- Number of instances where M&S standards, technical best practices, or tools have been adopted or employed.
- Number of M&S resources (tools, data, and services) made visible or updated in the DoD M&S Enterprise Catalog for reuse and the completeness of each record according to DoD discovery metadata standards.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603833D8Z / *Engineering Science and Technology (S&T)*	Project (Number/Name) P402 / *Systems Engineering Research Center*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P402: *Systems Engineering Research Center*	0.000	4.869	4.760	4.930	-	4.930	4.979	4.875	4.881	5.030	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Systems Engineering Research Center (SERC) is a University Affiliated Research Center (UARC) established in 2008 as a strategic resource to further systems research and increases its impact on the Department's ability to meet its mission. Greatly improved SE is essential to DoD's strategy to field systems that are agile, affordably sustainable, flexible, and ready for a full range of contingencies in the face of declining budgets and a shrinking workforce.

The SERC's network of universities is led by the Stevens Institute of Technology, and includes the Air Force Institute of Technology, Auburn University, Carnegie Mellon University, Georgetown University, Georgia Institute of Technology, Massachusetts Institute of Technology, Missouri University of Science and Technology, Naval Postgraduate School, North Carolina Agricultural and Technical State University, Pennsylvania State University, Purdue University, Southern Methodist University, Texas A&M University, Texas Tech University, University of Alabama, University of California, University of Maryland, University of Massachusetts, University of Southern California, University of Virginia, and Wayne State University. These Universities work collaboratively to bring the best talent in the nation to bear on DoD's systems engineering research problems.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Systems Engineering Research Center	4.869	4.760	4.930
Description: The SERC is a DoD UARC which conducts University-based research that directly supports DoD's Strategic Plan through development of new systems engineering methods, processes and tools. ***FY 2016 Accomplishments:*** Enhanced engineering methods, processes and tools (MPTs) to improve in the following areas: • Systems Engineering Transformation: transform current systems engineering methods to enable rapid, concurrent and scalable definition and affordable development of flexible systems that are responsive to changing threats and missions; – Affordability research integrated into courses at several universities. – Developed tool to help organizations evaluate the benefits of employing agile systems engineering methods. • Enterprises and Systems of Systems: create foundational methods to develop and design enterprises and system of systems to provide an overwhelming competitive advantage over our adversaries; – Congressional commendations to Secretary of the Army for acting on technical report for a Systems Oriented Study of Army Lethality.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603833D8Z / *Engineering Science and Technology (S&T)*	**Project (Number/Name)** P402 / *Systems Engineering Research Center*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Trusted Systems: secure defense systems from cyber and other threats through systemic security approaches that complement incomplete current perimeter/network defense methods; and – Transitioned security engineering methods to U.S. Army Armaments Research, Development and Engineering Center for initial use on Advanced Lethality and Accuracy System for Medium Caliber. • Human Capital Development: speed the professional development of highly capable systems engineers and technical leaders in the Department and the Defense Industrial Base. – Best paper award for systems engineering capstone research. 19 capstone design projects sponsored by U.S. Special Operations Command. ***FY 2017 Plans:*** Continue to enhance engineering methods, processes and tools (MPTs) to improve in the following areas: • Systems Engineering Transformation: transform current systems engineering methods to enable rapid, concurrent and scalable definition and affordable development of flexible systems that are responsive to changing threats and missions; – Publish technical report on emerging methods to evaluate system responses under complex uncertainties • Enterprises and Systems of Systems: create foundational methods to develop and design enterprises and system of systems to provide an overwhelming competitive advantage over our adversaries; – Publish technical report on foundational methods for development of robust architectures to enable end-to-end mission engineering; • Trusted Systems: secure defense systems from cyber and other threats through systemic security and assurance approaches that complement incomplete current perimeter/network defense methods; –Transition cyber-resilient engineering methods to U.S. Army Engineering Center. • Human Capital Development: speed the professional development of highly capable systems engineers and technical leaders in the Department and the Defense Industrial Base. – Publish v1.0 of Atlas, a theory that identifies the factors that make systems engineers effective along with methods to improve their proficiency, such as education, mentoring and rotational assignments. ***FY 2018 Plans:*** Continue to enhance engineering methods, processes and tools (MPTs) to improve in the following areas: • Systems Engineering Transformation: transform current systems engineering methods to enable rapid, concurrent and scalable definition and affordable development of flexible systems that are responsive to changing threats and missions;			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603833D8Z / *Engineering Science and Technology (S&T)*	**Project (Number/Name)** P402 / *Systems Engineering Research Center*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
– Apply and validate tools to understand tradeoffs in affordability and other system qualities. • Enterprises and Systems of Systems: create foundational methods to develop and design enterprises and system of systems to provide an overwhelming competitive advantage over our adversaries; – Complete pilot application of System of Systems Analytic Workbench with Naval Systems Warfare Center. • Trusted Systems: secure defense systems from cyber and other threats through systemic security and assurance approaches that complement incomplete current perimeter/network defense methods; – Evaluate results of pilot application of formal methods for resilient systems with a focus on autonomous vehicles. • Human Capital Development: speed the professional development of highly capable systems engineers and technical leaders in the Department and the Defense Industrial Base. – Establish library of courses for the Systems Engineering Experience Accelerator.			
Accomplishments/Planned Programs Subtotals	4.869	4.760	4.930

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Develop and extend fundamental knowledge, advanced methods, processes and tools and cutting edge techniques for systems engineering of complex designs of relevance to the DoD mission.

- Promulgation of advanced System Engineering approaches through research publications, presentations and monographs.
- Adoption of SERC methods, processes, and tools into DoD component activities.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603833D8Z / *Engineering Science and Technology (S&T)*	Project (Number/Name) P403 / *Engineered Resilient Systems*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P403: *Engineered Resilient Systems*	0.000	9.739	9.741	9.946	-	9.946	9.978	9.875	4.879	5.030	Continuing	Continuing

A. Mission Description and Budget Item Justification

Engineered Resilient Systems (ERS) improves design agility and cost-effectiveness during analysis and development leading to improvements in testing, manufacturing, and fielding of mission-effective and adaptable systems. Its products are engineering design visualization and tool integration frameworks that will integrate physics-based models and engineering tools across acquisition disciplines to vastly improve the ability to perform tradespace and requirements analysis, iteratively optimize designs and improve architectures to reduce or eliminate sensitivity to adversary tactics and capability improvements, and adapt those designs over time. The goal is to achieve a vitally-needed transformation in the contribution of Defense systems engineering to design resilience and effectiveness across the systems lifecycle. These engineering improvements are essential to address a geopolitical environment marked by rapidly changing threats, tactics, missions and technologies, and fiscal constraints. The pace of change renders current point-design approaches unsustainable in both cost and time.

ERS research and development focuses on new concepts for implementing an integrated suite of modern computational engineering tools, models, simulations and related capabilities, and tradespace assessment and visualization tools within an architecture aligned with acquisition and operational business processes. These integrated tools will operate within a framework that supports data-driven decision-making in an innovative environment that provides advanced knowledge management, including data retention and lessons-learned, and enables multi-community collaboration. ERS leverages multi-fidelity physics-based models developed by the S&T community to inform the acquisition decision process (e.g., increased/easier utilization of High Performance Computing, web-based analysis with large data sets, and lifecycle cost sensitivity analysis). These new computational and model-based frameworks adapt advanced design and modeling approaches from Government, industry, and academia to enable our Nation to affordably deliver warfighting capability.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Engineered Resilient Systems (ERS)	9.739	9.741	9.946
Description: ERS research and development focuses on new concepts for implementing an integrated suite of modern computational engineering tools, models, simulations and related capabilities, and tradespace assessment and visualization tools within an architecture aligned with acquisition and operational business processes. These integrated tools will operate within a framework that supports data-driven decision-making in an innovative environment that provides advanced knowledge management, including data retention and lessons-learned, and enables multi-community collaboration. ERS leverages multi-fidelity physics-based models developed by the S&T community to inform the acquisition decision process (e.g., increased/easier utilization of High Performance Computing, web-based analysis with large data sets, and lifecycle cost sensitivity analysis). These new computational and model-based frameworks adapt advanced design and modeling approaches from Government, industry, and academia to enable our Nation to affordably deliver warfighting capability.			
FY 2016 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603833D8Z / *Engineering Science and Technology (S&T)*	**Project (Number/Name)** P403 / *Engineered Resilient Systems*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Conceptual, Computational, and World-wide Environmental Representation. Implemented surface water and watershed modeling capability to represent effects of hydrological impacts on systems of interest. Translated and utilized National Geospatial Intelligence Agency Geospatial Information System (GIS) data and common data production standards sponsored by the Modeling and Simulation Management (MSM) Office to build synthetic computational environments. This effort has been expanded to additional domains of the environment further in the development term. Mission-Relevant Engineering Tradespace Analysis. Developed next-generation tradespace tools that allow generation of multitudes of designs with many design parameters; within this data-rich space, analytically examine trades in design parameters and system performance across a range of military missions; provided means to visualize results in order to efficiently identify promising designs and key parameters; and incorporated lifecycle cost. Utilized High Performance Computing (HPC) capability for physics-based modeling of system performance with initial focus on select systems, such as ship platforms. Collaborative Engineering Analysis and Engineering Decision Making. Demonstrated and analyzed conceptual workflow methods using open standards to link mission-relevant tradespaces and systems engineering tools with operational simulations. Designed and implemented initial knowledge management environment for information sharing across DoD networks in preparation for service, agency, and industry use. Capability Integration and Demonstration. Conducted a series of focused evaluations across the services, academia, and industry to integrate components of synthetic environments, high-fidelity computational models, and tradespace analysis tools into the ERS architecture. Integrated and demonstrated tools with acquisition community partners. Identified lessons learned and improved the associated workflows and ERS components.			
FY 2017 Plans: Conceptual, Computational, and World-wide Environmental Representation. Develop simulations of wave dynamics under varying physical and relative conditions; apply physics to analysis, integration and testing of NGA, Air Force, Navy, and Army environmental data sets. Extend mission context analysis and evaluation to multiple environmental simulations. Test and integrate automatic computational scenario development with simulation parameter settings. Provide workflow management with user-selected model-based simulations. Mission-Relevant Engineering Tradespace Analysis. Design and test primary framework for ERS next-generation tradespace analysis tools providing user-requirements in data package management, statistical analysis, automated data storage and advanced visualization; Implement and test sub-system analysis in trades; Design and test user interfaces; Design integration of tradespace analytics with ERS open system in mapping to acquisition users requirements and Defense Acquisition processes; apply tradespace capability to fixed-wing manned/unmanned, ground vehicle, and modular ship design project demonstrations.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603833D8Z / *Engineering Science and Technology (S&T)*	**Project (Number/Name)** P403 / *Engineered Resilient Systems*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Capability Integration and Demonstration. Enrich and extend open architecture design by collecting and integrating DoD acquisition and industry user requirements, implemented in an initial, open system model for feedback, evaluation, and enhancements. Design and evaluate information assurance security architecture, vulnerability analysis, and integrate intellectual property management capability. Map advanced ERS tools and capabilities to Defense acquisition processes and fully integrate distributed, lifecycle cost models. Collaborative Engineering Analysis and Engineering Decision-making. Develop robust methods to protect industry intellectual property and provide lessons-learned repository for creating and collaborating between DoD research & development, DoD acquisition, and industry partners. Provide mature knowledge management environment for tradespace analysis using facilities at the Defense Technical Information Center. ***FY 2018 Plans:*** Conceptual, Computational, and World-wide Environmental Representation. Develop simulations of ground vehicle dynamics under varying physical and relative conditions; apply physics to analysis, integration and testing of NGA, Air Force, Navy, and Army environmental data sets. Continue to extend mission context analysis and evaluation to multiple environmental simulations. Test and integrate automatic computational scenario development with simulation parameter settings. Provide automated workflows with user-selected model-based simulations. Mission-Relevant Engineering Tradespace Analysis. Improve and test primary framework for ERS next-generation tradespace analysis tools providing user-requirements in data package management, statistical analysis, automated data storage and advanced visualization; Implement and test sub-system analysis in trades; enhance and test user interfaces; enhance integration of tradespace analytics with ERS open system in mapping to acquisition users requirements and Defense Acquisition processes; apply tradespace capability to fixed-wing manned/unmanned, ground vehicle, modular ship design and service requested Joint Capability Technology Demonstration projects. Capability Integration and Demonstration. Enrich and extend open architecture design by collecting and integrating DoD acquisition and industry user requirements, implemented in an open system model, allowing for feedback, evaluation, and enhancements. Implement and evaluate information assurance security architecture, perform vulnerability analyses, and integrate intellectual property management capability within can ERS computational framework. Align ERS tools and capabilities to Defense acquisition processes.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603833D8Z / *Engineering Science and Technology (S&T)*	**Project (Number/Name)** P403 / *Engineered Resilient Systems*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Collaborative Engineering Analysis and Engineering Decision-making. Enhance established methods to protect industry intellectual property and provide lessons-learned repository for creating and collaborating between DoD research & development, DoD acquisition, and industry partners. Provide mature knowledge management environment for tradespace analysis using facilities at the Defense Technical Information Center.			
Accomplishments/Planned Programs Subtotals	9.739	9.741	9.946

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

- Development of a technological capability for DoD Science and Technology, academia, industry, and the requirements/acquisition communities to collaborate and provide an innovative and more effective means for engineering.
- Demonstration and evaluation of next-generation engineering methods and design tools, documented in analyses and technical reports.
- Use of Engineered Resilient Systems engineering methods and design tools.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation/Science and Technology*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	341.054	89.317	87.135	89.586	-	89.586	97.056	98.323	100.276	102.332	Continuing	Continuing
1: *High Speed Systems Test*	76.715	34.564	16.903	12.544	-	12.544	13.900	14.112	14.238	14.530	Continuing	Continuing
2: *Spectrum Efficient Technology*	30.983	10.085	8.458	9.633	-	9.633	10.306	10.486	10.689	10.908	Continuing	Continuing
3: *Electronic Warfare Test*	56.849	7.322	12.003	12.947	-	12.947	14.310	14.129	14.410	14.705	Continuing	Continuing
4: *Advanced Instrumentation Systems Technology*	42.452	6.716	10.876	11.919	-	11.919	12.408	12.641	12.908	13.173	Continuing	Continuing
5: *Directed Energy Test*	36.567	5.212	7.350	8.236	-	8.236	8.548	8.696	8.865	9.047	Continuing	Continuing
6: *C4I & Software Intensive Systems Test*	66.314	15.822	13.384	12.722	-	12.722	10.774	10.941	11.160	11.389	Continuing	Continuing
7: *Unmanned and Autonomous System Test*	19.260	4.054	8.819	9.888	-	9.888	12.697	12.980	13.408	13.683	Continuing	Continuing
8: *Cyberspace Test*	11.914	5.542	9.342	11.697	-	11.697	14.113	14.338	14.598	14.897	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Test and Evaluation/Science and Technology (T&E/S&T) Program seeks out and develops test technologies to stay in pace with evolving weapons technologies. This program is critical to ensure that the Department of Defense (DoD) has the ability to adequately test the advanced systems that will be fielded in the future. To meet this objective, the T&E/S&T Program performs the following activities:

- Exploits new technologies and processes to meet important test and evaluation (T&E) requirements.
- Expedites the transition of new technologies from the laboratory environment to the T&E community.
- Leverages industry advances in equipment, modeling and simulation, and networking to support T&E.

Additionally, the T&E/S&T Program examines emerging T&E requirements resulting from Joint Service initiatives to identify T&E technology needs and develop a long-range roadmap for technology insertion. The program leverages and employs applicable applied research efforts from the highly developed technology base in DoD laboratories and test centers, other government agencies, and industry to accelerate development of new test capabilities. The program outreaches and engages academia to address test technology challenges in DoD testing, advancing Science, Technology, Engineering and Mathematics (STEM) initiatives at Historically Black Colleges and Universities (HBCU) and other minority serving institutions. This program provides travel funds for T&E/S&T program oversight, special studies, analyses, and strategic planning related to test capabilities and infrastructure. The T&E/S&T Program aligns with the S&T Communities of Interest (COI) to prepare the T&E community to test warfighting capabilities that emerge from priority S&T investments. The T&E/S&T Program is funded within the Advanced Technology Development Budget Activity because it develops and demonstrates high payoff technologies for current and future DoD test capabilities.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603941D8Z *I Test and Evaluation/Science and Technology*

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	91.425	87.135	89.586	-	89.586
Current President's Budget	89.317	87.135	89.586	-	89.586
Total Adjustments	-2.108	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-2.108	-			

Change Summary Explanation

• Efficiency Savings: Fiscal Guidance of baseline program adjusted to realign funds for higher priorities within DoD and to achieve departmental efficiencies.
• Economic Assumption Reduction

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603941D8Z / *Test and Evaluation/ Science and Technology*	Project (Number/Name) 1 / *High Speed Systems Test*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
1: *High Speed Systems Test*	76.715	34.564	16.903	12.544	-	12.544	13.900	14.112	14.238	14.530	Continuing	Continuing

A. Mission Description and Budget Item Justification

High-speed/hypersonic weapons are being developed to ensure the continued military superiority and strike capability of the United States including freedom of movement and freedom of action in areas protected by anti-access/area denial defenses. Current weapon system demonstrations and technology development programs include high-speed and hypersonic air-breathing missiles, maneuvering reentry and boost-glide weapons, hypersonic gun-launched projectiles, and air-breathing space access vehicles. These systems require development of conventional and high-speed turbine, ramjet, scramjet, and combined cycle engines; high temperature materials; thermal protection systems (TPS); and thermal management systems.

The High Speed Systems Test (HSST) project addresses test technology needs including propulsion, aerodynamic and aerothermal testing, so the test community has the technology to support the required test scenarios for concepts under development in the science and technology (S&T) community. The technology developments within the HSST project align with the Department of Defense (DoD) S&T priority investments. As such, the HSST project is developing, validating and transitioning advanced test and evaluation (T&E) technologies for ground test, open-air range flight test, and advanced computational tools, along with instrumentation and diagnostics systems for use in both ground tests and flight tests of high speed systems.

The HSST project develops technologies to enable robust, accurate, and timely T&E of these future weapon systems. DoD acquisition regulations require weapon systems to undergo a thorough T&E process to detect deficiencies early and to ensure system suitability and survivability. However, the extreme environments in which these weapons operate preclude accurate determination of their performance and operability with today's T&E assets. Current national test capabilities have deficiencies in data accuracy, flight condition replication and simulation, test methods, productivity, modeling and simulation (M&S) fidelity, and range safety.

The HSST mission is to address these national test capability gaps by providing test technology solutions that will enable high-speed and hypersonic weapon systems to be successfully developed through accurate, robust, and efficient T&E.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: High Speed Systems Test	34.564	16.903	12.544
FY 2016 Accomplishments: The HSST project continued to advance ground and flight test technologies, techniques, instrumentation, and modeling and simulation capabilities required for the development of high speed air-breathing propulsion and boost-glide weapons. Progress was made toward addressing the two most significant technology shortfalls in current hypersonic aero propulsion ground test capabilities: clean air heat addition (i.e. non-vitiated air) and variable Mach number test capability. Current production ground test facilities create the high temperature propulsion system inlet conditions necessary for air-breathing scramjet engine testing by burning fuel in the facility airflow supplied to the engine inlet for operation. As demonstrated by a previous HSST test, the resulting vitiated air has different gas properties than clean air found in the atmosphere and thus is not representative of what the vehicle would experience during flight. This significantly affects the engine's performance and operability in the test environment resulting in erroneous flight performance predictions. In addition to the ability to test in clean air, a variable Mach number			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation/ Science and Technology*	**Project (Number/Name)** 1 / *High Speed Systems Test*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
capability is required to "fly the mission" and determine the critical transient operability effects throughout the flight envelope. Incorporation of component technologies, previously developed by the T&E/S&T program, were integrated into a small-scale, clean air, true temperature, and variable Mach number (M4.5-7.5) aero propulsion test facility, called the Hypersonic Aerothermal and Propulsion Clean Air Testbed (HAPCAT). Completion of this facility will demonstrate that component technologies and their integration have reached Technology Readiness Level (TRL) 6, provide an on-going test asset to the DoD, and reduce risk for construction of a full-scale facility. The HAPCAT project continued to develop and demonstrate air delivery system technologies to provide uniform flow with variable pressure and temperature through a nozzle up to Mach 7.5 conditions. The project activities included initiation of Phase 2 beginning fabrication of the air delivery system and conceptual design of a full scale facility. Efforts continued on the morphing ceramic components for hypersonic ground test facilities project which seeks to achieve a variable Mach number capability and variable inlet distortion patterns representative of flight-like inlet systems. Testing to validate direct-connect hardware designs were completed at the Air Force Research Lab (AFRL). This technology promises to provide a significant advantage over current rigid, stationary facility hardware by providing a "first-ever" realistic variable Mach flight distortion simulation test capability, while reducing costs and increasing productivity. The large-scale scramjet engine test techniques project accomplishments included continued progress in determining the capability of existing ground test facilities and methodologies to evaluate and develop large-scale hypersonic propulsion systems. Testing of the semi-freejet test configuration utilizing an advanced hydrocarbon fueled missile scale scramjet completed. Analysis comparing tests between the larger and smaller facilities allowed the optimized utilization of existing facilities and defined the size and type of investments needed for future large-scale scramjet vehicle development and reduction of flight test and acquisition risks. Construction of the Large Energy National Shock Tunnel II extension was completed and evaluated to verify extended run times. Such testing will enable the full development of complex flow features affecting vehicle performance, the determination of control surface responsiveness and effectiveness, and the evaluation of the performance of aerodynamic features. The improvements will help fill a critical test capability gap and support future hypersonic vehicle programs. Initial facility performance assessments of the extended tunnel demonstrated a 3 fold increase in test run time. The HSST project continued development of a mid-pressure arc heater prototype. The prototype replaced an existing Huels arc heater with a segmented heater, creating a test envelope approximately three times larger than the current envelope for aerothermal testing. The prototype will provide extended test run time of up to 30 minutes and a higher thermal load representative of that experienced by a hypersonic vehicle TPS. These efforts advanced progress toward the goal of improved T&E of maneuvering reentry and boost/glide vehicles. In a related effort, the arc heater flow quality aerothermal test technology development made significant progress toward independently-powered spin-coils to control the physical characteristics of the spinning arc column, its attachment location and duration on electrode surfaces within the arc heater. This effort will improve the service life of the electrodes and improve nozzle flow quality. The HSST project continued research that will provide better prediction and determination of boundary layer growth and transition effects upon hypersonic vehicle performance. Understanding and predicting boundary layer transition represents a critical			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation/ Science and Technology*	**Project (Number/Name)** 1 / *High Speed Systems Test*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
shortfall in the hypersonic community, as it affects the thermal loads, stability and control, and overall performance of a vehicle. Experimental results acquired through the boundary layer transition effort will be used to validate state of the art prediction tools and measurements of boundary layer transition mechanisms. The project conducted testing in multiple tunnels providing a basis for comparative analysis in different test configurations and comprehensive code validation test cases regarding 3D boundary layer stability and transition. Progress continued toward the development of a ground based, portable high altitude light detection and ranging (LIDAR) system to measure atmospheric conditions (density, temperature, pressure, wind speed/direction, oxygen/water content) along a hypersonic vehicle's flight path. This technology is a significant advancement over current methods, which employ balloons carrying sensors to sample the atmosphere. The LIDAR will improve the accuracy of high altitude atmospheric conditions. This atmospheric data is needed to assess the performance and operability of air-breathing missiles and boost-glide vehicles during development. Testing and demonstration of LIDAR atmospheric sensing was completed and the portable system was transitioned to support test programs at coastal flight test ranges to demonstrate system performance in a maritime environment. Development of an airborne version of the LIDAR began with the initial design and testing of hardware components. Progress continued on a high fidelity automated airborne reconfigurable tracking system which seeks to provide high resolution imaging of hypersonic vehicles in flight. Preliminary design was completed including concepts for integration onto a Global Hawk aircraft. An Uncrewed Aerial System (UAS) based range support study was completed to determine the technical performance and Concept of Operations (CONOPS) for a High Altitude, Long Endurance Uncrewed Aerial System (HALE UAS) configured to support flight T&E of hypersonic vehicles. Telemetry, optical remote sensing, and LIDAR atmospheric measurements instrumentation capabilities were analyzed to estimate the technical performance of each on an airborne platform. The design, fabrication, and installation of a telemetry capability integrated on to a HALE UAS airborne platform for a technical demonstration was initiated. Measurements of thermal emissions from the surface of typical boost-glide vehicles in an impulse test facility were conducted to evaluate the effectiveness of different surface compositions and treatments and filter frequencies for thermal imaging. Advances were achieved in the development of M&S tools. Verification and improvement of computational fluid dynamics (CFD) codes continued, making use of the unique data sets obtained from the HSST scramjet engines tests and boundary layer experiments. A validated boundary layer transition prediction tool was released for application to complex, 3D boost-glide vehicle geometries. The code enables prediction and analysis of the characteristics and extent of boundary layer transition on the test article surface resulting from variations in nose bluntness, unit Reynolds number, and angle of attack. The transient thermal analysis software effort completed integration of an aerothermal code and a structural heating code. The code underwent beta testing by multiple organizations and was released to the hypersonic community to support planning and analysis of flight tests.			
FY 2017 Plans:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation/ Science and Technology*	**Project (Number/Name)** 1 / *High Speed Systems Test*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Continuing efforts will address: test technologies, techniques, and methodologies to determine full-scale propulsion system performance and operability from subscale tests. New initiatives will address technology for testing weather effects and further development of M&S codes for accurate prediction of flow fields, boundary layer transition, and heat transfer in high-speed flow. Efforts will include demonstration of new flight test techniques, improvements in instrumentation, and continued improvement and validation of CFD codes. Progress will continue toward integration and operation of the HAPCAT clean-air, variable Mach number testbed, including the design, fabrication, testing and installation of the air delivery system components. The air delivery system will combine three separate streams of pressurized air, each at different temperatures and pressures, and deliver them to the hypersonic nozzle of the HAPCAT facility. The air streams are regulated through the air delivery system to produce a specified flight enthalpy (energy) level appropriate for the clean air flight condition being simulated in the test. Upgrades to the Large Energy National Shock Tunnel to increase productivity and accuracy during operation will be initiated. The upgrades to the mid-pressure arc heater will be completed to include the operation of a validated segmented arc heater system. Completion of boundary layer transition efforts will establish a new baseline protocol and recommendations for hypersonic aero performance predictions. Efforts will continue to assess the technical performance and CONOPS for a HALE UAS configured to support flight T&E of hypersonic vehicles. A telemetry system onboard a UAS capable of collecting data from a hypersonic flight vehicle over broad open ocean areas will be demonstrated. ***FY 2018 Plans:*** Developments will continue to improve hypersonic ground and flight test capabilities to levels required for acquisition programs. Efforts will include investigation of new flight test techniques to include further development and demonstration of a UAS-based range concept, investigation of new ground test instrumentation, and continued improvement and validation of CFD codes. Progress will continue toward final integration and operation of the HAPCAT clean-air, variable Mach number testbed, including completion of the variable Mach number nozzle design and preparations to demonstrate the capability to simultaneously vary stagnation pressure, temperature and Mach number from 4.5-7.5.			
Accomplishments/Planned Programs Subtotals	34.564	16.903	12.544

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation/ Science and Technology*	**Project (Number/Name)** 1 / *High Speed Systems Test*

E. Performance Metrics

Percentage of T&E/S&T projects progressing satisfactorily toward technical, financial, schedule, and risk mitigation goals.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603941D8Z / *Test and Evaluation/ Science and Technology*	Project (Number/Name) 2 / *Spectrum Efficient Technology*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
2: *Spectrum Efficient Technology*	30.983	10.085	8.458	9.633	-	9.633	10.306	10.486	10.689	10.908	Continuing	Continuing

A. Mission Description and Budget Item Justification

Weapon systems have become increasingly complex in recent years, resulting in the need for significantly more data to be passed among these systems as well as between the systems and our test infrastructure. A vast amount of data must be collected, transmitted, and analyzed, which requires a large amount of radio frequency (RF) spectrum resources. However, the amount of RF spectrum designated to support test and evaluation (T&E) is decreasing, most notably due to reallocation of spectrum for commercial use. The combination of decreasing RF spectrum and increasing data requirements results in an urgent need to develop test technologies that maximize the use of spectrum resources for Department of Defense (DoD) T&E operations.

The L and S frequency bands are the traditional spectrum allotted for military T&E use. The explosive need for spectrum in the commercial sector has resulted in reallocation of portions of these bands to industry. To compensate, DoD is now authorized to use the C-Band spectrum which offers numerous benefits, including a three-fold increase in available bandwidth, but C-Band comes with technical challenges and regulatory constraints. Most notably, our current test infrastructure for telemetry is not designed to accommodate C-Band. Technologies are required to implement innovative techniques that efficiently facilitate our use of C-Band without a major overhaul to our national test infrastructure. For instance, commercial telemetry transmitters operate in C-Band but do not have the form factor (size and weight) nor ruggedized packaging to survive airborne test applications.

Traditional telemetry applications employ streaming telemetry where data is moved one-way from the instrumented system under test to our test range infrastructure. Modern network based telemetry capabilities enable more robust, efficient bidirectional transfer of data. DoD's strategy is to create technologies for implementing a telemetry capability in C-Band, using the legacy L- and S-Bands for both streaming and networked telemetry, and researching the feasibility of using higher frequency bands to augment telemetry operations.

The Spectrum Efficient Technology (SET) project is developing test technologies that enable more efficient use of legacy telemetry bands and expansion into non-traditional areas of the RF and optical spectra at DoD test ranges. The technology development efforts within the SET project have been prioritized to align with Department of Defense guidance on science and technology priority investments. As such, the SET project is focusing on growing data requirements of warfighting systems and the limited availability of spectrum for testing. The SET project is structured to develop test technologies to advance range communications, networked telemetry capabilities, and enhanced management of spectrum at DoD test ranges.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Spectrum Efficient Technology	10.085	8.458	9.633
FY 2016 Accomplishments: The SET project performed risk reduction on a networked data recorder in support of Central Test and Evaluation Investment Program (CTEIP) networked telemetry projects and tested the recorder in the CTEIP integration laboratory. The networked data recorder addresses CTEIP requirements for data recording and parametric extraction during flight testing. The networked data recorder was used as the primary data recorder during CTEIP flight tests.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation/ Science and Technology*	**Project (Number/Name)** 2 / *Spectrum Efficient Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
A non-blocking Ethernet switch for airborne applications was demonstrated showing 10 gigabit Ethernet data speeds required to support CTEIP data transmission requirements. Once ruggedized, this technology will serve as the network backbone which will tie all onboard instrumentation together with the onboard test data transmitter. SET matured technology to enable more efficient handling of multiple priority test data and communications between the network router and telemetry transceiver. Development continued on a multi-band transceiver operating in the L/S/C-Band spectrum employing multiple advanced waveforms. This technology determines the performance of the telemetry link and selects the optimal modulation scheme based on current link conditions, accounting for issues such as multipath. Technology enabling the dynamic reconfiguration of transmitted test data over a telemetry network was further matured. This technology enables more efficient use of the RF spectrum by reducing the amount of data transmitted by only transmitting data parameters when changes occur. Technology enabling the compression of Pulse Code Modulation (PCM) data was further matured. The SET project developed technologies to address over-the-horizon telemetry requirements to support the testing of large footprint, long range missiles and hypersonic weapons. An S-Band phased array antenna suitable for mounting on a Global Hawk platform was developed and its antenna gain performance characterized in a high fidelity laboratory environment. A modular digital beam-forming solution to control a phased array antenna and track multiple targets simultaneously was developed. These technologies will significantly reduce the system complexity for an airborne phased array antenna, providing savings in terms of size, weight, and power consumption. The SET project initiated an effort to develop a software-based technology solution to accurately characterize RF spectrum utilization on DoD test ranges. This technology will develop the interfaces to existing range RF spectrum scheduling and resource management tools and also implement a standard set of spectrum usage metrics to quantify RF spectrum usage based on times of day and test programs. This tool will transition initially to the Air Force Test Center at Edwards AFB to support RF spectrum management activities, aid in the identification of future spectrum requirements, and quantify the impact of inadequate access to spectrum, in terms of program cost and schedule.			
FY 2017 Plans: The SET project will further advance development of technologies required for network telemetry. An L/S/C-Band transceiver will be transitioned to support both the CTEIP transceiver development and testing at the Edwards AFB RF Laboratory. The following will be transitioned to CTEIP projects: technology capable of reconfiguring the data modulation scheme based on telemetry link conditions, technology enabling more efficient handling of priority test data and communication between the network router and telemetry transceiver, and technology enabling the dynamic reconfiguration of transmitted test data over a telemetry network. The development of an Ethernet switch for airborne applications will continue. Technology enabling the compression of PCM data will be further matured. Efforts to develop spectrum management tools to optimize the use of available RF spectrum and accurately quantify RF spectrum usage on DoD test ranges will continue. The SET project will transition technologies to address over-the-horizon telemetry requirements to support the testing of long range missiles including hypersonic weapons. An S-Band phased array antenna with a modular digital beam-forming controller			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation/ Science and Technology*	**Project (Number/Name)** 2 / *Spectrum Efficient Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
will be integrated into a Global Hawk and used to support over-the-horizon telemetry requirements for a Navy hypersonic flight test in FY 2017. The SET project will initiate development of a steerable, multi-band antenna for airborne platforms. This antenna technology will employ either mechanical or digital methods to point the telemetry link to a specific ground receive antenna. The pointing of the telemetry link will enable spectrum reuse through spatial diversity, enabling two test platforms to transmit test data within the same portion of RF spectrum. The SET project will initiate development of radio technology that can utilize alternate spectrum in the upper frequency bands. ***FY 2018 Plans:*** The SET project will further advance development of technologies required for network telemetry. The development and ruggedization of an Ethernet switch for airborne applications will continue. Technology enabling the compression of PCM data will be further matured. Efforts to develop spectrum management tools to optimize the use of available RF spectrum and accurately quantify RF spectrum usage on DoD test ranges will continue. Efforts to develop phased array technology for use on the ground will continue. The development of a steerable, multi-band antenna for airborne platforms will continue. The development of radio technology that can utilize alternate spectrum in the upper frequency bands will continue. The SET project will initiate several efforts to develop the key technology components to use higher frequencies to support telemetry requirements. These efforts will focus on power amplifier, transmitter, and antenna development.			
Accomplishments/Planned Programs Subtotals	10.085	8.458	9.633

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Percentage of T&E/S&T projects progressing satisfactorily toward technical, financial, schedule, and risk mitigation goals.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603941D8Z / *Test and Evaluation/ Science and Technology*	Project (Number/Name) 3 / *Electronic Warfare Test*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3: *Electronic Warfare Test*	56.849	7.322	12.003	12.947	-	12.947	14.310	14.129	14.410	14.705	Continuing	Continuing

A. Mission Description and Budget Item Justification

In order to establish dominance in the modern battlespace, our offensive and defensive electronic warfare systems must be capable against advanced radio frequency (RF) directed threats and electro-optic (EO) guided threats, which include infrared (IR) guidance. Ensured dominance in these areas requires more robust test and evaluation (T&E) with technologies that are rapidly adaptable to changing threats.

Readily available, IR seeking, man-portable air defense systems (MANPADS) are difficult to detect and pose an imminent and lethal threat to military aircraft of all types. Our ability to counter such threats is essential to owning the battlespace in theater. Therefore, the ability to test missile warning systems (MWS), hostile fire indicator (HFI) systems, IR countermeasures (IRCM), and advanced threat sensors is critical to our national defense. Additionally, a new generation of enemy RF missile seekers is both currently fielded and in further development, requiring a correspondingly new generation of test technologies to test the latest countermeasures. The T&E community is required to test IRCM and RF countermeasure systems in a repeatable manner with ground-truth data before and after integration into warfighting systems. Without new test technologies, the Department of Defense (DoD) will be unable to perform adequate T&E of advanced warning and countermeasure systems.

The technology development efforts within the Electronic Warfare Test (EWT) project have been prioritized to align with DoD guidance on science and technology priority investments. As such, the EWT project is focusing on the test needs in both the EO, including IR, and the RF threat domains. Additionally, development of core test technologies in this area can be leveraged to meet other EO and RF test requirements, such as in fire control systems; intelligence, surveillance and reconnaissance (ISR) sensors, and weapon seekers.

The EWT project develops test technologies to stimulate IRCM and RF system sensors through the high-fidelity simulation of scenes viewed by the sensors. Stimulation can be as simple as testing to see if a system under test responds to an image or as complex as simulating complex battle space phenomena to measure the response of a system under test in a more relevant, cluttered scenario. Simulations and stimulations are used at open air ranges and in installed system test facilities (ISTF), and in hardware-in-the-loop (HWIL) test beds.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Electronic Warfare Test	7.322	12.003	12.947
FY 2016 Accomplishments: The EWT project completed efforts to develop an IR scene projector using digital micro-mirrors with long wave IR (LWIR) and mid-wave IR (MWIR) channels; this technology will be used for testing of MWS and next generation missile seekers. EWT completed efforts to develop a technology for testing directed IR countermeasures (DIRCM) and common IR countermeasures (CIRCM) systems in realistic, high clutter environments. EWT completed and demonstrated a two-color IR scene projector to test two-color, high spatial resolution MWIR sensors. Work on multi-static radar trackers for testing of HFI systems continued with a demonstration of this technology. Development continued on a wideband multi-beam klystron transmitter for high fidelity threat simulation of next generation RF surface-to-air missiles; the electron gun fabrication and output cavity design completed and a breadboard system was demonstrated in the laboratory environment. Development of digital RF memory (DRFM) algorithms for			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation/ Science and Technology*	**Project (Number/Name)** 3 / *Electronic Warfare Test*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
generation of virtual radar targets continued with completion of bench testing of hardware and software. Work continued on using DRFMs to enable chamber testing of data link communications between aircraft. A prototype MWIR scene projector with temperatures in excess of 1500K was developed; this is over a two-fold increase in the prior capability of 700K. Scene projector development continued toward a 1kHz, two-color scene. EWT continued design and testing of a prototype wideband multi-beam klystron transmitter for high fidelity threat simulation of next generation RF surface-to-air missile radars. ***FY 2017 Plans:*** The prototype multi-static radar for testing of HFI systems will be completed. EWT will continue to develop high fidelity scene generation capability for both EO and RF environments. EWT will continue developing a wideband multi-beam klystron transmitter for high fidelity threat simulation of next generation RF surface-to-air missiles to include demonstration and transition to a test range. Development of DRFM algorithms for generation of virtual radar targets will be completed. Work will be completed on using DRFMs to enable chamber testing of data link communications between aircraft. The EWT project will invest in new technologies related to improving the electronic warfare T&E infrastructure. These include investments in technology for testing IRCM systems, weapon seekers and ISR sensors. The EWT project will invest in high frame rate, high temperature, large format scene projectors and improvements to scene generation. ***FY 2018 Plans:*** The EWT project will invest in new technologies related to improving the electronic warfare T&E infrastructure. These new technologies will address the technology requirements to test and evaluate emerging weapon seekers, ISR sensors and next generation IRCM and RF EW systems.			
Accomplishments/Planned Programs Subtotals	7.322	12.003	12.947

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Percentage of T&E/S&T projects progressing satisfactorily toward technical, financial, schedule, and risk mitigation goals.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603941D8Z / *Test and Evaluation/ Science and Technology*	Project (Number/Name) 4 / *Advanced Instrumentation Systems Technology*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
4: *Advanced Instrumentation Systems Technology*	42.452	6.716	10.876	11.919	-	11.919	12.408	12.641	12.908	13.173	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Advanced Instrumentation Systems Technology (AIST) project addresses the test technology gaps resulting from emerging weapon systems that need to be tested at Department of Defense (DoD) open air ranges, undersea ranges, installed systems test facilities, hardware-in-the-loop laboratories, and measurement test facilities. Instrumentation requirements for systems under test are increasing exponentially for new weapons systems. Vehicle-borne and warfighter-wearable instrumentation packages are required. This instrumentation is for sensing and collecting critical performance data; determining accurate time, space, position information (TSPI)and attitude information; interfacing with command and control data links; monitoring and reporting system-wide communications; recording human operator physical and cognitive performance; and storing and transmitting data.

The technology development efforts within the AIST project have been prioritized to align with DoD guidance on science and technology (S&T) communities of interest (COIs). The AIST project is focused on supporting technology developments for advanced TSPI instrumentation (especially with limited or no availability of the Global Positioning System (GPS)), advanced sensors, advanced energy and power systems for instrumentation, non-intrusive instrumentation, mitigating range encroachment issues, and measuring warfighter physical and cognitive performance.

The AIST project addresses requirements for miniaturized, non-intrusive instrumentation suites with increased survivability in harsh environments. Such instrumentation is an urgent need because minimal space is available to add instrumentation to new or existing weapon systems subsequent to their development; furthermore, additional weight and power from instrumentation can adversely affect weapon system signature and performance. Instrumentation for humans-in-the-loop, such as dismounted warfighters, must not adversely affect performance, induce artificiality in the test environment, nor create operational burden. New technologies can be exploited to integrate small, non-intrusive instrumentation into emerging platforms during design and development, and, in some cases, into existing platforms. This class of instrumentation will provide critical system performance data during test and continuous assessment throughout a system's lifecycle. Technology developed under AIST can also benefit training and combat missions by enabling a continual feedback loop between the developer, training staff, operators and commanders.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Advanced Instrumentation Systems Technology	6.716	10.876	11.919
FY 2016 Accomplishments: Major thrusts included continuing efforts in advanced sensors, TSPI instrumentation, warfighter physical and cognitive assessment under various workloads and mitigation of test range encroachments. The AIST project completed development of a model to assess potential impacts of electromagnetic interference (EMI) caused by high voltage power lines near DoD test ranges and investigations to mitigate wind turbine effects on DoD test ranges. Development continued on a passive imaging technology to derive size, shape, mass, drag coefficients, and velocity vectors for individual fragments to quickly characterize the fragment velocity and size distribution in warhead testing.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation/ Science and Technology*	**Project (Number/Name)** 4 / *Advanced Instrumentation Systems Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018

Work continued on radar enabled projectile (e.g., mortar) tracking to provide a measurement rate sufficient to capture the physics of flight for weapon T&E.
The AIST project continued the development of: technology to provide accurate, dynamic measurements to display posture, head orientation, and respective orientations of warfighters and their equipment; classifiers to identify specific sea mammals (e.g., various dolphin and whale species) found at undersea ranges and the automated processing and display of mammal detections; a personnel tracking system using amplitude modulation (AM) band signals; and technology to evaluate back face deformation of body armor from a blunt trauma event.
Work continued on a technology to enable a capability for in-water vehicles to recognize their position relative to another platform in real time. This will improve ship safety during tests and allow for more controlled two-body T&E events involving conventional sea platforms as well as autonomous underwater vehicles.

FY 2017 Plans:
Efforts will include development of advanced TSPI technologies for non-intrusive applications using wireless systems and optical, infrared, and/or acoustic techniques. TSPI technologies will be further developed to support: data collection in GPS-denied environments with a focus toward data fusion from disparate sensors, TSPI on high dynamic systems such as missiles and projectiles, and Real Time Casualty Assessment (RTCA).
Advanced sensor initiatives for non-intrusive applications will include multimodal transducers, and self-registering/self-calibrating sensors. Sensing applications will include weapon system orientation, body armor blunt trauma evaluation, air launched stores separation, and weapon angle of incidence measurement at impact. Advanced data transformation initiatives will develop technologies for adaptive computing, virtual/synthetic instrumentation, data compression, wireless on-board data transport and improved data storage density. Other areas of investigation will include micro-miniaturization of electronic components for non-intrusive applications. AIST will continue to investigate technologies for mitigating range environmental encroachment issues such as alternative energy interference with range tracking systems. Additional efforts will include human performance measurement and assessment, specifically human interaction with unmanned systems and the evaluation of the interaction of the warfighter and weapons/equipment and interactions between individual warfighters in team-based holistic assessments.
The AIST project will complete technologies to measure: fragment characteristics from warhead testing; TSPI using distinctive near-field patterns from AM signals; and mental effort of warfighters during test events. AIST will demonstrate a capability for in-water vehicles to recognize their position relative to another in-water platform in real time. AIST will demonstrate automated processing and displaying of marine mammal locations on DoD sea ranges.

FY 2018 Plans:
The AIST project will initiate development of: sensors to support non-destructive weapons testing (such as non-destructive radiographic defect evaluation for warheads and other weapons structures); energy and power for rapidly deployable sea ranges; advanced non-intrusive data management techniques; and mitigation technologies for monitoring effects from EMI

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation/ Science and Technology*	**Project (Number/Name)** 4 / *Advanced Instrumentation Systems Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
and solar power towers. The AIST project will complete fiber optic shape sensing technology that accurately provides dynamic measurements during the time history of back face deformation of body armor from a blunt trauma event.			
Accomplishments/Planned Programs Subtotals	6.716	10.876	11.919

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Percentage of T&E/S&T projects progressing satisfactorily toward technical, financial, schedule, and risk mitigation goals.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603941D8Z / *Test and Evaluation/ Science and Technology*	Project (Number/Name) 5 / *Directed Energy Test*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
5: *Directed Energy Test*	36.567	5.212	7.350	8.236	-	8.236	8.548	8.696	8.865	9.047	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Department of Defense (DoD) is exploring the military utility, safety, and suitability of directed energy weapons. A robust test capability to assess directed energy weapons is essential to understanding their effectiveness and limitations, including determining their effectiveness in performing counter improvised explosive device (C-IED) operations. Such assessments will depend upon knowledge acquired through the test and evaluation (T&E) of directed energy technologies and testing of operational concepts. Directed energy weapon technologies, primarily consisting of high energy lasers (HEL) and high powered microwaves (HPM), are outpacing available test capabilities. Traditional test techniques for evaluating conventional munitions (with flight times ranging from seconds to minutes) are not sufficient for the T&E of directed energy weapons that place energy on target instantaneously. Consequently, new test technology solutions are needed to ensure that adequate developmental, live-fire, and operational test capabilities are available when directed energy programs are ready to test.

Directed energy system and component testing requires three principal assessments: (1) energy or power on target; (2) the effects on the target; and (3) the propagation of the directed energy to the target through the atmosphere. In addition, the vulnerabilities of DoD systems to directed energy threats are required to be characterized, such as those requirements captured in Military Standard (MIL-STD)-464C. Equally as important, current test capabilities do not provide the detailed data required to understand U.S. directed energy system performance and effects. The technology development efforts within the Directed Energy Test (DET) project have been prioritized to align with DoD guidance on science and technology priority investments. As such, the DET project is developing the technologies necessary for quantitative assessment of United States (U.S.) HEL and HPM performance, as well as the vulnerability of DoD weapon systems to enemy directed energy threats.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Directed Energy Test	5.212	7.350	8.236
FY 2016 Accomplishments: Two parallel efforts to measure HEL energy on small targets such as mortars were completed. One effort designed a recoverable mortar prototype to address Army and Navy requirements. Work continued on a Light Detection and Ranging (LIDAR)-based technology to characterize atmospheric profiles along a slant path adjacent to the HEL beam propagation path in a maritime environment. This technology enables real-time determination of the maritime atmospheric aerosol extinction profile from land or a moving ship. Development of non-intrusive dielectric voltage probes capable of measuring high voltage pulses and potentials was completed in support of measurements during HPM engagements including testing of electrical static discharge weapons used for C-IED applications. DET completed development and field demonstration of a radome that will allow more reliable operation of the White Sands Missile Range (WSMR) Wide Band Threat Source over nine bands of operation enabling more robust testing of U.S. systems against HPM threats. DET transitioned a compact hard tube vircator (CHTV) to the Air Force. The CHTV project developed an HPM source which will be used for in-chamber testing of HPM effects required for MIL-STD 464C testing.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation/ Science and Technology*	**Project (Number/Name)** 5 / *Directed Energy Test*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
An effort was initiated to mature a dense plasma focus technology to produce strategically relevant ultra-short pulse neutron fluence levels in support of the Central Test and Evaluation Investment Program (CTEIP) Pulsed Neutron Environment project. These efforts address nuclear vulnerability testing. ***FY 2017 Plans:*** Efforts will continue to focus on technology developments for onboard measurement of energy on target and characterizing effects on small targets, such as mortars and rockets. DET will continue efforts to characterize HEL beam propagation through the atmosphere in the maritime environment to support emerging needs of the Navy. The DET project will continue development of surrogate HPM sources to address gaps in MIL-STD-464C and instrumentation to support joint technology demonstration programs. The effort to mature the dense plasma focus technology for ultra-short pulse neutron source to address nuclear vulnerability testing will be continued. ***FY 2018 Plans:*** Investments in HEL test technologies will be initiated to assess the changes in HEL effects due to the shift of HELs to shorter wavelengths near one micron. These technology developments include efforts to characterize the performance of HEL systems as they test against small targets such as enemy rockets, missiles, artillery, and unmanned aerial vehicles. In the HPM area, measuring the actual cause of HPM effects on electronics will be addressed by measurement of electrical currents within the wires and chips of the electronic targets. DET will continue to investigate new technologies to further address gaps in the availability of sources for MIL-STD-464C testing.			
Accomplishments/Planned Programs Subtotals	5.212	7.350	8.236

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Percentage of T&E/S&T projects progressing satisfactorily toward technical, financial, schedule, and risk mitigation goals.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603941D8Z / *Test and Evaluation/ Science and Technology*	Project (Number/Name) 6 / *C4I & Software Intensive Systems Test*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
6: *C4I & Software Intensive Systems Test*	66.314	15.822	13.384	12.722	-	12.722	10.774	10.941	11.160	11.389	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Command, Control, Communications and Intelligence (C4I) & Software Intensive Systems Test (C4T) project is pursuing test technologies to emulate net-centric military operations in a system-of-systems test environment. This emulation supports analysis and evaluation of the increasing collection of structured and unstructured data generated by complex military test environments. The technology to conduct T&E on software intensive systems is required when testing sensor platforms, command and control systems and weapon platforms that support the kill chain in a Joint operation. These systems must be evaluated for their ability to provide the accurate, timely transfer of data (e.g., target tracks, weapons allocation, mission tasking and situational awareness) as the data passes among the Services and coalition participants.

The technologies within C4T will remove undesired distributed testing biases while improving test agility and the tester's ability to effectively conduct rapid analysis of "Big Data" and automated test reporting. C4T advances test automation features (test planning, test execution, Big Data collection, analysis, and visualization) that enable the virtual integration of Department of Defense (DoD) weapon laboratories and open air ranges. Using modeling and simulation (M&S) along with hardware-in-the-loop (HWIL)laboratories, the effectiveness of Joint missions can be assessed in terms of system-of-systems interoperability and effectiveness in executing Joint mission operations, including testing of weapons and command and control systems accessing and providing information.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: C4I and Software Intensive Systems Test	15.822	13.384	12.722
FY 2016 Accomplishments: The C4T project included developments to enable the Test and Training Enabling Architecture (TENA) to utilize remote methods of authentication and privilege management to distributed users. These policy-based access controls support end user authentication; enforcement of the defined access control policy prior to joining the TENA execution; and the automatic distribution of the required certificates, keys, and login tokens. The C4T project completed development of technologies that apply automated analysis of large net-centric systems data sets using cloud computing technologies in support of testing the F-35 and aircraft weapons separation testing. Development continued on technologies to provide an acoustic propagation model of sufficient fidelity to test torpedo performance operating in various maritime tactical environments. Specifically, a real-time simulation/emulation system for testing torpedo sonar systems in multiple bathometry, biological and threat environments. This technology is targeted for support of testing the MK-48 and MK-54 torpedoes.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation/ Science and Technology*	**Project (Number/Name)** 6 / *C4I & Software Intensive Systems Test*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
The C4T project initiated development of technologies to provide a reliable, fast, and cost-effective approach that enables Live Virtual Constructive (LVC) testing of next generation weapon systems. These technologies will enable live assets to sense and respond to stimulus without regard to whether the stimulus is real or synthetic. ***FY 2017 Plans:*** Development will continue on technologies to support the use of TENA over a broad range of networks and to provide a common interoperability test architecture. Moreover, C4T will investigate M&S technologies to support emulation and stimulation of networks for conducting T&E. Technology developments will focus on semantic analysis of large structured and unstructured data sets. These technology developments will include the ability to process unstructured test data into a structured format for analysis using data-to-decision algorithms. Further work on the correlation and analysis of “Big Data” from multiple sources will continue. Development of techniques to automate the reuse of knowledge to enable continuous developmental testing throughout the lifecycle of weapon systems will continue. The C4T project will develop technologies that mitigate data biases introduced by the test infrastructure. Multi-Level Security (MLS) and Cross Domain Solution (CDS) technologies will be investigated with the goals of improving the automation of preparing test data for analysis as well as facilitating automated sharing of information across all security enclaves. ***FY 2018 Plans:*** Work started in FY 2017 will continue. The C4T project will invest in developing MLS/CDS and assessing DoD platforms employing “Big Data” techniques with specific focus on tactical fighters in a net-enabled, dynamic environment. Developments will include verification and validation across integration and aggregation techniques for systems-of-systems evaluation as well as automating testing of warfighter software intensive systems using virtualized and cloud environments. “Big Data” analytical tools will continue to be developed to automatically analyze, extract, and manage actionable knowledge from terabytes of test data.			
Accomplishments/Planned Programs Subtotals	15.822	13.384	12.722

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation/ Science and Technology*	**Project (Number/Name)** 6 / *C4I & Software Intensive Systems Test*

E. Performance Metrics

Percentage of T&E/S&T projects progressing satisfactorily toward technical, financial, schedule, and risk mitigation goals.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603941D8Z / *Test and Evaluation/ Science and Technology*	Project (Number/Name) 7 / *Unmanned and Autonomous System Test*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
7: *Unmanned and Autonomous System Test*	19.260	4.054	8.819	9.888	-	9.888	12.697	12.980	13.408	13.683	Continuing	Continuing

A. Mission Description and Budget Item Justification

Unmanned and Autonomous Systems (UAS) support every domain of warfare. They operate in space, in air, on land, on the sea surface, undersea and in subterranean conditions to support a vast variety of missions. The emergence of unmanned systems brings a host of revolutionary capabilities that will profoundly influence warfare. The Unmanned and Autonomous Systems Test (UAST) project addresses current and emerging challenges associated with the test and evaluation (T&E) of these critical warfighting capabilities. The technology developments within the UAST portfolio have been prioritized to align with Department of Defense (DoD) guidance on science and technology priority investments, particularly in assessing autonomy. As such, the UAST project is developing test technologies to simulate, stimulate, instrument, measure, and assess an autonomous system's ability to perceive its environment, process information, adapt to dynamic conditions, make decisions, and effectively act on those decisions in the context of mission execution.

The UAST project will provide the test technologies to effectively measure performance and characterize risk, thereby increasing warfighter trust in autonomous systems. Current DoD test capabilities and methodologies are insufficient to address the testing of increasingly autonomous units and teams of unmanned systems operating in unstructured, dynamic, battlespace environments. Furthermore, advancements are being made in developing collaborating, system-of-autonomous-systems that will work in concert as a swarm or pack and in close proximity with humans. New test technologies are needed to stress the collective set of autonomous systems under realistic conditions, predict emergent behavior of autonomous systems, emulate the complex environment, and assess mission performance of these highly coupled and intelligent systems.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Unmanned and Autonomous System Test	4.054	8.819	9.888
FY 2016 Accomplishments: Work on the project for stress testing of autonomy architectures completed. The stress testing tool transitioned to the Services to support efficient evaluation of safety-related vulnerabilities in black-box UAS software and automatic detection of safety issues. New efforts focused on test technologies supporting the near term challenges identified in the 2013–2038 DoD Unmanned Systems Integrated Roadmap, such as, integrating DoD unmanned systems within the National Airspace and safely operating unmanned aerial systems within the Major Range and Test Facility Bases (MRTFB). The UAST collaborates with the Autonomy Community of Interest (COI) Test and Evaluation, Verification and Validation (TEVV) Working Group to help ensure that UAST is investing in technologies relevant to the future of autonomous systems. The UAST project explored technologies required for T&E of emerging UAS architectures, functional components, and interfaces. UAST continued research on autonomous system test planning to develop technologies which develop the most pertinent test plans for maritime, air, and ground-based autonomous systems and enable testers to identify the degree of regression testing required for autonomous systems upon changes to the hardware and software. The UAST project emphasized autonomy test			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation/ Science and Technology*	**Project (Number/Name)** 7 / *Unmanned and Autonomous System Test*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
technologies that can be integrated for use in a Test and Training Enabling Architecture (TENA) environment within the MRTFB. UAST invested in robustness testing technology to detect and predict vulnerabilities and failures within UAS software. UAST continued developments to automatically predict test vehicle collision potentials and cue test range controllers to take corrective action. These technologies will also prevent the test vehicle from violating flight envelopes, test range boundaries, and warning areas. ***FY 2017 Plans:*** Development of technologies that rapidly develop test plans, assess regression testing required, and characterize the bias from the test environment and instrumentation will complete. The technologies will be fully compliant with TENA and suitable for integration on the Joint Mission Environment Test Capability network. The UAST project will continue to develop test technologies that address mid-term UAS test challenges associated with autonomy and initiate efforts to explore the far term challenges of testing system intelligence. These efforts will include research on test technologies to measure the logical flow of sensing data to perception, decisions, and action. The UAST project will invest in complementary tools to predict UAS behavior by monitoring how autonomous systems process data in response to environmental changes. The UAST project will investigate technologies for T&E of UAS-to-UAS and human-to-UAS interactions. The UAST project will demonstrate technologies to automatically predict test vehicle collision potentials and cue test range controllers to take corrective action. These technologies will be TENA compliant to facilitate transition across the MRTFB. The UAST will continue coordination with the Autonomy COI and relevant Service organizations to improve T&E of autonomous systems. ***FY 2018 Plans:*** The UAST project will continue to initiate and develop technologies to support autonomous system test planning, autonomous system test execution, and autonomous system performance assessment. Efforts within test planning will include: automatic design of autonomous system test plans, predicting autonomous behavior for testing and assuring thorough testing of autonomous systems. Investments in test execution will include: enhancing safety of autonomous system testing; creating test environments that are complex, immersive, and reactive; and adapting ranges to cognitive, autonomous system testing. Developments under performance assessment will include: testing and evaluating UAS-to-UAS and human-to-UAS interactions and measuring autonomous system reliability. The UAST project will complete development of technologies to automatically predict test vehicle collision potentials and safety issues and cue test range controllers to take corrective action.			
Accomplishments/Planned Programs Subtotals	4.054	8.819	9.888

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation/ Science and Technology*	**Project (Number/Name)** 7 / *Unmanned and Autonomous System Test*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Percentage of T&E/S&T projects progressing satisfactorily toward technical, financial, schedule, and risk mitigation goals.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603941D8Z / *Test and Evaluation/ Science and Technology*	Project (Number/Name) 8 / *Cyberspace Test*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
8: *Cyberspace Test*	11.914	5.542	9.342	11.697	-	11.697	14.113	14.338	14.598	14.897	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Department of Defense (DoD) ability to use cyberspace for rapid communication and information sharing in support of operations is a critical enabler of DoD military missions. Advancements in utilizing cyberspace are outpacing the technologies needed for test and evaluation (T&E). The Cyberspace Test Technology (CTT) project develops advanced technologies and methodologies to test and evaluate DoD capabilities and information networks to defend and conduct full-spectrum military operations across cyberspace. Current cyberspace T&E capabilities are insufficient to support the continual experimental, contractor, developmental, operational, and live-fire testing requirements of warfighter systems operating in cyberspace. Many of the test tools and infrastructure items required for systems in cyberspace will require advancement and maturation of nascent test technologies. The CTT project will address test technology shortfalls in cyberspace testing, including planning cyberspace tests, creating representative cyberspace threats and test environments, executing cyberspace tests, and performing cyberspace test analysis and evaluation.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Cyberspace Test	5.542	9.342	11.697
FY 2016 Accomplishments: The threat and sanitization technology work was completed and transitioned to cyber test organizations and future test infrastructure development activities. The threat effort will deliver cyberspace threat representation and instrumentation technologies required to assess system and network vulnerabilities. The sanitization technology development will deliver test technologies to develop a reliable, fast, automated, and cost-effective sanitization approach. This will allow the rapid repurposing of equipment between different tests to meet the expanding requirements for cyberspace testing. The CTT project started a new effort to develop a system capable of detecting, monitoring, and analyzing malicious behavior during cyberspace attacks; this effort will generate reports, including visualizations to assess the potential damage to cyberspace assets.			
FY 2017 Plans: The CTT project will pursue technology developments addressing needs to: provide automated cyberspace test planning, create representative cyberspace threats and test environments, execute cyberspace tests, and perform cyberspace test analysis and evaluation. These efforts will support defensive and offensive cyberspace weapon systems testing, as well as cyber resiliency testing of air, land, and sea-based weapon systems. CTT will continue to develop a system capable of detecting, monitoring, and analyzing malicious behavior during cyberspace attacks.			
FY 2018 Plans: The CTT project will pursue technology developments addressing needs to: provide automated cyberspace test planning, create representative cyberspace threats and test environments, execute cyberspace tests, and perform cyberspace test analysis and			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation/ Science and Technology*	**Project (Number/Name)** 8 / *Cyberspace Test*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
evaluation. These efforts will support defensive and offensive cyberspace weapon systems testing, as well as cyber resiliency testing of air, land, and sea-based weapon systems.			
Accomplishments/Planned Programs Subtotals	5.542	9.342	11.697

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Percentage of T&E/S&T projects progressing satisfactorily toward technical, financial, schedule, and risk mitigation goals.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0604055D8Z / *Operational Energy Capability Improvement*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	144.175	40.387	37.329	38.403	-	38.403	40.914	40.976	41.715	42.539	Continuing	Continuing
P455: *Operational Energy Capability Improvement*	126.012	40.387	37.329	38.403	-	38.403	40.914	40.976	41.715	42.539	Continuing	Continuing
P456: *Hybrid Energy Storage Module (HESM)*	18.163	0.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	-	-

A. Mission Description and Budget Item Justification

The basic mission of this program element is to fund innovation to improve the Department of Defense's (DoD) operational effectiveness via targeted operational energy science and technology (S&T) investments.

P455, the Operational Energy Capability Improvement Fund (OECIF), incentivizes S&T to promote long term change in DoD capabilities so they are better aligned with the Operational Energy Strategy. OECIF generally fosters innovation to improve operational energy performance and has two key mission aspects. First, to develop operational energy technologies and practices that will improve DoD military capabilities and possibly reduce costs. Second, to establish within the military Services institutional momentum to continue those innovations. OECIF funds serve as "seed money" to start or consolidate promising operational energy innovation to be sustained by the Services; accordingly, OECIF generally emphasizes supporting or establishing programs, rather than one-off projects.

P456, the Hybrid Energy Storage Module (HESM), co-sponsored by the Assistant Secretary of Defense for Research and Engineering (ASD(R&E)) and the Assistant Secretary of Defense for Energy, Installations and Environment (ASD(EIE)), develops advanced energy storage technologies to maximize performance and reliability, and enable future high power weapons and sensor systems on legacy and next generation vehicles, aircraft and ships. The goals of HESM are to (1) demonstrate energy storage systems with high power/energy densities, scalable to all power levels, that reduce total logistics demand, (2) increase platform ability to sustain operations during engagement, and (3) reduce maintenance. Once demonstration is complete, this technology will be sustained by the Services and will be used to extend the operational performance and safety for these applications beyond the hybrid storage module baseline design configuration. This program is closely coordinated with the Advanced Management and Protection of Energy-storage Devices (AMPED) program of the Department of Energy's (DOE) Advanced Research Projects Agency - Energy (ARPA-E).

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0604055D8Z *I Operational Energy Capability Improvement*

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	37.420	37.329	37.403	-	37.403
Current President's Budget	40.387	37.329	38.403	-	38.403
Total Adjustments	2.967	0.000	1.000	-	1.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	4.000	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.033	-			
• Operational Energy Capability Improvement	-	-	1.000	-	1.000

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2016	FY 2017
Project: P455: *Operational Energy Capability Improvement*		
Congressional Add: *OECI*	4.000	-
Congressional Add Subtotals for Project: P455	4.000	-
Congressional Add Totals for all Projects	4.000	-

Change Summary Explanation

None

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0604055D8Z / *Operational Energy Capability Improvement*	Project (Number/Name) P455 / *Operational Energy Capability Improvement*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P455: *Operational Energy Capability Improvement*	126.012	40.387	37.329	38.403	-	38.403	40.914	40.976	41.715	42.539	Continuing	Continuing

A. Mission Description and Budget Item Justification

The basic mission of this program element is to fund innovation to improve the Department of Defense's (DoD) operational effectiveness via targeted operational energy science and technology (S&T) investments.

P455, the Operational Energy Capability Improvement Fund (OECIF), incentivizes S&T to promote long term change in DoD capabilities so they are better aligned with the Operational Energy Strategy. OECIF generally fosters innovation to improve operational energy performance and has two key mission aspects. First, to develop operational energy technologies and practices that will improve DoD military capabilities and possibly reduce costs. Second, to establish within the military Services institutional momentum to continue those innovations. OECIF funds serve as "seed money" to start or consolidate promising operational energy innovation to be sustained by the Services; accordingly, OECIF generally emphasizes supporting or establishing programs, rather than one-off projects.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Operational Energy Capability Improvement Fund	36.387	37.329	38.403	-	38.403
Description: The basic mission of the OECIF is to fund innovation that will improve DoD operational effectiveness via targeted S&T investments. As Defense-Wide funding, it incentivizes S&T to promote long term change in DoD capabilities so they are better aligned with the Operational Energy Strategy. OECIF generally fosters innovation to improve operational energy performance and has two key mission aspects. First, to develop operational energy technologies and practices that will improve DoD military capabilities and possibly reduce costs. Second, to establish within the military Services institutional momentum to continue those innovations. OECIF funds serve as "seed money" to start or consolidate promising operational energy innovations to be sustained by the Services; accordingly, OECIF generally emphasizes supporting or establishing programs, rather than one-off projects.					
FY 2016 Accomplishments: The Transformative Reductions in Operational Energy Consumption (TROPEC) program, which started in FY12, reached its final year of funding. TROPEC conducted four field assessments and completed three lab assessments, partnered with two winning FY16 OECIF unmanned systems proposals, delivered two newsletters, and coordinated with countless organizations on future assessment opportunities.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0604055D8Z / *Operational Energy Capability Improvement*	**Project (Number/Name)** P455 / *Operational Energy Capability Improvement*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
The consortia programs begun in FY13 generally reached their conclusion. The Tactical Microgrid Standards Consortium (TMSC) incorporated DoD and industry comments and finalized the draft Tactical Microgrid Standards. The Energy Efficient Outpost Modeling Consortium (EEOMC) completed the verification and validation (V&V) plan for the Energy Resource Planning Tool, updated the Commander's Application to enhance mode prioritization and optimization of generators and demonstrated with hardware, and offered pilot courses on energy efficiency in expeditionary operations. The Soldier and Small Unit Power consortium assisted the Marines in drafting their Dismounted Forces Energy Requirements Concept of Employment policy document; utilized the Power and Energy Test Bed to characterize Nett Warrior baseline configurations for Program Executive Office (PEO) Soldier supporting Program of Record Milestone decisions; and established a multi-agency, multi-Service consortium to coordinate Dismounted Warfighter efforts for the future. The Engineered Surface Materials and Coatings Drag Reduction consortium conducted flight tests, and reviewed proposals and made Phase 1 technology maturation awards to selected drag reduction “Challenge” winners. The analytical methods programs started in FY14 have continued. The Synthetic Theater Operations Research Model-Energy (STORM-E) effort translated a series of tool-based, OE focused, roadmap model enhancements, and performed Expeditionary Force 21 (EF 21) scenario development activities for implementation in STORM. The Operational Energy Analysis Task Force (OEATF) completed V&V of technical reports for the Fuel Consumption Prediction Model (FCPM) and Shelter Thermal Energy Model (STEM); conducted Soldier-level excursions using the Infantry Warrior Simulation (IWARS) to investigate the impact of system failure during combat operations; completed scenario enhancements for the second of three scenarios; continued to make enhancements to the Fully Burdened Cost Tool (FBCT) and successfully transitioned FBCT operations to the Tank Automotive Research, Development and Engineering Center (TARDEC); and completed the baseline Phase IV model using the System of Systems Analysis Toolset (SoSAT). The Joint Deployment Energy Planning and Logistics Optimization Initiative (J-DEPLOI) program brought software developer Group W on contract, developed a plan for integration of their decision support tool into the Map-Based Planning Services (MBPS) system, began adaption of existing software code to meet new requirements for fuel planning, and completed an implementation directive for the new tool's development. The Comprehensive Operational Energy (COE) Toolkit program completed the programming and graphical user interface to measure, model, and examine the installation OE damage and capacity reduction caused by enemy interdiction. The Mission Engineering Analytical Method for Operational Energy program (MEAM) integrated and refined prototype tools with as much verified fuel consumption data as could be identified and developed a range of excursion assessments based upon wartime scenarios, established cost analysis methodology, and investigated the ability of the tool to support future surface combatant platform design and force structure. The Capability					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0604055D8Z / *Operational Energy Capability Improvement*	**Project (Number/Name)** P455 / *Operational Energy Capability Improvement*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Assessment & Modeling for Energy Logistics (CAMEL) program developed methods and tools to explore airlift and aerial refueling effects within anti-access/area-denial (A2AD) environments; explored the impact of counter operational energy threats, military infrastructure investment and adaptive basing strategies; completed analysis of advanced combat engine technology impacts; and began analysis of costs incurred with flex basing. The major program started in FY15 is called “Improving Fuel Economy for the Current Ground Tactical Fleet Program,” and consists of four separate programs. The Thermally Efficient Cylinders program prepared and reconfigured the single-cylinder test laboratory for efficiency and heat rejection measurements, and developed a testing and modeling and simulation plan. The Tactical Vehicle Electrification Kit (TVEK) program has completed two major System Engineering processes (TARGET GATE 1 - Ideation & Scoping # Concepts & Feasibility, and System Needs Review) to kick off the project, began procuring critical long lead inverter controllers (20kW and 75kW), procured Caterpillar (CAT) 15 engine and instrumentation for fuel map testing, signed Memoranda of Agreements (MOAs) with all internal and external Integrated Project Team (IPT) organizations, and completed market surveys for DC/DC converters and other electrification subsystems. The Automation/Smart Cruise Control program completed Phase I of single vehicle simulation, upgraded hardware, and conducted vehicle tests. The Modeling and Simulation (M&S) for Vehicle Light-Weighting program began developing the analytical framework for the baseline Finite-Element Analysis (FEA) system model and Multi Body Dynamics model to generate loading for the FEA model, examined various vehicle components to target for light-weighting, and conducted weight optimization studies on components. The Joint Infantry Company Prototype (JIC-P) program performed small scale user evaluations with multiple units, conducted a human factors study on the kinetic harvesters, and continued to improve M&S data. For the shorter term projects funded using add money from FY15, accomplishments for FY16 include the following. The Cyber program completed seven cyber-security threat assessments at defense fuel supply points and installations. The M&S Federations program has succeeded in finalizing contracts with all performers, and secured agreements to participate throughout the life of the program with Departmental partners designated as potential transition partners for any capabilities developed. New programs started in FY16 reflect a shift within OECIF from an emphasis on contingency bases to one on mobile platforms for the Pacific. The new program focus will improve the operational energy performance of unmanned air, sea and ground systems that could be used in the Pacific. The Reliable, Efficient, Tactical Unmanned Aerial System (UAS) Power System program identified the contract vehicle and worked on the					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0604055D8Z / *Operational Energy Capability Improvement*	**Project (Number/Name)** P455 / *Operational Energy Capability Improvement*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
contract award to build the Great Horned Owl engine. The Hybrid Tiger team developed the major software architecture for hybrid vehicle control, completed initial vehicle (wing) sizing to include spreadsheet analysis of combined fuel cell and solar performance, and initiated a contract through the Naval Research lab Contracting Division. The Hydrothermal Vent Exploitation for Undersea Power and Energy (HTVE-UE) program initiated the funding coordination documentation for awarding a small business performer contract, and commenced several of the studies and analyses related to HTV characteristics, potential environment impacts of this initiative, and various concepts of operations (CONOPS). The Aluminum-Water Power for Unmanned Undersea Vehicles program began testing of the start system, and component requirements are being defined for the preferred configuration. The Small Turboprop Engine Range/Power Enhancement program initiated the procurement package for the engine demonstration, started the Operational Benefits Analysis (OBA), completed the baseline engine model, is working on the Improved Performance Technology Engine (IPTE) model, and is working with the Air Force and Pacific Command (PACOM) on selecting missions of interest for the MQ-9 Reaper to use to assess operational benefit. The JP-8 Fuel Cell Power program awarded two contracts to begin JP-8 reformer based fuel cell power system development, and began concept refinement and initial instrumentation diagrams.					
FY 2017 Plans: The TMSC program, which began in FY13, will still be active. TMSC will test, validate, and submit the draft Tactical Microgrid Standards for DoD and Service concurrence. The analytical methods programs, which began in FY14, will continue. The STORM-E effort will advance the EF 21 scenario development and analysis capabilities, identify energy-based risk to operations, examine mitigation solutions, and shape plans and programs. OEATF will complete the FCPM V&V; complete analysis of the second of three scenarios; complete scenario enhancements for the third of three scenarios; develop an IWARS technical report addressing OE; and represent aerial resupply capability within SoSAT. J-DEPLOI plans to continue adaptation and development of Group W's fuel planning tool, continue executing the plan for integration with MBPS, and begin verification and testing of the tool's first incremental capabilities. MEAM plans to assess future force structure and logistics force implications, investigate incorporating Joint and Coalition operations, define warfighting operational effectiveness tactical decision aid requirements, and develop a production plan for resulting tools and methods. CAMEL will continue analyzing concepts of operations associated with adaptive basing strategies within A2AD environments and the impact to operational energy within airlift and aerial refueling missions; explore overall costs associated with flex basing; and continue enhancements to the modeling, simulation and analysis tool set.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0604055D8Z / *Operational Energy Capability Improvement*	**Project (Number/Name)** P455 / *Operational Energy Capability Improvement*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
The FY15 vehicles program will continue. The Thermally Efficient Cylinders program will conduct single-cylinder engine testing with the first generation coating; the coating and piston optimization will be based on feedback from testing and modeling. The TVEK project will complete CAT 15 HEMTT A4 engine fuel map testing, test the baseline HEMTT vehicle's auxiliary systems, complete Analysis of Alternatives (AoA) of auxiliary systems for TVEK electrified component selections, develop M&S controls and software for the TVEK supervisory control system, initiate procurement of optimized TVEK components for testing in a system integration lab (SIL) at TARDEC, and conduct System Functional Review and Preliminary Design Review as part of the system engineering process. The Automation/Smart Cruise Control program will enter Phase II and conduct convoy vehicle simulations. The M&S for Vehicle Light-Weighting program will repeat the weight optimization process with various other target components and compare the updated optimized system model with the baseline model. The programs begun in FY16 will continue to ramp up during this fiscal year. The Reliable, Efficient, Tactical UAS Power System program will build the Great Horned Owl engine, which will lead to a runnable second generation engine. The Hybrid Tiger team will complete vehicle detailed analysis and purchase new wing tooling to build an integrated solar wing, combine software from multiple organizations, and complete end-to-end bench testing in preparation for maiden flight. The HTVE-UE program will award a small business performer contract and initiate base tasks related to the detailed design, component fabrication and breadboard assembly, and test planning; and expand studies and analyses related to Forward Deployed Energy and Communications Outpost (FDECO) interoperability, HTV characterization/environmental considerations, and various CONOPS. The Aluminum Seawater Power program will begin preliminary component fabrication of hardware and select test equipment. The Small Turboprop Engine Range/Power Enhancement program will complete the OBA, complete the engine requirements document and get Air Force concurrence, and will start engine preliminary design. The JP-8 Based Fuel Cell Power Program will conduct JP-8 reformer maturation, increase the technology readiness level of the solid oxide fuel cell being used in the system, and begin the system level controls strategy and initial integration plan. New programs starting in FY17 may continue the shift within OECIF toward a greater emphasis on fuel consuming mobile platforms for the Pacific. The focus of these new FY17 programs is likely to reflect input from the Services, various research Communities of Interest within DoD, such as Energy and Power, Ground and Sea Platforms, and Air Platforms, and any developing gaps or opportunities identified by ODASD(OE). ***FY 2018 Base Plans:***					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0604055D8Z / *Operational Energy Capability Improvement*	**Project (Number/Name)** P455 / *Operational Energy Capability Improvement*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
FY 2018 Plans: The TMSC program, which began in FY13, will still be active. TMSC will incorporate DoD and Service comments and publish the final draft for DoD approval. J-DEPLOI, which began in FY14, will still be active. J-DEPLOI plans to complete software development and testing, MBPS integration, and plan transition of the program to MPBS management and PACOM users. The FY15 vehicles program will continue. The Thermally Efficient Cylinders program will test the single-cylinder engine with an optimized coating and piston and will begin laboratory preparations for multi-cylinder testing. The TVEK program will complete the SIL testing with all sub-systems integrated into the vehicle, evaluate the sub-system fuel savings and M&S results from the Matlab Simulink and the Army Joint Operational Energy Initiative (JOEI) model to determine optimal kit architecture, start integration of kits in the HEMTT and LVSR vehicles, initiate electromagnetic interference testing of sub-systems, and develop vehicle test plans and agreements with testing facilities. The Automation/Smart Cruise Control program will complete Phase II by conducting convoy testing, deliver a final report, and provide the developed technology. The M&S for Light-Weighting program will incorporate novel materials for analysis and compare with the baseline system model. The FY16 unmanned vehicles programs will continue. The Reliable, Efficient, Tactical UAS Power System program will test the second generation engine for power output, specific fuel consumption, altitude, and product reliability. The Hybrid Tiger team will begin the flight testing phase validating the performance models and tuning flight controller gains, and refine software to emphasize optimal hybrid mode transitions and increased autonomy for soaring. The HTVE-UE program will continue base tasks related to component fabrication and breadboard assembly and testing, execute at-sea test planning, and perform initial system deployment; and continue studies and analyses related to FDECO interoperability, HTV characterization/environmental considerations, and CONOPS. The Aluminum Seawater Power program will go through the next round of component development and testing, and begin integration testing. The Small Turboprop Engine Range/Power Enhancement program will begin engine detailed design and acquire long lead materials for engine fabrication. The JP-8 Based Fuel Cell Power program will conduct physical integration of the JP-8 reformer and solid oxide fuel cell and all supporting hardware, and conduct the first two iterations of system level testing to determine weak parts of the system design. The programs begun in FY17 will continue to ramp up during this fiscal year.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0604055D8Z / *Operational Energy Capability Improvement*	**Project (Number/Name)** P455 / *Operational Energy Capability Improvement*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
New programs will start in FY18. The focus of these new programs is likely to reflect input from the Services, various research Communities of Interest within DoD, such as Energy and Power, Ground and Sea Platforms, and Air Platforms, and any developing gaps or opportunities identified by ODASD(OE).					
Accomplishments/Planned Programs Subtotals	36.387	37.329	38.403	-	38.403

	FY 2016	FY 2017
Congressional Add: OECI	4.000	-
FY 2016 Accomplishments: For the shorter term projects, plans for FY16 include: continue Operational Test and Evaluation of new Soldier Power equipment, and advance the Soldier Power program to Milestone-C/ Low-Rate Initial Production; investigate possible protections to cyber-security threats at defense fuel supply points and installations; implement a data collection plan to develop a set of behavior change strategies and design an experiment to verify the efficacy of those strategies; test novel membrane based dehumidification systems to reduce the air conditioning energy consumption of ground forces and ships in dock; improve analysis tools, analyze integration of a waste heat recovery system into a representative Naval platform, and begin fabrication of an exhaust gas heat exchanger for a 2017 demonstration with a gas turbine waste heat recovery system; integrate photovoltaic panels, power management and max power point tracking into the UAVs and conduct flight tests of up to five UAVs demonstrating through-the-night and multiple day endurance with zero fuel; conduct at-sea tests of promising energy-saving technologies and establish an enduring process for companies to quickly try out their technologies at sea; and prepare for a W2E industry day, develop guidance for contingency base waste management, and demonstrate a medium-sized waste disposal system.		
Congressional Adds Subtotals	4.000	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

None

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0604055D8Z / *Operational Energy Capability Improvement*	Project (Number/Name) P456 / *Hybrid Energy Storage Module (HESM)*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P456: *Hybrid Energy Storage Module (HESM)*	18.163	0.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	-	-

A. Mission Description and Budget Item Justification

P456, the Hybrid Energy Storage Module (HESM), co-sponsored by the Assistant Secretary of Defense for Research and Engineering (ASD(R&E)) and the Assistant Secretary of Defense for Energy, Installations and Environment (ASD(EIE)), develops advanced energy storage technologies to maximize performance and reliability, and enable future high power weapons and sensor systems on legacy and next generation vehicles, aircraft and ships. The goals of HESM are to (1) demonstrate energy storage systems with high power/energy densities, scalable to all power levels, that reduce total logistics demand, (2) increase platform ability to sustain operations during engagement, and (3) reduce maintenance. Once demonstration is complete, this technology will be sustained by the Services and will be used to extend the operational performance and safety for these applications beyond the hybrid storage module baseline design configuration. This program is closely coordinated with the Advanced Management and Protection of Energy-storage Devices (AMPED) program of the Department of Energy's (DOE) Advanced Research Projects Agency - Energy (ARPA-E).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Hybrid Energy Storage Module (HESM)	0.000	0.000	0.000	0.000	0.000
Description: Co-sponsored by the Assistant Secretary of Defense for Research and Engineering (ASD(R&E)) and the Assistant Secretary of Defense for Energy, Installations and Environment (ASD(EIE)), develops advanced energy storage technologies to maximize performance and reliability, and enable future high power weapons and sensor systems on legacy and next generation vehicles, aircraft and ships. The goals of HESM are to (1) demonstrate energy storage systems with high power/energy densities, scalable to all power levels, that reduce total logistics demand, (2) increase platform ability to sustain operations during engagement, and (3) reduce maintenance. Once demonstration is complete, this technology will be sustained by the Services and will be used to extend the operational performance and safety for these applications beyond the hybrid storage module baseline design configuration. This program is closely coordinated with the Advanced Management and Protection of Energy-storage Devices (AMPED) program of the Department of Energy's (DOE) Advanced Research Projects Agency - Energy (ARPA-E).					
FY 2016 Accomplishments: No longer funded					
FY 2017 Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0604055D8Z / *Operational Energy Capability Improvement*	**Project (Number/Name)** P456 / *Hybrid Energy Storage Module (HESM)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
No longer funded ***FY 2018 Base Plans:*** No longer funded ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.000	0.000	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

None

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0303310D8Z / *Countering Weapons of Mass Destruction (CWMD) Systems: Advanced Technology Development (ATD)*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	131.643	40.938	44.836	33.382	-	33.382	24.454	17.193	24.392	27.775	Continuing	Continuing
P*004: *Countering Weapons of Mass Destruction (CWMD) Systems*	131.643	40.938	44.836	33.382	-	33.382	24.454	17.193	24.392	27.775	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Countering Weapons of Mass Destruction (CWMD) Systems program provides funding for research, development, integration, and deployment of CWMD capabilities. Funding is allocated to a portfolio of projects and activities in response to Combatant Command needs and research initiatives.

A focal point of this program is development of CWMD situational awareness capabilities. The Joint Requirements Oversight Council approved the Information Systems Initial Capabilities Document for CWMD Situational Awareness on 23 December 2015, which identifies the need for a family of systems to mitigate capability gaps identified by the Combatant Commands. U.S. Special Operations Command, which assumed CWMD mission responsibilities in January 2017 per the Unified Command Plan, is providing focus and direction for development of CWMD situational awareness capabilities. Gaining situational awareness of weapons of mass destruction (WMD) threats and risks, as well as U.S. and international efforts to counter WMD proliferation, requires expertise and information access. Relevant information is spread across disconnected systems, on multiple networks, and in the open source domain, making it difficult to discover and use information to support mission needs. WMD-related situations in recent years, including the removal of chemical weapons from Syria and the response to the West African Ebola outbreak, have demonstrated the need for Combatant Commands to access and share CWMD information, collaborate on planning and operations, and have a common understanding of the operational environment with mission partners. CWMD Systems is addressing existing gaps and deficiencies through a portfolio of investments.

The CWMD Systems program provides funding for two technology-enabled fusion cells at the Defense Threat Reduction Agency (DTRA) and the Defense Intelligence Agency (DIA), which utilize information systems and applications to enable CWMD situational awareness. Existing DoD information systems, networks, and applications are utilized and/or modified using CWMD Systems funding. Development of new applications reuses software to the extent possible. The DTRA and DIA cells curate, synthesize, and contextualize CWMD information for end-users. This hybrid approach facilitates cross-organizational information sharing and collaboration, necessary for addressing the trans regional character of WMD proliferation.

The CWMD Systems program utilizes four Research, Development, Test & Evaluation (RDT&E) program elements (BA-3 / PE#0303310D8Z, BA-5 / PE#0305310D8Z, BA-6 / PE#0306310D8Z, and BA-7 / PE#0607310D8Z), as well as an Operations and Maintenance (O&M) "CWMD Sustainment" line (ORC-2531).

This Program Element (PE) funds research, development, testing, and evaluation of materiel and non-materiel solutions to develop CWMD capabilities. Funds are used for software development and integration, including development of new applications for existing systems; contractor personnel for fusion cells at DTRA and DIA; research partnerships with DoD and civilian academic institutions, FFRDCs and UARCs; and interagency table-top exercises conducted on behalf of Combatant Commands.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0303310D8Z *I Countering Weapons of Mass Destruction (CWMD) Systems: Advanced Technology Development (ATD)*

This appropriation funds travel to support the requirements of this program, and work (including manpower) performed by a government agency or by private individuals or organizations under a contractual or grant arrangement with the government who conduct research, development and test and evaluation efforts.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	42.404	44.836	42.436	-	42.436
Current President's Budget	40.938	44.836	33.382	-	33.382
Total Adjustments	-1.466	0.000	-9.054	-	-9.054
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.466	-			
• Realignment to Other Programs	-	-	-9.054	0.000	-9.054

Change Summary Explanation

Change in FY2018 from previous President's Budget to Current President's Budget is due to reallocation of resources to two new Program Elements (05/030531D8Z and 06/0306310D8Z) to support transition of mature technologies to acquisition programs of record.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0303310D8Z / *Countering Weapons of Mass Destruction (CWMD) Systems: Advanced Technology Development (ATD)*	Project (Number/Name) P*004 / *Countering Weapons of Mass Destruction (CWMD) Systems*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P*004: *Countering Weapons of Mass Destruction (CWMD) Systems*	131.643	40.938	44.836	33.382	-	33.382	24.454	17.193	24.392	27.775	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Countering Weapons of Mass Destruction (CWMD) Systems program provides funding for research, development, integration, and deployment of CWMD capabilities. Funding is allocated to a portfolio of projects and activities in response to Combatant Command needs and research initiatives.

A focal point of this program is development of CWMD situational awareness capabilities. The Joint Requirements Oversight Council approved the Information Systems Initial Capabilities Document for CWMD Situational Awareness on 23 December 2015, which identifies the need for a family of systems to mitigate capability gaps identified by the Combatant Commands. U.S. Special Operations Command, which assumed CWMD mission responsibilities in January 2017 per the Unified Command Plan, is providing focus and direction for development of CWMD situational awareness capabilities. Gaining situational awareness of weapons of mass destruction (WMD) threats and risks, as well as U.S. and international efforts to counter WMD proliferation, requires expertise and information access. Relevant information is spread across disconnected systems, on multiple networks, and in the open source domain, making it difficult to discover and use information to support mission needs. WMD-related situations in recent years, including the removal of chemical weapons from Syria and the response to the West African Ebola outbreak, have demonstrated the need for Combatant Commands to access and share CWMD information, collaborate on planning and operations, and have a common understanding of the operational environment with mission partners. CWMD Systems is addressing existing gaps and deficiencies through a portfolio of investments.

The CWMD Systems program provides funding for two technology-enabled fusion cells at the Defense Threat Reduction Agency (DTRA) and the Defense Intelligence Agency (DIA), which utilize information systems and applications to enable CWMD situational awareness. Existing DoD information systems, networks, and applications are utilized and/or modified using CWMD Systems funding. Development of new applications reuses software to the extent possible. The DTRA and DIA cells curate, synthesize, and contextualize CWMD information for end-users. This hybrid approach facilitates cross-organizational information sharing and collaboration, necessary for addressing the transregional character of WMD proliferation.

The CWMD Systems program utilizes four Research, Development, Test & Evaluation (RDT&E) program elements (BA-3 / PE#0303310D8Z, BA-5 / PE#0305310D8Z, BA-6 / PE#0306310D8Z, and BA-7 / PE#0607310D8Z), as well as an Operations and Maintenance (O&M) "CWMD Sustainment" line (ORC-2531).

This Program Element (PE) funds research, development, testing, and evaluation of materiel and non-materiel solutions to develop CWMD capabilities. Funds are used for software development and integration, including development of new applications for existing systems; contractor personnel for fusion cells at DTRA and DIA; research partnerships with DoD and civilian academic institutions, FFRDCs and UARCs; and interagency table-top exercises conducted on behalf of Combatant Commands.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0303310D8Z / *Countering Weapons of Mass Destruction (CWMD) Systems: Advanced Technology Development (ATD)*	**Project (Number/Name)** P*004 / *Countering Weapons of Mass Destruction (CWMD) Systems*

This appropriation funds travel to support the requirements of this program, and work (including manpower) performed by a government agency or by private individuals or organizations under a contractual or grant arrangement with the government who conduct research, development and test and evaluation efforts.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Countering Weapons of Mass Destruction (CWMD) Systems	40.938	44.836	33.382

Description: Research, develop, test, and evaluate materiel and non-materiel solutions to develop CWMD capabilities. Funds are used for software development and integration, including development of new applications for existing systems; contractor personnel for fusion cells at DTRA and DIA; research partnerships with DoD and civilian academic institutions, FFRDCs and UARCs; and interagency table-top exercises conducted on behalf of Combatant Commands.

FY 2016 Accomplishments:
• Completed developmental prototype information system ("Constellation 1.0") and received authority to operate on SIPRNET and the Secure Unclassified Network (SUNet)
• The DIA/DTRA cells curated, cross-referenced, and characterized thousands of WMD-related facilities to support situational understanding of global sources of WMD threat materials.
• Conducted a large, interagency table-top exercise to gain insights into CWMD situational awareness needs of Combatant Command, interagency and other mission partners
• WMD-related research conducted on emerging technologies and impact on WMD proliferation, use of new tools and techniques for monitoring and verification, and proliferation finance.

FY 2017 Plans:
• Due to FY17 NDAA and appropriation constraints, Constellation 1.0 developmental prototype is discontinued
• DTRA and DIA fusion cells are focused on development of CWMD "user defined operational picture" in support of U.S. Special Operations Command
• Existing information systems and applications are being used, modified, and/or integrated to support CWMD situational awareness needs.
• Sponsored a CWMD senior leader seminar for Commander, U.S. Special Operations Command in Dec 2016
• Will conduct another interagency table-top exercise to support U.S. Central Command and U.S. Special Operations Command
• WMD-related research will be conducted by Naval Postgraduate School, National Defense University, the Center for Nonproliferation Studies, and the JASONs.

FY 2018 Plans:
• Continue development, integration, and/or modification of situational awareness systems and applications to meet Combatant Command needs, building upon projects initiated in FY2017
• Complete development of CWMD "user defined operational picture" in support of U.S. Special Operations Command

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0303310D8Z / *Countering Weapons of Mass Destruction (CWMD) Systems: Advanced Technology Development (ATD)*	**Project (Number/Name)** P*004 / *Countering Weapons of Mass Destruction (CWMD) Systems*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Conduct table-top exercises and senior leader seminars in support of U.S. Special Operations Command or other Combatant Command request • Continue WMD-related research studies and analyses.			
Accomplishments/Planned Programs Subtotals	40.938	44.836	33.382

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Utilize or reuse information technologies to field initial capabilities to end-users. As technologies mature and user needs are refined, systems or applications may transition to acquisition program(s) or be sustained separately. Integration of or interoperability among systems is also an acquisition pathway.

E. Performance Metrics

Success in this area is measured by compliance with various statutes and DoD directives that govern the conduct of the affairs within the Office of the Assistant Secretary of Defense for Nuclear, Chemical and Biological Defense Programs (OASD/NCB). Maintain cost, schedule, and performance reporting, review, and adjudication. Maintain requirements traceability matrix.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603161D8Z / *Nuclear and Conventional Physical Security/Countering Nuclear Threats*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	180.297	31.149	28.498	32.937	-	32.937	36.085	34.702	37.624	36.641	Continuing	Continuing
P162: *Nuclear and Conventional Physical Security*	144.751	27.858	27.535	30.871	-	30.871	33.445	33.772	34.723	35.416	Continuing	Continuing
P041: *CNT Prevention ADC&P*	1.927	0.000	0.000	0.691	-	0.691	1.000	0.005	1.699	0.000	Continuing	Continuing
P040: *National Technical Nuclear Forensics Systems*	33.619	3.291	0.963	1.375	-	1.375	1.640	0.925	1.202	1.225	Continuing	Continuing

A. Mission Description and Budget Item Justification

This Program Element (PE) addresses the need to defend and deter against weapons of mass destruction (WMD) threats and to safeguard personnel; prevent unauthorized access to equipment, installations, material, and documents; and to safeguard the foregoing against espionage, sabotage, damage, and theft. This program oversees advanced engineering development throughout DoD for an integrated and systemic RDT&E approach for countering nuclear threats and nuclear and conventional physical security technology and systems. The funding has been centralized in this Defense-wide PE since the early 1990s and represents a substantial portion of all DoD physical security RDT&E funding. Priorities for this PE RDT&E efforts are driven by inputs from Quadrennial Defense Review guidance, Combatant Command and Service requirements, analysis reports such as “Protecting the Force: Lessons from Fort Hood," January 2010, the Integrated Unit, Base, and Installation Protection Cost Benefits Analysis, Multi-national Work Plans established through the Nuclear Security Summit process, and DoD Directive 5210.41, Security Policy for Protecting Nuclear Weapons-directed requirements and associated security deviation reports.

Under this integrated approach, funds are used to provide advanced component development and prototypes for the Department in seven capability areas: (1) Detection and Assessment; (2) Access Controls; (3) Installation and Transport Security; (4) Storage and Safeguards; (5) Prevention; (6) Decision Support Systems; and (7) Analytical Support. This program will evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment. The projects under the Program Element either (a) lead to Programs of Record which can transition to Program Element 0604161D8Z for systems development and demonstration (SDD); (b) become technology insertions into existing programs; or (c) advance to being a certified Commercial/Government off-the-shelf product. The PE initiatives are coordinated by the Physical Security Enterprise and Analysis Group. This group is responsible for avoiding duplication of effort and when applicable ensure systems integration and promote interoperability and sustainability.

This PE can fund travel to support the requirements of this program.

This appropriation will finance work, including manpower, performed by a government agency or by private individuals or organizations under a contractual or grant arrangement with the government who conduct research (systematic study directed toward fuller scientific knowledge or understanding of the subject studied), development (systematic use of the knowledge and understanding gained from research, for the production of useful materials, devices, systems, or methods, including the design and development of prototypes and processes) and test and evaluation efforts.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense					Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*		**R-1 Program Element (Number/Name)** PE 0603161D8Z *I Nuclear and Conventional Physical Security/Countering Nuclear Threats*			
B. Program Change Summary ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**
Previous President's Budget	31.648	28.498	33.677	-	33.677
Current President's Budget	31.149	28.498	32.937	-	32.937
Total Adjustments	-0.499	0.000	-0.740	-	-0.740
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.499	-			
• Internal Directed Reduction	-	-	-0.030	-	-0.030
• Internal Realignment	-	-	-0.490	-	-0.490
• DTIC Offset	-	-	-0.220	-	-0.220

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603161D8Z / *Nuclear and Conventional Physical Security/Countering Nuclear Threats*	Project (Number/Name) P162 / *Nuclear and Conventional Physical Security*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P162: *Nuclear and Conventional Physical Security*	144.751	27.858	27.535	30.871	-	30.871	33.445	33.772	34.723	35.416	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Program Element (PE) addresses the need to defend and deter against weapons of mass destruction (WMD) threats and to safeguard personnel; prevent unauthorized access to equipment, installations, material, and documents; and to safeguard the foregoing against espionage, sabotage, damage, and theft. This program oversees advanced engineering development throughout DoD for an integrated and systemic RDT&E approach for countering nuclear threats and nuclear and conventional physical security equipment (PSE) technology and systems. The funding has been centralized in this Defense-wide PE since the early 1990s and represents a substantial portion of all DoD PSE RDT&E funding. Priorities for this PE RDT&E efforts are driven by inputs from Quadrennial Defense Review guidance, Combatant Command and Service requirements, analysis reports such as “Protecting the Force: Lessons from Fort Hood," January 2010, the Integrated Unit, Base, and Installation Protection Cost Benefits Analysis, Multi-national Work Plans established through the Nuclear Security Summit process, and DoD Directive 5210.41, Security Policy for Protecting Nuclear Weapons-directed requirements and associated security deviation reports.

Under this integrated approach, funds are used to provide PSE advanced component development and prototypes for the Department in seven capability areas: (1) Detection and Assessment; (2) Access Controls; (3) Installation and Transport Security; (4) Storage and Safeguards; (5) Prevention; (6) Decision Support Systems; and (7) Analytical Support. The projects under the Program Element either (a) lead to Programs of Record – which can transition to Program Element 0604161D8Z for systems development and demonstration (SDD); (b) become technology insertions into existing programs; or (c) advance to being a certified Commercial/Government off-the-shelf product. The PE initiatives are coordinated by the Security Policy Verification Committee and the Physical Security Equipment Action Group. These groups work together to avoid duplication of effort and when applicable ensure systems integration and promote interoperability and sustainability.

This PE can fund travel to support the requirements of this program.

This appropriation will finance work, including manpower, performed by a government agency or by private individuals or organizations under a contractual or grant arrangement with the government who conduct research (systematic study directed toward fuller scientific knowledge or understanding of the subject studied), development (systematic use of the knowledge and understanding gained from research, for the production of useful materials, devices, systems, or methods, including the design and development of prototypes and processes) and test and evaluation efforts.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Detection and Assessment	9.787	15.225	17.839

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0603161D8Z / *Nuclear and Conventional Physical Security/Countering Nuclear Threats*	**Project (Number/Name)** P162 / *Nuclear and Conventional Physical Security*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Description: The ability to detect an adversary and assess their intentions is a basic physical security tenant. This capability area will design equipment to identify and warn of unauthorized access to a specified area or installation as well as equipment related to the notification and identification of explosive threats or hazards. ***FY 2016 Accomplishments:*** • Developed a Joint detection and assessment capability • Developed a multi-sensor detection and discrimination capability to reduce nuisance and false alarms • Compared dual energy X-Ray vehicle imaging systems • Developed a radar processing dynamic structure filter to reduce nuisance and false alarms • Finalized development of the Joint Radiological Detection System • SPAM Transition to Operational Initial Capability (STOIC) • Stand-Off Weapon Defeat IPT • Thermal Imaging Dual-use for Aerosol Monitoring Alarms and Security ***FY 2017 Plans:*** • Develop a Joint detection and assessment capability • Develop a multi-sensor detection and discrimination capability to reduce nuisance and false alarms • Compare dual energy X-Ray vehicle imaging systems • Develop a radar processing dynamic structure filter to reduce nuisance and false alarms ***FY 2018 Plans:*** • Develop a Joint detection and assessment capability • Develop a multi-sensor detection and discrimination capability to reduce nuisance and false alarms • Compare dual energy X-Ray vehicle imaging systems • Develop a radar processing dynamic structure filter to reduce nuisance and false alarms			
Title: Access Controls ***Description:*** Controlling access to safeguard personnel and their families and to prevent unauthorized access to critical infrastructure and materials is paramount. This capability area will focus on programs and processes related to the validity and verification of individuals entering or already within a facility. ***FY 2017 Plans:***	-	2.855	5.554

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0603161D8Z / *Nuclear and Conventional Physical Security/Countering Nuclear Threats*	**Project (Number/Name)** P162 / *Nuclear and Conventional Physical Security*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Continue to develop a continuous evaluation capability to be able to identify cleared individuals in near real-time who may no longer meet the criteria for retaining a clearance and have become a potential security risk ***FY 2018 Plans:*** • Continue to develop a continuous evaluation capability to be able to identify cleared individuals in near real-time who may no longer meet the criteria for retaining a clearance and have become a potential security risk			
Title: Installation and Transport Security ***Description:*** Robust installation and transport security are vital to preventing a weapon of mass destruction attack or the unauthorized access to key assets such as nuclear weapons and special nuclear material. This capability area will focus on programs and equipment intended to improve the physical security profile of fixed sites and facilities, as well as critical items while in-transit. ***FY 2016 Accomplishments:*** • Determined the Operational suitability of an Automated Harbor Barrier Gate capability • Developed an enterprise Installation Decision Support Initiative application providing risk analysis and risk mitigation decision support in a secure, web-enabled architecture to be hosted on the DoD's SIPRNET ***FY 2017 Plans:*** • Determine the Operational suitability of an Automated Harbor Barrier Gate capability • Develop an enterprise Installation Decision Support Initiative application providing risk analysis and risk mitigation decision support in a secure, web-enabled architecture to be hosted on the DoD's SIPRNET ***FY 2018 Plans:*** • Determine the Operational suitability of an Automated Harbor Barrier Gate capability • Conduct a concept demonstration in an operational environment comprised of equipment, technologies and systems deployed and integrated across land, rail and waterside operating areas to address physical security detection gaps	8.820	7.509	0.397
Title: Storage and Safeguards ***Description:*** Properly securing critical assets to prevent access by unauthorized persons and implementing control measures that ensure access is limited to authorized persons is the foundation of physical security. This capability area will focus on equipment (e.g., locks, doors, etc.) designed to delay or stop unauthorized entry/access to a specified/localized area. ***FY 2018 Plans:***	-	-	0.000

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0603161D8Z / *Nuclear and Conventional Physical Security/Countering Nuclear Threats*	**Project (Number/Name)** P162 / *Nuclear and Conventional Physical Security*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
No efforts currently planned.			
Title: Prevention ***Description:*** The security procedures taken to discourage an adversary from accessing weapons of mass destruction or gaining unauthorized access to critical assets are at the heart of prevention. This capability area will focus on broad spectrum, generic efforts which have the ability to influence multiple areas. ***FY 2018 Plans:*** • Utilize Electronic Warfare / Directed Energy system capabilities for feasibility testing against Personal Water Craft threats	-	-	2.562
Title: Decision Support Systems ***Description:*** Decision support systems serve the management, operations, and planning levels of the DoD physical security enterprise to help to make decisions, which may be rapidly changing and not easily specified in advance. This capability area will focus on command and control equipment and projects related to the creation and enhancement of common operating pictures, and the establishment of common architectures / interface standards. ***FY 2016 Accomplishments:*** • Developed a shared and automated content across the security domains and functional areas, enabling more efficient and accurate personnel vetting, access controls, insider threat prevention and enhanced security operating environments • Developed a risk analysis tool to help commanders' in the field make sound security decisions ***FY 2017 Plans:*** • Finalize the development of a shared and automated content across the security domains and functional areas, enabling more efficient and accurate personnel vetting, access controls, insider threat prevention and enhanced security operating environments • Finalize the risk analysis tool to help commanders' in the field make sound security decisions ***FY 2018 Plans:*** • Use modeling and simulation to characterize a High Value Unit escort with existing small boat support • Provide a secure communication system for responding forces that will represent a "leap ahead" from currently deployed systems • Provide a rapid replay or reconstruct system and operator activity to provide data forensics and training/exercise tools	4.836	1.946	3.120
Title: Analytical Support	4.415	-	1.399

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0603161D8Z / *Nuclear and Conventional Physical Security/Countering Nuclear Threats*	**Project (Number/Name)** P162 / *Nuclear and Conventional Physical Security*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Description: This capability area will focus on studies related to physical security topics and operational and management efforts related to day-to-day activities of the DoD Physical Security Equipment/Countering Nuclear Threats RDT&E Program. ***FY 2016 Accomplishments:*** • Conducted a waterside security stakeholder Table Top Exercise to confirm set of alternatives and select the preferred alternative • Continued to support global nuclear security and support the US Government for the Nuclear Security Summit ***FY 2018 Plans:*** • Provide the support necessary to coordinate PSEAG efforts with the Military Services and Agencies, as they relate to the Test & Evaluation of Physical Security Equipment technology for applications within the DOD • Provide support to the Services to address physical security RDT&E needs			
Accomplishments/Planned Programs Subtotals	27.858	27.535	30.871

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

The program performance metrics are established/approved through the DoD Physical Security Enterprise and Analysis Group (PSEAG). The cost, schedule and technical progress is reviewed at quarterly PSEAG meetings. Performance variances are addressed and corrective action(s) is(are) implemented as necessary.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0603161D8Z / *Nuclear and Conventional Physical Security/Countering Nuclear Threats*	**Project (Number/Name)** P162 / *Nuclear and Conventional Physical Security*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Years - Closed Out Efforts	Various	Various : Various	122.076	-		-		-		-		-	Continuing	Continuing	-
Defense Security Enterprise Architecture	Various	Multiple performers : Multiple locations	3.024	1.450		0.999		-		-		-	-	-	-
Keystone EUCOM Project	Various	Multiple Performers : Multiple Locations	2.804	1.845		1.977		-		-		-	-	-	-
Joint Risk Decision Support Tool	MIPR	AF Civil Engineering Center : Tyndall AFB, FL	2.071	1.800		1.524		-		-		-	-	-	-
Foliage Penetrating Technology Evaluation	MIPR	Naval Surface Warfare Crane : Crane, Indiana	0.504	-		-		2.700		-		2.700	-	-	-
Radar Assisted Area Protection	MIPR	US Army ARDEC : Picatinny Arsenal, NJ	3.979	2.500		-		-		-		-	-	-	-
Automated Harbor Barrier Gate - Operational Suitability	MIPR	CTTSO - Navy Systems Mgmt : JBAB, DC	1.000	1.250		-		-		-		-	-	-	-
Detection & Assessment Follow-on	Various	Multiple Vendors : Multiple Locations	1.500	2.054		2.000		-		-		-	-	-	-
Maritime Expeditionary & Transit Security	MIPR	ARO : Research Triangle Park, NC	0.760	1.255		1.455		-		-		-	-	-	-
US Navy Spike Weapon System, Common Launch Tube	MIPR	NAVAIRWARCENWPNDIV : China Lake, CA	1.000	1.555		0.984		-		-		-	-	-	-
Thermal Imaging Dual-use for Aerosol Monitoring Alarms and Security	MIPR	ECBC : Aberdeen Proving Ground	0.700	1.678		1.788		-		-		-	-	-	-
Multi-sensor Detection and Discrimination	MIPR	Naval Research Laboratory : Washington, DC	0.590	0.650		0.873		0.400		-		0.400	-	-	-
Tactical Security System	MIPR	Multiple Performers : Multiple Locations	-	-		2.850		-		-		-	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0603161D8Z / *Nuclear and Conventional Physical Security/Countering Nuclear Threats*	**Project (Number/Name)** P162 / *Nuclear and Conventional Physical Security*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Mobile Integrated Expeditionary Vehicle Inspection Station	MIPR	US Army ARDEC : Picatinny Arsenal, NJ	-	-		2.100		1.150		-		1.150	-	-	-
Linear Sensor System for Multi-Threat Detection	MIPR	Engineer Research and Development Center : Vicksburgs, MS	-	-		1.750		1.097		-		1.097	-	-	-
PL1N/PL1 Portable Intrusion Detection System	MIPR	AFLCMC : Hanscom AFB, MA	-	-		1.100		1.500		-		1.500	-	-	-
JIGSAW Enhanced Capability Suite Technology Development	MIPR	SPAWAR Atl : Charleston, SC	-	-		0.800		-		-		-	-	-	-
GreyNet - Secure Communications with Persistent Identification/ Blue Force Tracking	MIPR	SPAWAR Atlantic : Charleston, SC	-	-		1.450		1.732		-		1.732	-	-	-
Wide Area Detection Systems	MIPR	AFLCMC : Hanscom AFB, MA	-	-		0.800		-		-		-	-	-	-
Radar Detection of UAVs	MIPR	SPAWAR Atlantic : Charleston, SC	-	-		0.700		-		-		-	-	-	-
HVU Self Escort M&S	MIPR	Navy - Strategic System Programs : Washington Navy Yard, DC	-	-		-		0.275		-		0.275	-	-	-
Force Protection Pre-shot Sniper Detection Capability	TBD	TBD : TBD	-	-		-		1.918		-		1.918	Continuing	Continuing	-
Harbor and Restricted Waterway Counter-UUV/ AUV System	MIPR	NUWC NWPT : Newport, RI	-	-		-		0.975		-		0.975	Continuing	Continuing	-
WISP 2.0	TBD	TBD : TBD	-	-		-		1.949		-		1.949	Continuing	Continuing	-
Joint UAS Defeat Project	TBD	TBD : TBD	-	-		-		0.846		-		0.846	Continuing	Continuing	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0603161D8Z / *Nuclear and Conventional Physical Security/Countering Nuclear Threats*	**Project (Number/Name)** P162 / *Nuclear and Conventional Physical Security*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Defense Installation Access Control	TBD	TBD : TBD	0.345	-		-		3.000		-		3.000	Continuing	Continuing	-
Trace Explosive Detection System Improvement	MIPR	NSWC IHEODTD : Indian Head, MD	-	-		-		0.531		-		0.531	Continuing	Continuing	-
Gatekeeper on the Move - Biometrics	TBD	TBD : TBD	-	-		-		1.497		-		1.497	Continuing	Continuing	-
Counter Personal Water Craft - Naval Experiment	MIPR	NSWC Dahlgren : Dahlgren, VA	-	-		-		0.561		-		0.561	Continuing	Continuing	-
Physical Security Enterprise Program	Various	Multiple Performers : Multiple Locations	-	8.441		2.450		3.033		-		3.033	-	-	-
Defense Security CBRN Information Sharing	Various	ARDEC : Picatinny Arsenal, NJ	-	-		-		2.245		-		2.245	Continuing	Continuing	-
		Subtotal	140.353	24.478		25.600		25.409		-		25.409	-	-	-

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
World Institute for Nuclear Security	MIPR	Defense Threat Reduction Agency : Ft Belvoir, VA	0.650	0.350		0.350		-		-		-	-	-	-
International Atomic Energy Agency Support	IA	Department of State : Washington, DC	0.500	0.300		-		-		-		-	-	-	-
Physical Security Subject Matter Experts	MIPR	Naval Sea Systems Command : Washington Navy Yard, DC	0.320	0.250		0.250		0.135		-		0.135	-	-	-
Nuclear Security Subject Matter Experts	Various	*** PERFORMING ACTIVITY *** : *** LOCATION ***	-	-		-		0.150		-		0.150	Continuing	Continuing	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0603161D8Z / *Nuclear and Conventional Physical Security/Countering Nuclear Threats*	**Project (Number/Name)** P162 / *Nuclear and Conventional Physical Security*

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Autonomous Defense Accelerator	MIPR	Army Research Lab : Adelphi, MD	-	-		-		0.200		-		0.200	Continuing	Continuing	-
PSEAG Support	MIPR	Army Research Lab : Adelphi, MD	-	-		-		0.536		-		0.536	Continuing	Continuing	-
Texas Engineering Experiment Station	Option/ T&M	Texas A&M University : Texas	-	-		-		0.249		-		0.249	Continuing	Continuing	-
Contingency Response Tool	SS/FFP	Cubic Global Defense : San Diego, CA	-	-		-		0.886		-		0.886	Continuing	Continuing	-
PSEAG Website and PSEAG SharePoint	MIPR	Army Research Lab : Adelphi, MD	0.266	-		-		0.206		-		0.206	Continuing	Continuing	-
		Subtotal	1.736	0.900		0.600		2.362		-		2.362	-	-	-

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Citadel Protect	Various	Various : Various	-	-		-		0.140		-		0.140	Continuing	Continuing	-
COTS Indoor Detection System	MIPR	SPAWAR : Charlston, SC	-	-		-		0.473		-		0.473	Continuing	Continuing	-
Development, Test and Evaluation of System Operations Audit and Recording	MIPR	SPAWAR : Charlston, SC	-	-		-		0.591		-		0.591	Continuing	Continuing	-
Comparative Evaluation of Man-Portable Mass Spectrometry Explosive Detection Systems T&E	MIPR	NAVEODTECH : Indian Head, MD	-	-		-		0.918		-		0.918	Continuing	Continuing	-
Comparative Colorimetric T&E	MIPR	NAVEODTECH : Indian Head, MD	-	-		-		0.978		-		0.978	Continuing	Continuing	-
		Subtotal	-	-		-		3.100		-		3.100	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0603161D8Z / *Nuclear and Conventional Physical Security/Countering Nuclear Threats*	**Project (Number/Name)** P162 / *Nuclear and Conventional Physical Security*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Years - Completed Efforts	Various	*** PERFORMING ACTIVITY *** : *** LOCATION ***	0.507	-		-		-		-		-	Continuing	Continuing	-
Detection & Assessment IPT	MIPR	AF Security Forces Center : Lackland AFB, TX	0.450	0.350		0.350		-		-		-	-	-	-
DoD Nuclear Weapons Complex Critical Infrastructure Analysis	MIPR	Naval Sea Systems Command : Washington Navy Yard, DC	0.255	0.455		-		-		-		-	-	-	-
Explosive Detection Equipment Guide	MIPR	NAVEODTECH : Indian Head, MD	0.700	0.850		0.985		-		-		-	-	-	-
JASON Study	MIPR	Defense Threat Reduction Agency : Ft Belvoir, VA	0.500	0.525		-		-		-		-	-	-	-
Monterey Institute of International Studies	MIPR	Defense Threat Reduction Agency : Ft Belvoir, VA	0.250	0.300		-		-		-		-	-	-	-
		Subtotal	2.662	2.480		1.335		-		-		-	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	144.751	27.858		27.535		30.871		-		30.871	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0603161D8Z / *Nuclear and Conventional Physical Security/Countering Nuclear Threats*	**Project (Number/Name)** P162 / *Nuclear and Conventional Physical Security*

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0603161D8Z / *Nuclear and Conventional Physical Security/Countering Nuclear Threats*	**Project (Number/Name)** P162 / *Nuclear and Conventional Physical Security*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Detection & Assessment				
Detection & Assessment	1	2012	4	2022
Decision Support				
Decision Support	1	2012	4	2022
Storage & Safeguards				
Storage & Safeguards	1	2012	4	2022
Installation & Transport Security				
Installation & Transport Security	1	2012	4	2022
Prevention				
Prevention	1	2012	4	2022
Access Control				
Access Control	1	2012	4	2022
Analytical Support				
Analytical Support	1	2012	4	2022

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603161D8Z / *Nuclear and Conventional Physical Security/Countering Nuclear Threats*	Project (Number/Name) P041 / *CNT Prevention ADC&P*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P041: *CNT Prevention ADC&P*	1.927	0.000	0.000	0.691	-	0.691	1.000	0.005	1.699	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Establish a Defense-wide Countering Nuclear Threats (CNT) Materiel Development Program focused on prevention. Addresses capability gaps identified by Services, Combatant Commands, and Joint Staff. The CNT acquisition strategy directly applies to Joint requirements for CNT materiel development and addresses the materiel and sustainment gaps for general purpose Joint Forces including the US Army 20th Support Command / Navy Visit, Board, Search, and Seizure / Technical Support Groups (NIMBLE ELDER and the US Special Operations Command).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Countering Nuclear Threats	-	-	0.691
Description: Establish a Defense-wide Countering Nuclear Threats (CNT) Materiel Development Program in FY14 based on capability gaps identified by Services, Combatant Commands, and Joint Staff. The CNT acquisition strategy directly applies to Joint requirements for CNT materiel development and addresses the materiel and sustainment gaps for general purpose Joint Forces including the US Army 20th Support Command / Navy Visit, Board, Search, and Seizure / Technical Support Groups (NIMBLE ELDER and the US Special Operations Command). ***FY 2018 Plans:*** • Develop an active prevention capability to counter nuclear threats			
Accomplishments/Planned Programs Subtotals	-	-	0.691

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

The program performance metrics are established/approved through the Countering Nuclear Threats Program Manager. The cost, schedule and technical progress is reviewed on a quarterly basis. Performance variances are addressed and corrective action(s) is(are) implemented as necessary.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603161D8Z / *Nuclear and Conventional Physical Security/Countering Nuclear Threats*	Project (Number/Name) P040 / *National Technical Nuclear Forensics Systems*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P040: *National Technical Nuclear Forensics Systems*	33.619	3.291	0.963	1.375	-	1.375	1.640	0.925	1.202	1.225	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Nuclear forensics is the thorough collection, analysis and evaluation of radiological and nuclear material in a pre-detonation state and post-detonation radiological or nuclear materials, devices and debris, as well as the immediate effects created by a nuclear detonation. The ability to identify the source of nuclear material from radioactive debris is critical to our national defense and security. Swift and accurate forensic and attribution (identification) capabilities are vital to developing an appropriate national response to a nuclear event and preventing future attacks in a timely manner.

Nuclear terrorism is one of the most significant and pressing threats identified by national leadership. A credible nuclear forensics program is essential to preventing nuclear terrorism by deterring nations from sponsoring nuclear terrorism. During the Deputy Management Advisory Group process shortfalls and resources to close these gaps were identified and supported by the Deputy Secretary of Defense. The purpose of this program is to develop systems such as ground based prompt diagnostic systems and airborne sample collection systems to provide timely and accurate information to national leadership in the area of nuclear forensics.

Per DoDD 2060.04 OSD AT&L NCB provides guidance and direction for the implementation of the Department of Defense National Technical Nuclear Forensics program. NCB represents DoD interests in all areas of nuclear forensics but emphasizes post-detonation applications due to Presidential guidance assigning the department the lead role in develop, providing, and maintaining post-detonation nuclear forensics capability.

This PE can fund travel to support the requirements of this program.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: National Technical Nuclear Forensics Systems	3.291	0.963	1.375
Description: Advanced development of ground based prompt diagnostic and airborne collection systems. This technology will provide new information that increases accuracy and provides an improved timeline in support of senior leadership decision making.			
FY 2016 Accomplishments: • Completed installation of prototype prompt diagnostics systems in Metropolitan Areas B & C. Develop and tested prototype prompt diagnostics systems for testbed use. Continue testing and operational support and integration of prototype ground-based prompt diagnostic systems and install in one additional city.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0603161D8Z / *Nuclear and Conventional Physical Security/Countering Nuclear Threats*	**Project (Number/Name)** P040 / *National Technical Nuclear Forensics Systems*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Procured platform-specific mounting systems to enable operation of Harvester PACS on DCR-designated platform. Continued research for modular air sample collection systems to support National Technical Nuclear Forensics and augment treaty verification capabilities. ***FY 2017 Plans:*** • Transition operational support and integration of ground-based prompt diagnostic systems to the Air Force for strategic implementation in key metropolitan areas. • Continue Harvester PACS operational support of a modular particulate air sampling capability that augments the Department of Defense mobile nuclear air sampling capability to support collection requirements for treaty verification and National Technical Nuclear Forensics. ***FY 2018 Plans:*** • Continue Harvester PACS operational support of a modular particulate air sampling capability that augments the Department of Defense mobile nuclear air sampling capability to support collection requirements for treaty verification and National Technical Nuclear Forensics.			
Accomplishments/Planned Programs Subtotals	3.291	0.963	1.375

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

The program performance metrics are established/approved through the Countering Nuclear Threats Program Manager. The cost, schedule and technical progress is reviewed on a quarterly basis. Performance variances are addressed and corrective action(s) is(are) implemented as necessary. This is new program focusing on advanced development to meet critical needs.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603600D8Z / *WALKOFF*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	88.222	88.031	98.143	101.714	-	101.714	94.341	95.249	97.078	99.082	Continuing	Continuing
600: *WALKOFF*	88.222	88.031	98.143	101.714	-	101.714	94.341	95.249	97.078	99.082	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Classified.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	88.031	89.643	96.482	-	96.482
Current President's Budget	88.031	98.143	101.714	-	101.714
Total Adjustments	0.000	8.500	5.232	-	5.232
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Service Requirements Review Board Directed Decrease	-	-	-5.768	-	-5.768
• FY 2017 Request for Additional Appropriations	-	8.500	-	-	-
• Program Increase (Classified)	-	-	11.000	-	11.000

Change Summary Explanation

In FY 2017 Amended Budget Request, $8.500 million is required to address emergency warfighting readiness requirements. Details are classified.

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: WALKOFF	88.031	98.143	101.714
FY 2016 Accomplishments: Classifed.			
FY 2017 Plans:			

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603600D8Z / *WALKOFF*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Classified. ***FY 2018 Plans:*** Classified.			
Accomplishments/Planned Programs Subtotals	88.031	98.143	101.714

D. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 0603600D8Z O&M DW: *WALKOFF*	4.408	2.559	2.710	-	2.710	2.659	2.686	2.739	2.797	Continuing	Continuing

Remarks

E. Acquisition Strategy

Classified.

F. Performance Metrics

Classified.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0603600D8Z / *WALKOFF*	**Project (Number/Name)** 600 / *WALKOFF*

Remarks

Classified.

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0603600D8Z / *WALKOFF*	**Project (Number/Name)** 600 / *WALKOFF*

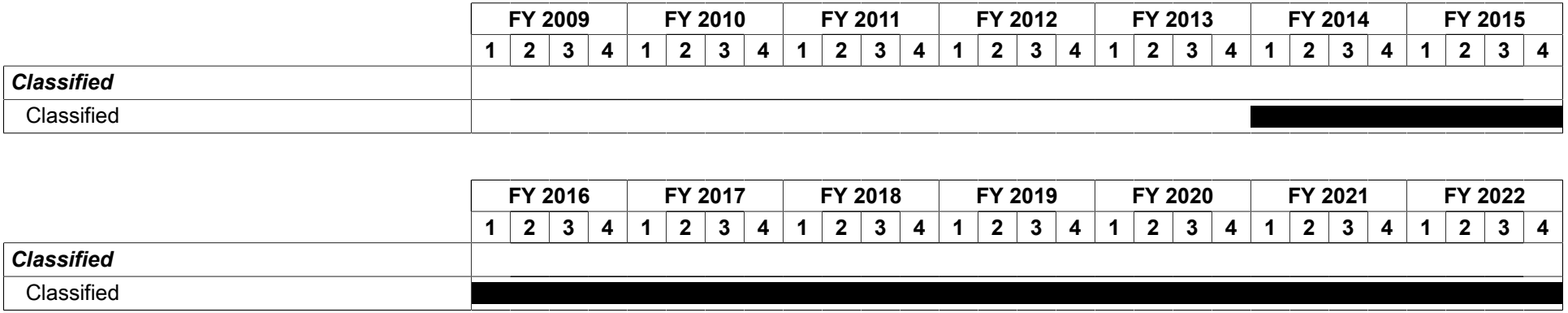

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0603600D8Z / *WALKOFF*	**Project (Number/Name)** 600 / *WALKOFF*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Classified				
Classified	1	2014	4	2022

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603714D8Z / *Advanced Sensors Application Program (ASAP)*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	38.672	15.869	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
714: *Advanced Sensors Application Program*	38.672	15.869	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

ASAP focuses on continued investigations of foreign technologies in Anti-Submarine Warfare (ASW). In coordination with an international partner, unique and innovative approaches are used to understand foreign capabilities and threats to US forces.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	15.869	0.000	0.000	-	0.000
Current President's Budget	15.869	0.000	0.000	-	0.000
Total Adjustments	0.000	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			

Change Summary Explanation

Funded by Navy starting in FY2017.

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Advanced Sensors Application Program	15.869	-	-
FY 2016 Accomplishments: Provided Mission Support (Details available in Defense-Wide classified book).			
Accomplishments/Planned Programs Subtotals	15.869	-	-

D. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603714D8Z *I Advanced Sensors Application Program (ASAP)*

D. Other Program Funding Summary ($ in Millions)

Remarks

E. Acquisition Strategy

Details available in Defense-Wide classified book.

F. Performance Metrics

Numbers of operational field demonstrations; actual/in-kind resource sharing differential among participating entities; studies produced; successful anomaly detections; false-positive results; and technology transfers.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603821D8Z / *Acquisition Enterprise Data & Information Services*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	0.000	0.000	2.136	2.198	-	2.198	2.527	3.096	3.956	4.036	Continuing	Continuing
*P840: *Acquisition Enterprise Data & Information Services*	0.000	0.000	2.136	2.198	-	2.198	2.527	3.096	3.956	4.036	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Acquisition Enterprise Data & Information Services (AEDIS) investment supports enhanced Acquisition Visibility (AV) of the Defense Acquisition Executive (DAE), Component Acquisition Executives (CAE), Service Chiefs of Staff, OSD senior leaders, and OSD and Component analysts who assess and decide the efficiency and effectiveness of acquiring and sustaining the Department's acquisition programs including Major Defense Acquisition Programs (MDAPs), Major Automated Information Systems (MAIS), major IT investments, and Acquisition Category (ACAT) II – IV programs. AEDIS/AV information service supports USD(AT&L), CAE, and Service Chief responsibilities by providing critical information for acquisition analysis, oversight, and decision making. AEDIS/AV institutionalizes the management of data and business rules used in the Department's acquisition decision making, and it integrates the acquisition data stored across multiple disparate Federal and Departmental organizations' data sets and systems. AEDIS/AV investment delivers a Department-wide accessible collection of acquisition information, techniques, and tools, including the Defense Acquisition Visibility Environment (DAVE), the Defense Acquisition Management Information Retrieval (DAMIR) capability, and acquisition data analysis capabilities as well as data access services and data standards via the Acquisition Visibility Data Matrix (AVDM). Funding supports enhancements to Acquisition Visibility through the definition, development, and fielding of concepts and tools for Department-wide data analysis for use across Congress and the Department, particularly in support of the DAE and his decision authority.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	0.000	2.136	2.198	-	2.198
Current President's Budget	0.000	2.136	2.198	-	2.198
Total Adjustments	0.000	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Acquisition Enterprise Data & Information Services	0.000	2.136	2.198

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603821D8Z *I Acquisition Enterprise Data & Information Services*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Description: Acquisition Enterprise Data & Information Services investments enhance the visibility of the Department's acquisitiion programs for the Defense Acquisition Executive (DAE), Component Acquisition Executives (CAE), Service Chiefs of Staff, OSD senior leaders, and OSD and Component analysts. ***FY 2016 Accomplishments:*** As a new Program Element for FY2017, there were no FY16 accomplishments. ***FY 2017 Plans:*** Advanced component development and prototyping efforts will focus on integrating acquisition data stored across multiple disparate data sets and systems to deliver a centrally accessible collection of tools, acquisition data analysis capabilities, data access services, and data standards. FY2017 plans include development of the initial Defense Acquisition Visibility Environment (DAVE) that includes underlying architecture, data, information, and capabilities such as program information and schedule. It also includes prototyping future Acquisition Enterprise data and capabilities such as Should Cost and business analytics. ***FY 2018 Plans:*** FY2018 plans include the development of DAVE Operational Capability; development and prototyping of a SIPR instance of DAVE; and prototyping of efforts to transition legacy capabilities to DAVE. Development of DAVE includes architecture enhancements, new data and information, and additional capabilities.			
Accomplishments/Planned Programs Subtotals	0.000	2.136	2.198

D. Other Program Funding Summary ($ in Millions)

N/A

Remarks

E. Acquisition Strategy

Acquisition Enterprise Data & Information Services development and prototyping is acquired through a combination of small-disadvantaged business contract awards.

F. Performance Metrics

Code coverage reports must demonstrate a minimum of 80% code coverage for automated testing.
Delivered capabilities must not exceed 0.5% unscheduled down time annually.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603851D8Z / *Environmental Security Technology Certification Program*

COST ($ in Millions)	Prior Years (+)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	269.024	51.380	52.491	54.583	-	54.583	58.647	59.550	60.717	61.994	Continuing	Continuing
P514: *Environmental Security Technology Certification Program*	263.024	51.380	52.491	54.583	-	54.583	58.647	59.550	60.717	61.994	Continuing	Continuing

(+) The sum of all Prior Years is $6.000 million less than the represented total due to several projects ending

A. Mission Description and Budget Item Justification

(U) The Environmental Security Technology Certification Program (ESTCP) demonstrates and validates promising and innovative environmental and energy technologies that target DoD's most urgent needs. Technologies selected are projected to provide a return on the investment through cost savings and improved efficiencies. The program responds to: (1) Congressional concern over the slow pace of remediation of environmentally polluted sites on military installations, (2) Congressional direction to conduct demonstrations specifically focused on emerging new technologies, and (3) the need to improve defense readiness by reducing the drain on the Department's operation and maintenance dollars caused by environmental restoration, waste management, and the cost of energy. Preference for demonstrations is given to technologies that have successfully completed all necessary research and development objectives, and address the highest priority DoD requirements.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	51.380	52.491	54.433	-	54.433
Current President's Budget	51.380	52.491	54.583	-	54.583
Total Adjustments	0.000	0.000	0.150	-	0.150
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• DTIC Offset	-	-	0.150	-	0.150

Change Summary Explanation

Funding realigned to other programs. Other reductions in FY 18 is a result of department efficiency and economic assumptions adjustments.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603851D8Z / *Environmental Security Technology Certification Program*	Project (Number/Name) P514 / *Environmental Security Technology Certification Program*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P514: *Environmental Security Technology Certification Program*	263.024	51.380	52.491	54.583	-	54.583	58.647	59.550	60.717	61.994	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

(U) The Environmental Security Technology Certification Program (ESTCP) demonstrates and validates promising and innovative environmental and energy technologies that target DoD's most urgent needs. Technologies selected are projected to provide a return on the investment through cost savings and improved efficiencies. The program responds to: (1) Congressional concern over the slow pace of remediation of environmentally polluted sites on military installations, (2) Congressional direction to conduct demonstrations specifically focused on emerging new technologies, and (3) the need to improve defense readiness by reducing the drain on the Department's operation and maintenance dollars caused by environmental restoration, waste management, and the cost of energy. Preference for demonstrations is given to technologies that have successfully completed all necessary research and development objectives, and address the highest priority DoD requirements.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Environmental Technology Demonstration/Validation	31.290	27.247	32.223

Description: Funds are programmed for investments in projects that address priority DoD environmental requirements. The focus of the program is on live site unexploded ordnance (UXO) in the underwater environment, addressing emerging and recalcitrant cleanup issues, range sustainment technologies, and reducing life cycle costs of DoD weapon systems by eliminating hazardous materials. Accomplishments/plans are described for each FY below.

FY 2016 Accomplishments:

Funds were invested in projects that address priority DoD environmental requirements. Focused new investment topics for FY 2016 include: 1) Management of Contaminated Groundwater and 2) Detection, Classification, and Remediation of Military Munitions in Underwater Environments. Details are provided at www.serdp-estcp.org.

FY 2017 Plans:

Funds are planned for continued investment in projects that address priority DoD environmental requirements and new Investments in technology for the most challenging remaining groundwater restoration sites, scale up demonstrations for Underwater Unexploded Ordnance, and demonstrations of environmentally benign surface engineering technology at larger scales.

FY 2018 Plans:

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0603851D8Z / *Environmental Security Technology Certification Program*	**Project (Number/Name)** P514 / *Environmental Security Technology Certification Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Funds are planned for continued investment in projects that address priority DoD environmental requirements and new Investments in technology for the most challenging remaining groundwater restoration sites, scale up demonstrations for Underwater Unexploded Ordnance, and demonstrations of environmentally benign surface engineering technology at larger scales.			
Title: Energy Technology Demonstration/Validation ***Description:*** Funds are programmed for investments in energy projects that constitute the Installation Energy Test Bed Initiative. This initiative responds to Congressional direction for the Department to increase energy efficiency, reduce installation energy intensity, increase the use of renewable energy, and improve energy security. Emerging energy technologies offer DoD a cost effective opportunity to meet these requirements on its installations while reducing energy and operational costs. The DoD test bed program validates and tests the operational cost and performance of innovative energy technologies in a real-world integrated building environment so as to reduce risk, overcome the barriers to deployment, and facilitate wide-scale deployment. The test bed program exploits the Department's existing built infrastructure to evaluate energy efficiency and renewable energy technologies under the varied climatic conditions and building types DoD manages. The test bed's key elements are: 1) competitive selection of new technologies, 2) systematic and consistent evaluation to determine performance, operational readiness and life cycle costs, and 3) development of guidance and design information for future deployment across installations. ***FY 2016 Accomplishments:*** Funds were invested in energy and water projects that constitute the Installation Energy Test Bed Initiative. In FY 2016, ESTCP solicited proposals for funding in two areas: 1) Energy Generation, Storage, Dispatch and Management on Military Installations and 2) Cybersecure Connectivity for Energy System Components and Military Installation Energy Infrastructure. Details are provided at www.serdp-estcp.org. ***FY 2017 Plans:*** Funds are planned to continue investments in energy and water projects that constitute the Installation Energy Test Bed Initiative. ***FY 2018 Plans:*** Funds are planned to continue investments in energy and water projects that constitute the Installation Energy Test Bed Initiative.	20.090	25.244	22.360
Accomplishments/Planned Programs Subtotals	51.380	52.491	54.583

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0603851D8Z / *Environmental Security Technology Certification Program*	**Project (Number/Name)** P514 / *Environmental Security Technology Certification Program*

D. Acquisition Strategy

ESTCP solicits proposals from all DoD organizations, other Federal Agencies, and the commercial sector. Projects are selected based on an annual competitive process through reviews by multi-agency panels.

E. Performance Metrics

Performance in this program is monitored at two levels. At the lowest level, each individual project is measured against technical and financial milestones on a quarterly and annual basis. At a program-wide level, progress is measured against DoD's environmental requirements and the demonstration and transition of technologies that address these requirements.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0603851D8Z / *Environmental Security Technology Certification Program*	**Project (Number/Name)** P514 / *Environmental Security Technology Certification Program*

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Support Contract	C/IDDQ	Noblis : Falls Church, VA	11.760	2.666		2.425		2.380		-		2.380	Continuing	Continuing	-
		Subtotal	11.760	2.666		2.425		2.380		-		2.380	-	-	-

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Energy and Water	C/Various	Various : Various	112.610	18.762		24.032		23.743		-		23.743	Continuing	Continuing	-
Weapons Systems and Platforms	C/Various	Various : Various	37.344	9.936		8.011		9.226		-		9.226	Continuing	Continuing	-
Munitions Response	C/Various	Various : Various	29.433	3.945		4.005		5.300		-		5.300	Continuing	Continuing	-
Environmental Restoration	C/Various	Various : Various	46.121	11.299		9.012		10.051		-		10.051	Continuing	Continuing	-
Resource Conservation and Resiliency	C/Various	Various : Various	25.756	4.772		5.006		3.883		-		3.883	Continuing	Continuing	-
		Subtotal	251.264	48.714		50.066		52.203		-		52.203	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	263.024	51.380		52.491		54.583		-		54.583	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0603851D8Z / *Environmental Security Technology Certification Program*	**Project (Number/Name)** P514 / *Environmental Security Technology Certification Program*

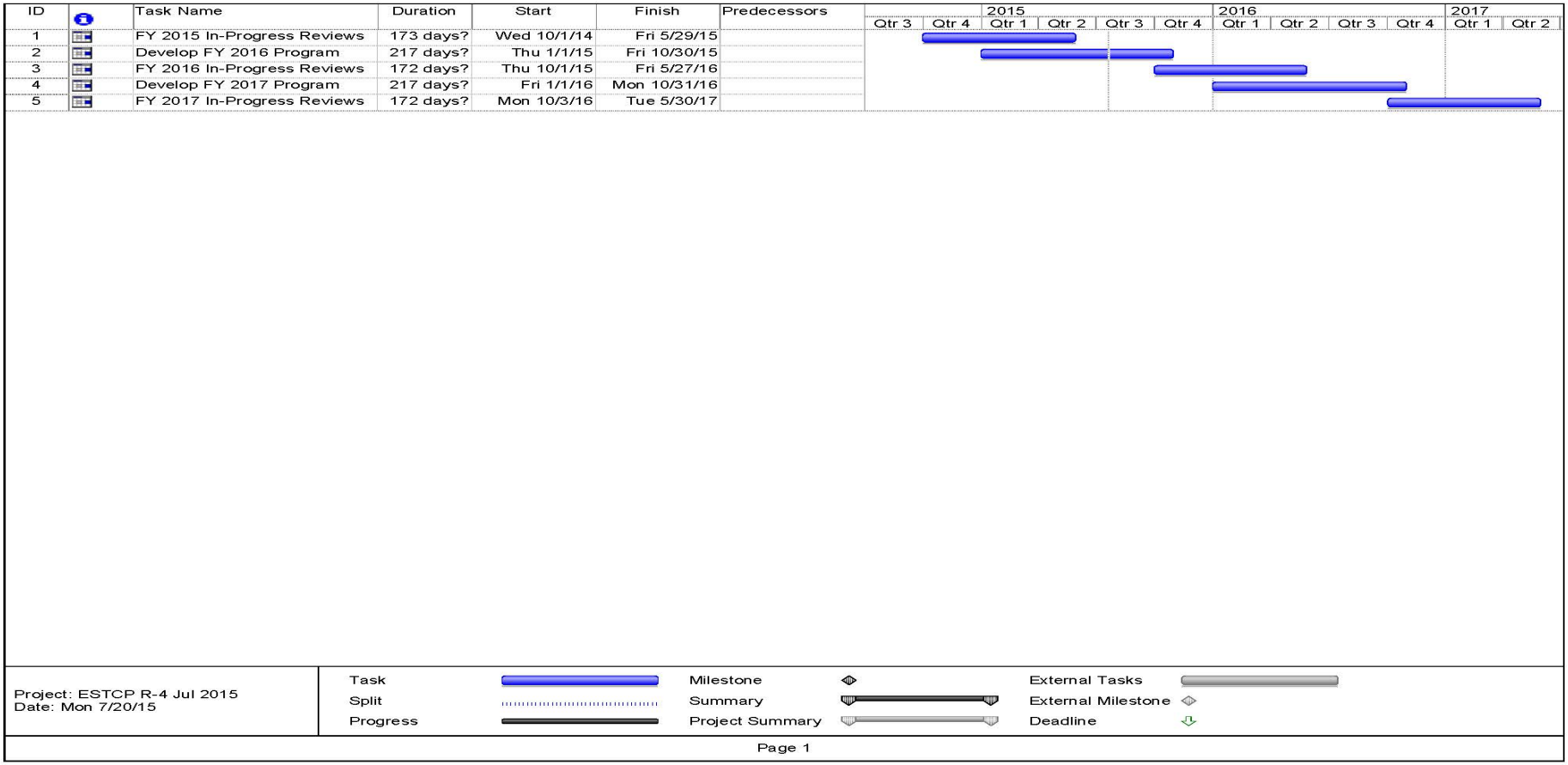

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0603851D8Z / *Environmental Security Technology Certification Program*	**Project (Number/Name)** P514 / *Environmental Security Technology Certification Program*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
In Progress Reviews				
FY 2015 In Progress Reviews	1	2015	3	2015
FY 2016 In Progress Reviews	1	2016	3	2016
FY 2017 In Progress Reviews	1	2017	3	2017
Develop Program				
Develop FY 2016 Program	1	2015	4	2015
Develop FY 2017 Program	1	2016	4	2016

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603920D8Z / *Humanitarian De-mining*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	47.606	9.858	10.007	10.837	-	10.837	11.424	10.901	11.113	11.356	Continuing	Continuing
920: *Humanitarian De-mining*	47.606	9.858	10.007	10.837	-	10.837	11.424	10.901	11.113	11.356	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Under the Office of the Assistant Secretary of Defense for Special Operations and Low-Intensity Conflict (OASD SO/LIC), the Humanitarian Demining Research and Development (HD R&D) program element develops, demonstrates and validates cost-effective technologies for use in humanitarian demining via operational field evaluations in support of Geographical Combatant Commands (GCC) Humanitarian Mine Action (HMA) goals and objectives.

The HD R&D Program works closely with the GCCs and the Humanitarian Demining Training Center (HDTC) to craft a research and development plan that supports GCC HMA program plans and strategic objectives and enhances mil-to-mil partnerships in key regional states and provides access to live mines/UXO around the world for operational test data collection unavailable to any other DoD organization. The HD R&D Program accomplishes the GCC support by utilizing host nation demining partners to evaluate technology in actual minefields to simultaneously achieve HMA objectives and identify performance parameters; data is delivered to the US military countermine R&D programs to inform future investment decisions. In addition to the improvements made to technologies used by U.S. forces and to the reduction of landmine and UXO threat to US forces and host nation population, the Program's technology trainings and evaluations build mine action capacity and capability within mine-affected countries and improve safety, stability and economic development.

Since 1995 the program has fielded technologies for 199 evaluations in 39 countries, including Afghanistan, Iraq, Vietnam, Cambodia, Angola and Zimbabwe. The program's technologies have cleared 42 million square meters of the world's toughest minefields; and found or destroyed 177,000 mines and UXO.

New technology requirements and areas of emphasis are identified and validated at a biennial Requirements Workshop and a biennial UXO Working Group Meeting held by OASD SO/LIC. The meetings involve representatives from Department of State (DOS), GCC Humanitarian Mine Action offices, mine action organizations and mine-affected nations. The program element's work fulfills the Department of Defense's strategic guidance to address instability and reduce the demand for significant US force commitments to stability operations; with DODI 3000.05 to foster security, economic security and development, and build indigenous capacity; and with § 407 and CJCSI 3207.01C to reduce the social, economic and environmental impact of landmines and unexploded ordnance.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603920D8Z / *Humanitarian De-mining*

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	10.110	10.007	10.837	-	10.837
Current President's Budget	9.858	10.007	10.837	-	10.837
Total Adjustments	-0.252	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Internal Adjustments	-0.252	-	-	-	-

Change Summary Explanation

Reductions were in support of Departmental efficiencies and economic assumptions.

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: 0603920D8Z - SO/LIC Humanitarian De-mining	9.858	10.007	10.837

Description: The HD R&D Program adapts commercial-off-the-shelf equipment, integrates mature technologies, and leverages R&D activity within DoD, particularly in the Army's Night Vision and Electronic Sensors Directorate (NVESD) Tactical Countermine mission area. The program aims to improve existing technologies for: mine/unexploded ordnance (UXO) detection, technical survey/area reduction, mechanical mine/UXO clearance, underwater UXO detection and clearance, vegetation clearance, mechanical mine neutralization, and post-clearance quality control (QC).

FY 2016 Accomplishments:

Deployed new technology, including Medium MineWolf in Thailand; Rambo, Mini MineWolf, Underwater Detection System, and Scorpion II in Cambodia; HSTAMIDS in Kosovo, Rex I in Sri Lanka; Quadcopter and Rex II in Angola; and Storm and Six-Tine Rotary Mine Comb in Afghanistan

- Continued to support ongoing FY2015 operational field evaluations with less down time due to technology fault
- Supported the combatant commands and Embassy staffs by conducting site surveys and country assessments in Thailand, Colombia, and Vietnam; and continuing mil-to-mil engagements in Cambodia, Chile, and Thailand
- Developed, tested and evaluated new prototype technologies in the following areas: technical survey, individual mine/UXO and minefield detection, mechanical mine/UXO and vegetation clearance, underwater UXO detection and clearance, mechanical mine neutralization, and post-clearance quality assurance (QA)

FY 2017 Plans:

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603920D8Z / *Humanitarian De-mining*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Deploy new technology, including Wet Soil Buckets, Armored Operator Station, and Sparrow to Cambodia; Rambo to Laos; HSTAMIDS and Bearcat to Colombia; Remote Monitoring Station to Thailand; and Quadcopter to Bosnia, Cambodia, Iraq, Laos, Lebanon, Sri Lanka, Ukraine, and West Bank • Develop new technology for mine clearance in Iraq and Colombia • Complete ongoing equipment developments/modifications • Continue successful operational evaluations from FY2016 • Support the combatant commands and Embassy staffs by conducting new site surveys and country assessments in Vietnam, Colombia, Ukraine and Northern Iraq • Develop, test and evaluate new prototype technologies based on feedback from the field, including nine technology development tasks in individual mine/UXO and minefield detection and six technology development tasks in mechanical mine/UXO and vegetation clearance			
FY 2018 Plans: Deploy new technology to Colombia, Iraq and other countries • Complete ongoing equipment developments/modifications • Continue successful operational evaluations from FY2017 • Support the combatant commands and Embassy staffs by conducting new site surveys and country assessments • Develop, test and evaluate new prototype technologies based on feedback from the field in the following areas: technical survey, individual mine/UXO and minefield detection, mechanical mine/UXO and vegetation clearance, underwater UXO detection and clearance, mechanical mine neutralization, and post-clearance QA			
Accomplishments/Planned Programs Subtotals	9.858	10.007	10.837

D. Other Program Funding Summary ($ in Millions)

N/A

Remarks

E. Acquisition Strategy

Following a rapid prototyping strategy, the program emphasizes the use/modification of existing, commercially-available equipment and components to build functional prototype equipment suited for humanitarian demining operations. This approach is required due to the immediate need for new demining technologies in the face of ongoing U.S. forces and host nation citizen casualties in mine-affected countries. The program evaluates prototype equipment by acquiring it off-the-shelf from industry using competition to the extent possible, by leveraging ongoing countermine R&D efforts in other U.S. and foreign R&D activities, and by taking advantage of extensive in-house fabrication capabilities at the Army's Night Vision and Electronic Sensors Division (NVESD).

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603920D8Z / *Humanitarian De-mining*

F. Performance Metrics

Obtain adequate funding to support critical shortfalls; prioritize proposals that are deemed acceptable and allocate funding accordingly; and establish outreach programs to leverage institutional knowledge and expertise.

Performance Indicator and Rating:
FY 2016 Target:
90% of currently funded research technologies are completed on time and within budget
Complete scheduled R&D project tasks
Transition field-ready technologies to host nation demining partners

FY 2017 Target:
90% of currently funded research technologies are completed on time and within budget
Complete scheduled R&D project tasks
Transition field-ready technologies to host nation demining partners
Conduct biennial Humanitarian R&D Program Requirements Workshop

FY 2016 Performance Rating: Currently the number of funded research technologies is on track to be completed per the target.

Verification: The Humanitarian Demining Program performs program reviews with other USG agencies (DOS PM WRA, DSCA, HDTC, CENTCOM, PACOM, SOUTHCOM, AFRICOM, EUCOM) and has oversight from OSD SO/LIC.

Validation: Completed R&D products increase the capabilities of the DoD to effectively perform demining missions.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603920D8Z / *Humanitarian De-mining*	Project (Number/Name) 920 / *Humanitarian De-mining*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development	Various	RDECOM-NVESD : Ft Belvoir, VA	28.832	5.267		5.337		5.797		-		5.797	-	-	-
		Subtotal	28.832	5.267		5.337		5.797		-		5.797	-	-	-

Remarks

The HD R&D Program adapts commercial-off-the-shelf equipment, integrates mature technologies, and leverages R&D activity within DoD, particularly in the Army's Night Vision and Electronic Sensors Directorate (NVESD) Tactical Countermine mission area.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Humanitarian Demining Research and Development Program	Various	RDECOM-NVESD : Ft Belvoir, VA	17.296	4.338		4.405		4.770		-		4.770	-	-	-
		Subtotal	17.296	4.338		4.405		4.770		-		4.770	-	-	-

Remarks

Evaluations of HD R&D Program-developed technologies in actual minefields are conducted by host nation demining partners (foreign military, non-governmental organizations and mine action centers) and provide valuable data for US military countermine R&D and next generation HD technology developments while directly contributing to world-wide mine and UXO clearance.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Humanitarian Demining Program Management Support	Various	RDECOM-NVESD : Ft Belvoir, VA	1.478	0.253		0.265		0.270		-		0.270	-	-	-
		Subtotal	1.478	0.253		0.265		0.270		-		0.270	-	-	-

Remarks

The HD R&D Program managers oversee adaptation of commercial-off-the-shelf equipment, integration of mature technologies, and leverage of R&D activity within DoD, particularly in the Army's Night Vision and Electronic Sensors Directorate (NVESD) Tactical Countermine mission area. Areas of emphasis are identified and validated at a

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603920D8Z / *Humanitarian De-mining*	Project (Number/Name) 920 / *Humanitarian De-mining*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
biennial Requirements Workshop held by OASD SO/LIC. The Requirements Workshop involves representatives from Department of State (DoS), U.S. combatant commands (COCOMS) and mine-affected nations.															

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	47.606	9.858		10.007		10.837		-		10.837	-	-	-

Remarks

The Humanitarian Demining Research and Development (HD R&D) program element rapidly develops, demonstrates and validates new technologies for DoD-supported nations to detect and clear landmines and unexploded ordnance (UXO), and to contribute to US military countermine R&D. The HD R&D Program focuses on development of new technologies to improve the efficiency and safety of indigenous nation-conducted, post-conflict clearance of residual mines and UXO, which pose a serious threat to US forces conducting stability operations, and to the host nation's population and economy.

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0603920D8Z / *Humanitarian De-mining*	**Project (Number/Name)** 920 / *Humanitarian De-mining*

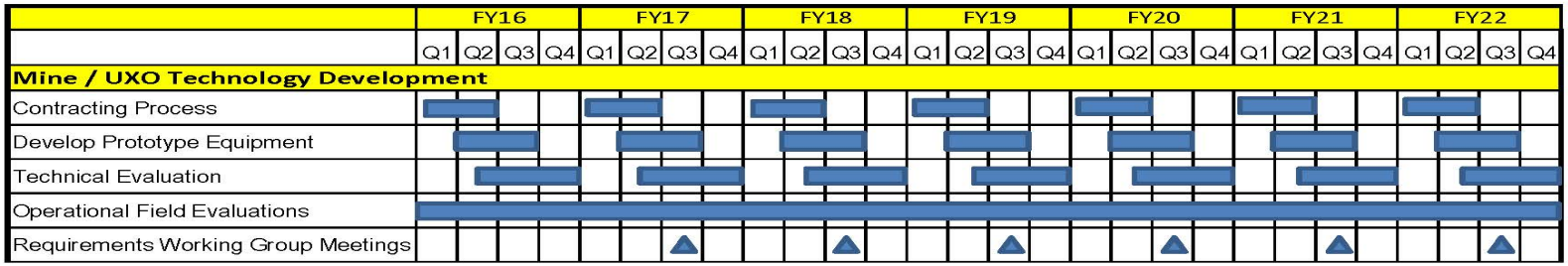

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0603920D8Z / *Humanitarian De-mining*	**Project (Number/Name)** 920 / *Humanitarian De-mining*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Mechanical Mine/UXO Clearance Systems	1	2016	4	2022
Mine/UXO Detection Systems	1	2016	4	2022

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603923D8Z / *Coalition Warfare Program*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	42.530	10.179	10.126	10.740	-	10.740	11.030	11.143	11.351	11.578	Continuing	Continuing
P923: *Coalition Warfare*	42.530	10.179	10.126	10.740	-	10.740	11.030	11.143	11.351	11.578	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Coalition Warfare Program (CWP) supports DoD organizations that: 1) work with foreign partners to collaboratively address strategic technology gaps for current and future missions; 2) develop interoperability solutions for coalition operations; and 3) develop and strengthen defense relationships. CWP is the only Office of the Secretary of Defense (OSD) program with this mission. Coalition warfare and multinational operations are fundamental features of the U.S. National Security Strategy. Coalitions provide a broad base of technological, operational, and logistical support for military operations and ease the U.S. financial and manpower burdens associated with meeting military goals and objectives. Coalitions and relationships with international partners are high priorities for the nation and the Department of Defense.

CWP supplements a U.S. Government proponent's funding for cooperative efforts, ensuring U.S. funds are sufficient to complete the engagement with the foreign partner(s). When CWP funds are used to help fund a cooperative project, that project leverages technical and financial contributions of the foreign partner(s) and speeds the development and delivery of technical solutions to the warfighter. In its sixteen-year history, CWP has leveraged $4 of foreign partner funding from 76 foreign partners and $3 of other U.S. Government funding for every $1 CWP has invested in cooperative projects. CWP funding enables DoD project teams to move a technology into the next stage of development or to complete and transition a technology to operational forces. These projects may also form the basis for future cooperation with international partners.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	10.179	10.126	10.812	-	10.812
Current President's Budget	10.179	10.126	10.740	-	10.740
Total Adjustments	0.000	0.000	-0.072	-	-0.072
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• DTIC Offset Bill	-	-	-0.072	-	-0.072

Change Summary Explanation

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603923D8Z / *Coalition Warfare Program*	Project (Number/Name) P923 / *Coalition Warfare*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P923: *Coalition Warfare*	42.530	10.179	10.126	10.740	-	10.740	11.030	11.143	11.351	11.578	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Coalition Warfare Program (CWP) supports DoD organizations that: 1) work with foreign partners to collaboratively address strategic technology gaps for current and future missions; 2) develop interoperability solutions for coalition operations; and 3) develop and strengthen defense relationships. CWP is the only Office of the Secretary of Defense (OSD) program with this mission. Coalition warfare and multinational operations are fundamental features of the U.S. National Security Strategy. Coalitions provide a broad base of technological, operational, and logistical support for military operations and ease the U.S. financial and manpower burdens associated with meeting military goals and objectives. Coalitions and relationships with international partners are high priorities for the nation and the Department of Defense.

CWP supplements a U.S. Government proponent's funding for cooperative efforts, ensuring U.S. funds are sufficient to complete the engagement with the foreign partner(s). When CWP funds are used to help fund a cooperative project, that project leverages technical and financial contributions of the foreign partner(s) and speeds the development and delivery of technical solutions to the warfighter. In its sixteen-year history, CWP has leveraged $4 of foreign partner funding from 76 foreign partners and $3 of other U.S. Government funding for every $1 CWP has invested in cooperative projects. CWP funding enables DoD project teams to move a technology into the next stage of development or to complete and transition a technology to operational forces. These projects may also form the basis for future cooperation with international partners.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Previous Year Continuing Projects	8.817	5.661	2.787
Description: Program provided additional funding to projects that began in earlier selection cycles. Currently funded portfolio includes projects with 12 different foreign partners.			
FY 2016 Accomplishments: Completion of efforts that will result in improved submarine force network interoperability, improved standoff detection of explosives, and non-lethal options for disabling maritime vessels.			
FY 2017 Plans: Completion of efforts that will enhance detection, classification and mapping of underwater munitions and mines and increase underwater power to sensors in marine environments.			
FY 2018 Plans:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0603923D8Z / *Coalition Warfare Program*	**Project (Number/Name)** P923 / *Coalition Warfare*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Completion of efforts that will improve directed energy weapons interface with ship's electrical power, maintain warfighters' access to position, navigation, and timing signals when GPS is unavailable, and improve tracking of space objects and debris in real-time.			
Title: Improved Detect, Track, Defeat of Aerial Target Threats ***Description:*** U.S. Army project to improve detection, tracking, and defeat of low, slow, small unmanned aerial systems (UAS) by developing and demonstrating radar, munition and launcher system technologies. ***FY 2017 Plans:*** Characterize threat UAS and determine optimal designs. ***FY 2018 Plans:*** Develop warhead and update radar algorithms.	-	0.750	0.750
Title: Advanced Methods for Space Object Understanding ***Description:*** US Air Force project to improve coalition space situational awareness and command and control by improving methods for utilizing coalition partner sensor data on resident space objects. ***FY 2017 Plans:*** Concept of employment and use case development. Initial system design and comparative algorithm analysis. ***FY 2018 Plans:*** Initial implementation and testing and continued development of visualization tools.	-	0.300	0.350
Title: Advance Al-Mg Alloys for Land and Sea Applications ***Description:*** Joint US Army and Navy project to improve welded strength, ballistics, and marine corrosion resistance of current alloy used in ground, amphibious, and sea systems by developing and validating a new class of multirole 5000 series aluminum-magnesium alloys. ***FY 2017 Plans:*** Initial small-scale alloy property screening. ***FY 2018 Plans:*** Final screening to confirm alloy properties.	-	0.072	0.085
Title: Biosurveillance Application Tool Development ***Description:*** DTRA project to demonstrate enhanced decision making for biological agent outbreak response by developing regional specific biosurveillance analytical applications.	-	0.160	0.188

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0603923D8Z / *Coalition Warfare Program*	**Project (Number/Name)** P923 / *Coalition Warfare*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
FY 2017 Plans: Conduct baseline scoping studies for discovery of data services and information systems. Conduct design review and pre-demonstration testing. ***FY 2018 Plans:*** Conduct scenario development for exercise and conduct demonstration.			
Title: High Powered Radio Frequency (RF) Vehicle/Vessel Stopping ***Description:*** US Navy/US Marine Corps/US Coast Guard project to demonstrate non-lethal weapon vessel/vehicle stopping systems, using recent developments in vacuum electronics designs and solid state power modulators. ***FY 2017 Plans:*** Conduct radio frequency weapon effects research as well as hardware development and integration. ***FY 2018 Plans:*** Complete power combining research and development; test hardware.	-	0.635	0.615
Title: Moth Eye Structures for Optics and Detectors ***Description:*** US Navy project to improve durability and dependability of antireflective coatings on optics, detectors, and focal plane arrays by developing and testing antireflective moth eye surfaces. ***FY 2016 Accomplishments:*** Initial equipment purchase. Design and characterization of moth eye structures on optics and detectors. ***FY 2017 Plans:*** Improve moth eye structure fabrication and characterization on focal plane arrays. ***FY 2018 Plans:*** Optimize moth eye structure and conduct field test with sensor systems.	0.238	0.420	0.392
Title: Remote Multi-Sensor Multi-Angular Terrain Characterization ***Description:*** US Navy project to increase accuracy of terrain characterization tools for derivation of surface and sub-surface sediment conditions and trafficability estimation by developing and testing a combined multi-sensor data collection and processing methodology. ***FY 2017 Plans:***	-	0.526	0.109

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0603923D8Z / *Coalition Warfare Program*	**Project (Number/Name)** P923 / *Coalition Warfare*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Initial equipment purchases and software integration. ***FY 2018 Plans:*** Implementation of additional components, data analysis, and preparation for final field demonstration.			
Title: Classified Project ***FY 2017 Plans:*** Classified project. ***FY 2018 Plans:*** Classified project.	-	0.250	0.500
Title: Rapid Integration of Coalition Sensors ***Description:*** US Army project to rapidly integrate information, surveillance, target acquisition, and reconnaissance sensors and validate interoperability of these sensors with current architectures by developing methodology and software tools. ***FY 2017 Plans:*** Develop requirements, conduct system engineering, design and development of integration tools. Integrate sensors and conduct demonstration. ***FY 2018 Plans:*** Complete system engineering and design and development of integration tools. Develop architecture interface.	-	0.200	0.200
Title: Small Scalable Kinetic Weapon Phase 2 ***Description:*** US Air Force project to add all-weather, night and moving target capability to the Small Scalable Kinetic Weapon, to provide a more robust, scalable, low collateral damage weapon. ***FY 2017 Plans:*** Initial component procurement. ***FY 2018 Plans:*** Lab set up and instrumentation for testing.	-	0.025	0.700
Title: Project Selections ***Description:*** Program will conduct competitive nomination process to identify new projects. ***FY 2018 Plans:***	-	-	2.972

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0603923D8Z / *Coalition Warfare Program*	**Project (Number/Name)** P923 / *Coalition Warfare*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Projects selected based on Combatant Command, Service, Joint Staff, OSD, and DoD Agency priorities and requirements.			
Title: Coalition Warfare Program (CWP) Support ***Description:*** Program funds contractors to support CWP program management, which includes: ensuring CWP projects are consistent with the policies and principles articulated in Department of Defense directives and regulations; monitoring project progress toward goals and objectives to include tracking project budget execution; providing assessments of program status and risk to higher authorities; briefing and providing recommendations to the Director, International Cooperation concerning new and continuing CWP projects; supporting periodic meetings to foster international cooperation and improve U.S. interoperability with foreign partners; supporting CWP proposal selection process; briefing program stakeholders on the status of CWP projects and interoperability initiatives; educating Combatant Command, Service, Agency, and OSD personnel about the CWP and the opportunity to improve coalition interoperability. ***FY 2016 Accomplishments:*** Contractor provided management support of the CWP, to include evaluating proposals for FY17 funding, attending RDT&E meetings and events, and monitoring and managing projects' technical and financial performance. ***FY 2017 Plans:*** Contractor provides management support of the CWP, to include evaluating proposals for FY18 funding, attends RDT&E meetings and events, and monitors and manages projects' technical and financial performance. ***FY 2018 Plans:*** Contractor provides management support of the CWP, to include evaluating proposals for FY19 funding, attends RDT&E meetings and events, and monitors and manages projects' technical and financial performance.	0.541	0.552	0.562
Title: Interoperability and Collaboration Initiatives ***Description:*** Program provides funds in support of new or planned acquisition programs with the aim of 1) promoting coalition interoperability early in the requirements or technical development phases, 2) harmonizing common goals between U.S. and foreign partners, 3) improving management of collaborative efforts. Funds support workshops, risk reduction efforts, standards development, architecture analysis, and information management initiatives. ***FY 2016 Accomplishments:*** Program will fund efforts aimed at building partnerships, improving U.S. interoperability with foreign partners and improving collaborative project processes. ***FY 2017 Plans:***	0.583	0.575	0.530

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0603923D8Z / *Coalition Warfare Program*	**Project (Number/Name)** P923 / *Coalition Warfare*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Program will fund efforts aimed at building partnerships, improving U.S. interoperability with foreign partners and improving collaborative project processes. ***FY 2018 Plans:*** Program will fund efforts aimed at building partnerships, improving U.S. interoperability with foreign partners and improving collaborative project processes.			
Accomplishments/Planned Programs Subtotals	10.179	10.126	10.740

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

The Combatant Commands, Services, Defense Agencies, and the Office of the Secretary of Defense nominate candidate projects on an annual basis. CWP provides selected projects up to three years of funding. The Program selects projects that address DoD priorities and meet the needs and requirements specified by the Joint Staff and the Combatant Commanders. Projects have equitable contributions from international partners, strong potential for transition, and contribute to allied interoperability and/or meet a user need.

E. Performance Metrics

After successful completion of the competitive nomination process, initial project funding is dependent on receipt of project documentation, which includes financial information, project plan, description of project team, etc. Continued project funding is dependent on compliance with CWP requirements, which include: adequate progress toward each project's stated goals, timely reporting on financial status and project activities, financial document close-out, provision of updated project plans and charts, and progress towards transition goals.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0603923D8Z / *Coalition Warfare Program*	**Project (Number/Name)** P923 / *Coalition Warfare*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Coalition Warfare Program Project Product Development Costs	Various	Various : Various	27.728	8.088		7.760		8.800		-		8.800	-	-	-
		Subtotal	27.728	8.088		7.760		8.800		-		8.800	-	-	-

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Coalition Warfare Program Project Test and Evaluation Costs	Various	Various : Various	8.470	1.296		1.556		0.848		-		0.848	-	-	-
		Subtotal	8.470	1.296		1.556		0.848		-		0.848	-	-	-

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Coalition Warfare Program Project Management Services Costs	Various	Various : Various	6.332	0.795		0.810		1.092		-		1.092	-	-	-
		Subtotal	6.332	0.795		0.810		1.092		-		1.092	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	42.530	10.179		10.126		10.740		-		10.740	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0603923D8Z / *Coalition Warfare Program*	**Project (Number/Name)** P923 / *Coalition Warfare*

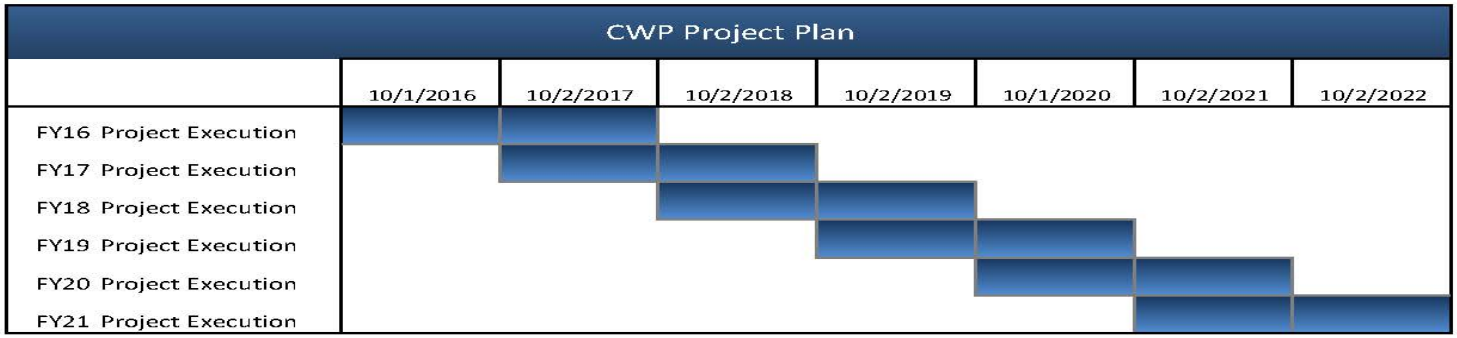

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0603923D8Z / *Coalition Warfare Program*	**Project (Number/Name)** P923 / *Coalition Warfare*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
FY16 CWP Project Execution	1	2016	4	2017
FY17 CWP Project Execution	1	2017	4	2018
FY18 CWP Project Execution	1	2018	4	2019
FY19 CWP Project Execution	1	2019	4	2020
FY20 CWP Project Execution	1	2020	4	2021
FY21 CWP Project Execution	1	2021	4	2022

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604016D8Z / *Department of Defense Corrosion Program*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	96.626	7.471	3.893	3.837	-	3.837	3.505	3.542	3.610	3.682	Continuing	Continuing
P015: *Corrosion Protection Projects*	96.626	7.471	3.893	3.837	-	3.837	3.505	3.542	3.610	3.682	Continuing	Continuing

Note

The FY 2016 funding request was reduced by $1.521 million to account for the availability of prior year execution balances.

A. Mission Description and Budget Item Justification

The purpose of this program is to develop a comprehensive capability to prevent and mitigate corrosion and its effects on Department of Defense (DoD) weapon systems and infrastructure. Corrosion severely impacts system and facility reliability, readiness and safety, and consumes a disproportionate amount of material and labor hours for repair and treatment of corrosion damaged systems and facilities. The cost of corrosion across the DoD has been estimated at over 23 billion each year. The impact and cost of corrosion are so pervasive that Congress enacted Public Law 107-314 Sec: 1067 [portions codified in 10 U.S.C. 2228]: Prevention and mitigation of corrosion of military infrastructure and equipment. This legislation requires that DoD develop a long-term corrosion strategy to include establishment of a coordinated R&D program with transition plans. The legislation also requires that DoD designate a responsible official or organization to oversee a corrosion prevention and mitigation program. The responsibilities of the Director, Corrosion Policy and Oversight and the Military Department Corrosion Prevention and Control Executives were further delineated in DODI 5000.67 "Prevention and Mitigation of Corrosion on Military Equipment and Infrastructure" of 01 February 2010.

The Deputy Secretary of Defense designated the Principal Deputy Under Secretary of Defense (Acquisition, Technology, and Logistics) (PDUSD(AT&L)) as the DoD Corrosion Executive in May 2003. The DoD Corrosion Executive subsequently established a Corrosion Control and Oversight office to implement the program. Subsequently, in accordance with Section 371 of the 2008 National Defense Authorization Act, the Under Secretary of Defense (USD(AT&L)) designated a Director, Corrosion Policy and Oversight to perform the duties of the DoD Corrosion Executive with responsibilities as described in the 2008 NDAA legislation. A major responsibility of the Director, Corrosion Policy and Oversight is to select high payoff research and development projects that promise to prevent or mitigate corrosion and significantly reduce the total cost of corrosion along with the adverse impact of corrosion effects on weapon system and infrastructure operational capability. This office chartered a Corrosion Prevention and Control Integrated Product Team (CPCIPT) that has selected and funded Operation and Maintenance projects for each Fiscal Year (FY) commencing in FY 2005. However, the DoD CPCIPT has determined that the biggest payoff in corrosion prevention and mitigation will come from investing in up-front prevention technologies, materials, and processes to leverage downstream cost avoidance in corrosion maintenance and repair. Likewise, development of improved predictive and prognostic techniques can eliminate unseen failure and reduce unnecessary maintenance and repair costs. Thus, technology development, demonstration, and transition projects have been selected and funded since FY 2006. In addition, the University Corrosion Collaboration (now the Technical Corrosion Collaboration (TCC)) was formed as collaboration between universities, academies and research laboratories, focused on corrosion technology research and development to provide solutions to long-term, complex corrosion prevention and control problems, including metallic-non-metallic interactions, advanced surface coatings and treatments for non-traditional use of materials. This advanced corrosion research has been funded since FY 2008 and performed by teams from TCC participating organizations.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604016D8Z / *Department of Defense Corrosion Program*

In FY 2009, the Military Departments assigned corrosion executives and began submitting reports to Congress on inserting corrosion planning into the acquisition process. The FY 2011 NDAA added a requirement for the DoD to report the amount of funds requested in the preceding year budget for each planned project or activity, as compared to the funding required for each project or activity. These funds provide a portion of the funds used to implement associated corrosion control projects and activities.

These projects address critical corrosion issues in both Department of Defense infrastructure as well as warfighting systems. A number of low-risk, high-payoff technologies promise to vastly improve the service life and significantly reduce the maintenance costs of storage tanks and other mission support facilities essential to maintain support for the warfighter. Each of the services has identified important projects that vastly increase operational readiness and reduce operations and maintenance costs. All services are studying corrosion inhibitors that improve reliability and life of electrical and avionics equipment. Likewise, an array of highly effective, rapid cure coatings that are easy to apply and can forestall corrosion for many years on aircraft and ships are being developed. Other vital projects being considered include sealants, wash down systems, sensors and prognostic technologies that have joint service applications and potential to prevent and mitigate corrosion and its effects over a wide range of systems.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	6.518	3.893	3.866	-	3.866
Current President's Budget	7.471	3.893	3.837	-	3.837
Total Adjustments	0.953	0.000	-0.029	-	-0.029
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	1.000	-			
• SBIR/STTR Transfer	-0.047	-			
• DTIC Offset	-	-	-0.026	-	-0.026
• Other	-	-	-0.003	-	-0.003

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2016	FY 2017
Project: P015: *Corrosion Protection Projects*		
Congressional Add: *Corrosion Control, Prevention and Prediction through Coatings, Materials and Maintenance R&D*	5.000	-
Congressional Add Subtotals for Project: P015	5.000	-
Congressional Add Totals for all Projects	5.000	-

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604016D8Z / *Department of Defense Corrosion Program*

Change Summary Explanation

Baseline adjustment reflects funding for internal AT&L priorities and requirements.

NOTE: The FY 2016 funding request was reduced by $1.521 million to account for the availability of prior year execution balances.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604016D8Z / *Department of Defense Corrosion Program*	Project (Number/Name) P015 / *Corrosion Protection Projects*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P015: *Corrosion Protection Projects*	96.626	7.471	3.893	3.837	-	3.837	3.505	3.542	3.610	3.682	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The purpose of this program is to develop a comprehensive capability to prevent and mitigate corrosion and its effects on Department of Defense (DoD) weapon systems and infrastructure. Corrosion severely impacts system and facility reliability, readiness and safety, and consumes a disproportionate amount of material and labor hours for repair and treatment of corrosion damaged systems and facilities. The cost of corrosion across the DoD has been estimated at over $20 billion each year. The impact and cost of corrosion are so pervasive that Congress enacted Public Law 107-314 Sec: 1067 [portions codified in 10 U.S.C. 2228]: Prevention and mitigation of corrosion of military infrastructure and equipment. This legislation requires that DoD develop a long-term corrosion strategy to include establishment of a coordinated R&D program with transition plans. The legislation also requires that DoD designate a responsible official or organization to oversee a corrosion prevention and mitigation program. The responsibilities of the Director, Corrosion Policy and Oversight and the Military Department Corrosion Prevention and Control Executives were further delineated in DODI 5000.67 "Prevention and Mitigation of Corrosion on Military Equipment and Infrastructure" of 01 February 2010.

The Deputy Secretary of Defense designated the Principal Deputy Under Secretary of Defense (Acquisition, Technology, and Logistics) (PDUSD(AT&L)) as the DoD Corrosion Executive in May 2003. The DoD Corrosion Executive subsequently established a Corrosion Control and Oversight office to implement the program. Subsequently, in accordance with Section 371 of the 2008 National Defense Authorization Act, the Under Secretary of Defense (USD(AT&L)) designated a Director, Corrosion Policy and Oversight to perform the duties of the DoD Corrosion Executive with responsibilities as described in the 2008 NDAA legislation. A major responsibility of the Director, Corrosion Policy and Oversight is to select high payoff research and development projects that promise to prevent or mitigate corrosion and significantly reduce the total cost of corrosion along with the adverse impact of corrosion effects on weapon system and infrastructure operational capability. This office chartered a Corrosion Prevention and Control Integrated Product Team (CPCIPT) that has selected and funded Operation and Maintenance projects for each Fiscal Year (FY) commencing in FY 2005. However, the DoD CPCIPT has determined that the biggest payoff in corrosion prevention and mitigation will come from investing in up-front prevention technologies, materials, and processes to leverage downstream cost avoidance in corrosion maintenance and repair. Likewise, development of improved predictive and prognostic techniques can eliminate unseen failure and reduce unnecessary maintenance and repair costs. Thus, technology development, demonstration, and transition projects have been selected and funded since FY 2006. In FY 2009, the Military Departments assigned corrosion executives and began submitting reports to Congress on inserting corrosion planning into the acquisition process. The FY 2011 NDAA added a requirement for the DoD to report the amount of funds requested in the preceding year budget for each planned project or activity, as compared to the funding required for each project or activity. These funds provide a portion of the funds used to implement associated corrosion control projects and activities.

These projects address critical corrosion issues in both Department of Defense infrastructure as well as warfighting systems. A number of low-risk, high-payoff technologies promise to vastly improve the service life and significantly reduce the maintenance costs of weapon systems and facilities essential to maintain support for the warfighter. The current composite return on investment for these projects is 16:1. Each of the services has identified important projects that vastly increase

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604016D8Z / *Department of Defense Corrosion Program*	**Project (Number/Name)** P015 / *Corrosion Protection Projects*

operational readiness and reduce operations and maintenance costs. All services are studying advanced coatings and corrosion inhibitors that improve reliability and life of equipment. New inspection monitoring techniques focused on rapid and quantitative assessment of corrosion are also being investigated.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Corrosion Prevention and Control Projects and Activities	2.471	3.893	3.837
FY 2016 Accomplishments: Continue to work with the Services to develop and transition mature technologies Refined and improve acquisition policies related to corrosion control Re-issued DoDI 5000.67 “Prevention and Mitigation of Corrosion on DoD Military Equipment and Infrastructure” Continued to provide oversight of corrosion planning for ACAT I systems Completed impact of corrosion studies on additional defense segments; complete development of predictive capabilities Issued joint SSPC/NACE standard on Corrosion Planning			
FY 2017 Plans: Continue to work with the Services to develop and transition mature technologies Refine and improve acquisition policies related to corrosion control Continue to provide oversight of corrosion planning for ACAT I systems Complete impact of corrosion studies on additional defense segments; perform pilot evaluation of selected ACAT I program using predictive capabilities Partner with the Services to provide corrosion training to military and DoD civilians Continue to produce DoD-relevant research results and highly trained individuals under the Technical Corrosion Collaboration			
FY 2018 Plans: Continue to work with the Services to develop and transition mature technologies Refine and improve acquisition policies related to corrosion control Continue to provide oversight of corrosion planning for ACAT I systems Complete impact of corrosion studies on additional defense segments; perform pilot evaluation of selected ACAT I program using predictive capabilities Partner with the Services to provide corrosion training to military and DoD civilians			
Accomplishments/Planned Programs Subtotals	2.471	3.893	3.837

	FY 2016	FY 2017
Congressional Add: Corrosion Control, Prevention and Prediction through Coatings, Materials and Maintenance R&D	5.000	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604016D8Z / *Department of Defense Corrosion Program*	**Project (Number/Name)** P015 / *Corrosion Protection Projects*

	FY 2016	FY 2017
FY 2016 Accomplishments: Completed grant execution for establishment of self-sustaining National Center for Education and Research on Corrosion and Materials Properties (NCERCAMP) at the University of Akron Partnered with the Services to provide corrosion training to military and DoD civilians Conducted 2015 DoD – Allied Nations Technical Corrosion Conference Completed congressionally requested studies on Care of Supplies in Storage (COSIS) and Semi-Permanent Dehumidified Storage. Contributed to the update of the Defense Acquisition Guidebook (DAG) Produced 7 journal articles and graduated 12 individuals with advanced degrees under the Technical Corrosion Collaboration		
Congressional Adds Subtotals	5.000	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Acquisitions are accomplished in three categories including projects, research opportunities, and activities as described in the DoD Corrosion Prevention and Mitigation Strategic Plan.

Projects are funded jointly by CPO and the Military Departments and are led by subject matter experts at the Military Department laboratories. CPO issues a call for proposed project plans in April and projects are submitted in June. The project plan format is contained in the DoD Corrosion Prevention and Mitigation Strategic Plan. The Corrosion Prevention and Control Integrated Project Team (CPCIPT) receives project plans and engages an evaluation panel to review proposed projects and make recommendations regarding project selection. Projects are also evaluated using Data Envelopment Analysis (DEA) to rank projects by relative efficiency. DEA factors include project performance period, ratio of OSD funding to Service funding, return-on-investment (ROI), degree to which the proposed technology addresses high-cost corrosion problems, potential benefits, joint service applicability, and probability of transition. Upon acceptance and approval of the projects, funding is distributed to the Military Departments by Military Interdepartmental Purchase Request (MIPR) based on funding priorities associated with the evaluation process results. Project execution is monitored through submission of quarterly quad charts and by conducting an annual review.

Research opportunities are funded through the Technical Corrosion Collaboration (TCC). A call for white paper proposals is issued by CPO through an existing U.S. Air Force Academy (USAFA) Broad Agency Announcement (BAA). Submissions are evaluated by a technical panel chaired by the Deputy Director, CPO. Evaluation factors include quality of proposed research, potential impact on DoD corrosion problems, level of student involvement, and proposed collaboration between the research institutions and DoD laboratories. Projects are ranked by the selection panel and funded based on merit and available funds. Research institutions receive

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604016D8Z / *Department of Defense Corrosion Program*	**Project (Number/Name)** P015 / *Corrosion Protection Projects*

funds for the TCC through the establishment of cooperative agreements with USAFA. Research execution is monitored through submission of quarterly quad charts and by conducting an annual review.

Activities are those work efforts associated with the Working Integrated Product Teams (WIPT) under the CPCIPT and include policy, training, specifications and standards, metrics, science and technology, facilities, and communication and outreach. WIPT Leads submit funding requirements associated with their annual tactical plan submission to CPO. The proposed activities are prioritized by CPO and funded based on merit and available funds. Activities are accomplished by both government and contractor personnel. Funds are transferred to government personnel through the MIPR process. Funds are transferred to contractor personnel through competitively awarded contracts including the multiple-award Blanket Purchase Agreement held by CPO. Progress on activities is reviewed tri-annually at meetings of the CPCIPT.

E. Performance Metrics

Not applicable.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense											Date: May 2017	
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0604132D8Z / *Missile Defeat Project*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	0.000	0.000	185.500	98.369	-	98.369	0.000	0.000	0.000	0.000	Continuing	Continuing
P072: *Missile Defeat Project*	0.000	0.000	185.500	98.369	-	98.369	0.000	0.000	0.000	0.000	Continuing	Continuing

Program MDAP/MAIS Code:
Project MDAP/MAIS Code(s): 000

Note

This is a new program element in FY 2017. Previous funding was through various FY 2014, FY 2015, and FY 2016 OUSD program elements including: PE 0602234D8Z (Lincoln Laboratory), PE 0603160BR (Counter-proliferation Initiatives - DTRA), PE 0603699D8Z (Emerging Capabilities Technology Development), and a few classified program elements.

A. Mission Description and Budget Item Justification

The Missile Defeat Project counters the growing global advancement and proliferation of road-mobile ballistic missile threats. This effort develops and integrates new capability and architectures to optimize fielded weapon systems and C4ISR to defeat these emerging threats.

The Missile Defeat Project coordinates and integrates DoD and Intelligence Community (IC) efforts to develop counter threat capability. This effort measures the effectiveness of new architectures and revolutionary concepts against evolving threats by working with the IC, Combatant Commands, government labs, program offices, industry, and academia.

To meet this challenge the Missile Defeat Project leverages existing test and simulated environments to perform analysis of industry and government reference concepts and architectures to provide innovative technical solutions for missile defeat. We are developing virtual and physical testbeds to robustly test, evaluate, and prototype architectures and assess their ability to improve time critical targeting and defeat of road-mobile threats. The virtual testbed complements testing at physical ranges by providing an infrastructure for addressing different training, test, and evaluation needs. This effort also includes systems engineering and analysis to devolve technical requirements, identify promising solutions, and inform future investment decisions.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604132D8Z / *Missile Defeat Project*

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	0.000	45.000	46.000	-	46.000
Current President's Budget	0.000	185.500	98.369	-	98.369
Total Adjustments	0.000	140.500	52.369	-	52.369
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Other Adjustment	-	-	52.678	-	52.678
• DTIC Offset	-	-	-0.309	-	-0.309
• FY 2017 Request for Additional Appropriation	-	140.500	-	-	-

Change Summary Explanation

Activities within this document reflect headquarter-wide efficiency initiatives.

The amended budget request for an additional $140.500 million is required to address emergency warfighting readiness requirements.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604132D8Z / *Missile Defeat Project*	Project (Number/Name) P072 / *Missile Defeat Project*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P072: *Missile Defeat Project*	0.000	0.000	185.500	98.369	-	98.369	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 000

Note

This is a new program element in FY 2017. Previous funding was through various FY 2014, FY 2015, and FY 2016 OUSD program elements including: PE 0602234D8Z (Lincoln Laboratory), PE 0603160BR (Counter-proliferation Initiatives - DTRA), PE 0603699D8Z (Emerging Capabilities Technology Development), and a few classified program elements.

A. Mission Description and Budget Item Justification

The Missile Defeat Project coordinates and integrates joint DOD and Intelligence Community (IC) efforts to develop counter threat capability solutions in five key areas: 1) dynamic command and control; 2) intelligence, surveillance and reconnaissance; 3) responsive conventional counterforce; 4) national missile defense; and 5) an enduring demonstration and experimentation capability to integrate and measure the effectiveness of developed solutions.

The Missile Defeat Project performs system engineering, integration, and modeling and simulation in support of the development of a set of system architectures. In addition, it develops integrated capability assessments with updated architectures and threat scenarios, defines and allocates options, expands functionality, and incorporates exercise results for missile defeat enterprise tools. The end-to-end systems engineering informs capability investments and requirement allocations across the missile defeat enterprise.

The Missile Defeat Project is leveraging existing state of the art and emerging technology to offer game changing solutions for the department's highest priorities. This technology is evaluated using new and novel concepts of operation to rapidly deliver improved time critical targeting, concepts of operation, and missile defeat to the warfighter. The Missile Defeat Project is developing an evolutionary roadmap to document an architecture that best utilizes the Nation's resources to defeat the emerging threats.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Previous Missile Defeat Project efforts	-	185.500	98.369
Description: The Missile Defeat Project counters the growing global advancement and proliferation of ballistic missile threats through development of counter threat capability solutions that monitor, coordinate and integrate the Department of Defense (DoD) efforts. Missile Defeat is integrating existing capacity and identifying and developing new capabilities to address these threats.			
FY 2017 Plans:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604132D8Z / *Missile Defeat Project*	**Project (Number/Name)** P072 / *Missile Defeat Project*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- In FY 2017, Missile Defeat Project will focus on development, integration and testing in five key areas: Dynamic command and control; Intelligence, surveillance and reconnaissance; Responsive conventional counterforce; National missile defense; and Enduring demonstration and experimentation capability. - Expand the time critical targeting end-to-end simulation to model additional architecture elements and functions. - Perform systems engineering to deliver initial overarching technical requirements documentation and analysis for candidate architectures. - Deliver detailed test objectives, test event planning, and post-test evaluation for time critical targeting test events in FY 2017. FY 2017 Request for Additional Appropriations (RAA) Plans ($140.500 Million): - Advanced airborne Time Critical Targeting surrogate test platforms, $48.000 million. - Game changing sensing demonstration satellite for find and fix, $22.000 million. - Find and Mark Experiment for Mobile Missiles, $7.200 million. - National security site modifications to test, evaluate, and prototype architectures and assess their ability to improve time critical targeting and defeat of road-mobile threats, $51.300 million. - Advanced risk reduction demonstrations to improve observational persistence, $12.000 million. ***FY 2018 Plans:*** - In FY 2018, Missile Defeat Project will evaluate results from development and testing to enhance experimental and existing system architectures for Missile Defeat. - Deliver architecture improvements to enhance time critical targeting. - Develop and deliver prototype hardware and software for evaluation during test events. - Deliver component, system, and architecture analysis to the warfighter for recommendations on improved time critical targeting, concepts of operation, and missile defeat. - Perform systems engineering to deliver technical requirements documentation and analysis of candidate architectures. - Deliver detailed test objectives, test event planning, and post-test evaluation for time critical targeting test events in FY 2018.			
Accomplishments/Planned Programs Subtotals	-	185.500	98.369

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604132D8Z / *Missile Defeat Project*	**Project (Number/Name)** P072 / *Missile Defeat Project*

D. Acquisition Strategy

The acquisition strategy consists of partnering with small businesses, industry, Federally Funded Research and Development Centers and University Affiliated Research Centers. OSD will leverage DoD, the Intelligence Community, and government model-based assessments to inform Better Buying Power philosophy acquisition decisions.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604132D8Z / *Missile Defeat Project*	Project (Number/Name) P072 / *Missile Defeat Project*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Various	C/TBD	MULTI : MULTI	-	-		185.500		98.369		-		98.369	Continuing	Continuing	-
		Subtotal	-	-		185.500		98.369		-		98.369	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		185.500		98.369		-		98.369	-	-	-

Remarks

N/A

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604132D8Z / *Missile Defeat Project*	**Project (Number/Name)** P072 / *Missile Defeat Project*

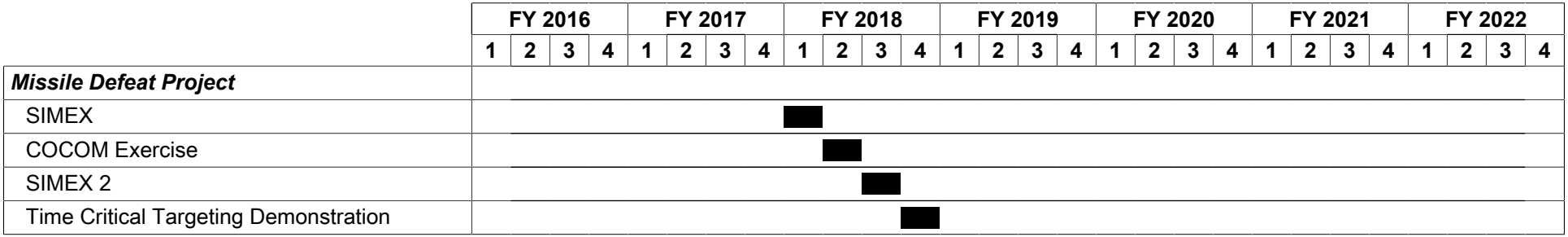

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604132D8Z / *Missile Defeat Project*	**Project (Number/Name)** P072 / *Missile Defeat Project*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Missile Defeat Project				
SIMEX	1	2018	1	2018
COCOM Exercise	2	2018	2	2018
SIMEX 2	3	2018	3	2018
Time Critical Targeting Demonstration	4	2018	4	2018

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604250D8Z / *Advanced Innovative Technologies*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	296.683	459.966	846.470	1,175.832	-	1,175.832	958.802	620.173	89.365	103.000	Continuing	Continuing
P250: *Advanced Innovative Technologies*	296.683	459.966	846.470	1,175.832	-	1,175.832	958.802	620.173	89.365	103.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Strategic Capabilities Office (SCO) identifies, analyzes, demonstrates, and transitions game-changing applications of existing and near-term technology (and other U.S. Government capabilities) to shape and counter emerging threats. Currently focused on the Asia-Pacific Rebalance, SCO combines capability innovation with concepts of operation and information management to develop novel concepts often crossing Service, Defense-Intelligence, and multi-classification divides. This helps to solve critical national security challenges in partnership with the Services, Defense Agencies, Combatant Commands (COCOMS), Joint Chiefs of Staff, Intelligence Community, and the Office of the Secretary of Defense (OSD). SCO analyzes, demonstrates, and red-teams these concepts on an accelerated time frame to enable subsequent programmatic decisions on alternative capabilities that have greater mission impact and lower cost.

The Advanced Innovative Technologies Program Element (PE) contains projects that include in-depth analysis to determine technical and operational performance and risk, component and subsystem-level prototyping and testing to reduce risk, and operational demonstrations to prove concept viability prior to subsequent programmatic decisions. Due to the nature of these projects, specific applications and detailed plans are available at a higher classification level.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	468.881	844.870	544.547	-	544.547
Current President's Budget	459.966	846.470	1,175.832	-	1,175.832
Total Adjustments	-8.915	1.600	631.285	-	631.285
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-8.915	-			
• OTHER adjustments	-	-	624.285	-	624.285
• Request for Additional Appropriations	-	1.600	7.000	-	7.000

Change Summary Explanation

OTHER adjustments provided for FY 2017 and FY 2018.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604250D8Z *I Advanced Innovative Technologies*

The amended budget request for an additional of $1.600 million is required in FY 2017 and an additional $7.000 million in FY 2018 to address emergency warfighting readiness requirements.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604250D8Z / *Advanced Innovative Technologies*	Project (Number/Name) P250 / *Advanced Innovative Technologies*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P250: *Advanced Innovative Technologies*	296.683	459.966	846.470	1,175.832	-	1,175.832	958.802	620.173	89.365	103.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Strategic Capabilities Office (SCO) identifies, analyzes, demonstrates, and transitions game-changing applications of existing and near-term technology (and other U.S. Government capabilities) to shape and counter emerging threats. Currently focused on the Asia-Pacific Rebalance, SCO combines capability innovation with concepts of operation and information management to develop novel concepts often crossing Service, Defense-Intelligence, and multi-classification divides. SCO helps to solve critical national security challenges in partnership with the Services, Defense Agencies, Combatant Commands (COCOMS), Joint Chiefs of Staff, Intelligence Community, and the Office of the Secretary of Defense (OSD). SCO analyzes, demonstrates, and red-teams these concepts on an accelerated time frame to enable subsequent programmatic decisions on alternative capabilities that have greater mission impact and lower cost.

The Advanced Innovative Technologies Program Element (PE) contains projects that include in-depth analysis to determine technical and operational performance and risk, component and subsystem-level prototyping and testing to reduce risk, and operational demonstrations to prove concept viability prior to subsequent programmatic decisions. Due to the nature of these projects, specific applications and detailed plans are available at a higher classification level.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Advanced Navigation	11.659	3.350	-
Description: Leverage existing technologies to analyze, build and demonstrate a prototype advanced navigation technique for contested environments and integrate into a mature weapons system.			
FY 2016 Accomplishments: • Defined software development requirements and preliminary software design. • Evaluated software – hardware compatibility in a captive-carry flight test. • Modeled navigation performance when integrated into a weapon system. • Defined system requirements and preliminary system design. • Began test planning for demonstrations in FY 2017. • Tested sensor hardware in captive-carry test and post-processed with navigation algorithms.			
FY 2017 Plans: • Determine baseline design of software development tools, flight software, and flight hardware. • Conduct captive-carry flight test of baseline hardware and software. • Conduct planning for integration into additional weapons.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604250D8Z / *Advanced Innovative Technologies*	**Project (Number/Name)** P250 / *Advanced Innovative Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Conduct functional qualification testing of hardware and software for flight test. • Test sensor hardware and navigation software in captive-carry test. • Drop guided test vehicles to demonstrate weapon accuracy using sensor hardware and navigation software.			
Title: Alternative Strike ***Description:*** The Alternative Strike program demonstrates feasibility and utility of launching existing/modified weapons from existing launch platforms. This project will retire risks associated with cross platform integration to enable transition of new weapon/system combinations to Service partners. Due to the nature of these projects, specific applications and detailed plans are available at a higher classification level. The Alternative Strike project transitions fully in FY 2017 from the Advanced Innovative Analysis and Concepts Program Element (PE) 0603289D8Z to the Advanced Innovative Technologies (PE) 0604250D8Z. ***FY 2017 Plans:*** • Complete system design analysis and trade studies. • Conduct environmental testing. • Complete initial ground testing. • Conduct sub-system requirement review. • Develop wind tunnel models. • Perform wind tunnel tests. • Continue test planning. ***FY 2018 Plans:*** • Conduct initial design review. • Develop initial weapon designs. • Develop weapon system simulation. • Continue ground testing.	-	198.030	175.760
Title: Assured Tactical C2 (ATC2) ***Description:*** Leverage existing technologies to analyze and demonstrate an alternative tactical command and control solution for contested environments. Project will apply existing Department of Defense (DoD) investments in novel ways to increase tactical command and control reliability in contested environments. Due to the nature of these projects, specific applications and detailed plans are available at a higher classification level. This project transitions to the Services in FY 2017. ***FY 2016 Accomplishments:*** • Completed enhanced security and vulnerability assessments.	15.100	-	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604250D8Z / *Advanced Innovative Technologies*	**Project (Number/Name)** P250 / *Advanced Innovative Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Demonstrated an integrated, secure, and assured operational environment that provides reliable communications and robust security for the tactical warfighter. • Demonstrated capabilities at Trident Warrior 16.			
Title: AVATAR ***Description:*** SCO will convert manned aircraft and target drones to avatars in order to develop enhanced combat capabilities. Due to the nature of this project, specific applications and detailed plans are available at a higher classification level. ***FY 2018 Plans:*** • Conduct detailed design and systems engineering activities in support of system architecture, hardware design and platform integration requirements. • Establish a ground-based simulator for further system development and testing. • Complete design review and execute vendor down-select. • Finalize sensor package requirements and select systems for integration.	-	-	25.000
Title: Breaker ***Description:*** The Breaker demonstration integrates existing systems to provide Combatant Commanders with long range, surface- and air-delivered area effects. This project will demonstrate the feasibility and utility of launching this modified weapon from existing fires launchers. This project will retire risks associated with munition integration into and dispense from existing systems including modifications to increase munition lethality. Due to the nature of these projects, specific applications and detailed plans are available at a higher classification level. ***FY 2018 Plans:*** • Determine munition integration design. • Conduct planning for integration into existing fires launchers. • Conduct ground-based tests to confirm design and functionality. • Continue mission analysis evaluating capability across multiple mission areas.	-	-	47.782
Title: Command and Control of the Information Environment (C2IE) ***Description:*** The Command and Control of the Information Environment (C2IE) project provides Combatant Commands, Services, Agencies, and Department of Defense leadership the ability to detect, monitor, understand, and act in the information environment. The C2IE project leverages commercial and other existing software tools to enable dynamic understanding of the information environment. C2IE will improve the warfighters ability to sense, understand, and visualize the information environment, and collaboratively plan and execute responses. Due to the nature of this project, specific applications and detailed plans are available at a higher classification level. The Command and Control of the Information Environment project transitions fully in	-	31.880	36.570

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604250D8Z / *Advanced Innovative Technologies*	**Project (Number/Name)** P250 / *Advanced Innovative Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
FY 2017 from the Advanced Innovative Analysis and Concepts Program Element (PE) 0603289D8Z to the Advanced Innovative Technologies (PE) 0604250D8Z. ***FY 2017 Plans:*** • Demonstrate near real-time analysis of unclassified data sources on a single platform. • Complete initial assessment of performance of four analytic components. • Complete initial installation/demonstration of C2IE components on two Secure Internet Protocol Router (SIPR) networks. • Perform developmental, operational, and interface testing of C2IE software. • Initiate development of Tactics Techniques & Procedures (TTP) for use of developed analytics. • Continue incremental software development of information Common Operational Picture (iCOP) and Situational Awareness (SA) components of C2IE. • Conduct multiple validation demonstrations and workshops for various Combatant Commanders (CCMDs). • Establish a C2IE requirements working group and validation process. ***FY 2018 Plans:*** • Continue assessment of performance for four additional analytic components. • Continue incremental software development, system integration, and testing cycle of the C2IE software. • Continue installation/demonstration of C2IE components and system on SIPR networks for each Combatant Command. • Continue developmental, operational, and interface testing of C2IE software. • Continue conducting multiple validation demonstrations and workshops for Combatant Commanders (CCMDs). • Develop a C2IE Capability Package (CP) and incorporate into the approved requirements Capability Definition Package (CDP).			
Title: Contender ***Description:*** SCO will develop and demonstrate an operational prototype that will extend the range of torpedoes for use in expanded mission sets. This project is currently funded within the Advanced Innovative Analysis and Concepts Program Element 0603289D8Z and will transition to the Advanced Innovative Technologies Program Element 0604250D8Z in FY 2017. ***FY 2017 Plans:*** • Refine Stakeholders Objectives Document. • Design and test communications subsystems and integrate into full design. • Test and scale propulsion plant to meet desired speed and range goals while keeping integrated form factor. • Plan demonstrations to prove concept operational viability. • Design, integrate and test required sensors with Guidance Navigation and Control (GNC) package. ***FY 2018 Plans:***	-	35.550	69.600

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604250D8Z / *Advanced Innovative Technologies*	**Project (Number/Name)** P250 / *Advanced Innovative Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Design and test host platform dynamics. • Conduct in-water risk reduction tests. • Conduct payload launch testing. • Perform subsystem integration planning.			
Title: Enhanced Munitions ***Description:*** Leverage existing technologies to analyze and prototype enhancements to current munitions. As existing munitions age, leveraging advanced technology may enhance or buy-back performance. This project will retire risks associated with transition of enhanced munitions. Due to the nature of these projects, specific applications and detailed plans are available at a higher classification level. ***FY 2016 Accomplishments:*** • Conducted prototype component testing. • Completed first In-Process Review (IPR) of munition enhancements concept and design. ***FY 2017 Plans:*** • Build and test munition enhancement article. • Conduct second IPR of munition enhancements. • Finalize Critical Experiment test plan. • Plan and conduct first ground test of enhanced munition test article. ***FY 2018 Plans:*** • Build and test form factor enhancement article. • Conduct third In-Progress Review of munition enhancements. • Integrate enhancements into munitions test article. • Plan and conduct second ground test of integrated enhanced munition test article.	22.300	41.960	29.970
Title: Ghost Fleet ***Description:*** SCO will develop and demonstrate fleet integrated, operational prototype unmanned maritime vehicles to fill existing mission requirements for Combatant Commanders. The prototypes will include the platforms, autonomy, Command, Control and Communications (C3) and payload integration. Due to the nature of these projects, specific applications and detailed plans are available at a higher classification level. ***FY 2018 Plans:*** • Build and evaluate unmanned capabilities to support future operational demonstrations. • Begin payload integration activities.	-	-	206.000

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604250D8Z / *Advanced Innovative Technologies*	**Project (Number/Name)** P250 / *Advanced Innovative Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Finalize autonomy architecture to support mission, platform, and payload level autonomy development. • Conduct operational assessments for prototype systems.			
Title: Hornet's Nest ***Description:*** SCO will develop a multi-mission Unmanned Aerial Vehicle (UAV) capable of launch from manned/unmanned rotary and fixed wing aircraft and ground systems. Due to the nature of these projects, specific applications and detailed plans are available at a higher classification level. ***FY 2018 Plans:*** • Conduct initial program and testing review. • Conduct wargames to define operational scenarios. • Conduct subsystem development and testing. • Perform initial analysis for platform integration. • Demonstrate integration of various payloads and capabilities.	-	-	24.000
Title: Hypervelocity Gun Weapon System (HGWS) ***Description:*** Cost-effective, large magazine point defense will be demonstrated by closing the fire control loop between existing sensors and prototype projectiles launched from existing families of powder guns. Due to the nature of this project, specific applications and detailed plans are available at a higher classification level. ***FY 2016 Accomplishments:*** • Conducted live-fire projectile launches from numerous powder guns. • Conducted a control actuation system test from high velocity guns. • Tested projectile capabilities in hardware-in-the-loop and gun live-fire demonstrations. • Built government-designed projectiles for FY 2016 and FY 2017 testing. ***FY 2017 Plans:*** • Test lethality of projectile. • Use hardware-in-the-loop to test closed-loop system performance. • Conduct closed-loop live-fire testing at high velocity launch against synthetic targets. • Begin procurement of targets to be used in FY 2018 tests. • Conduct prototype fire control sensor Critical Design Review (CDR). • Conduct test site development activities. • Continue procurement of test targets for live-fire testing. ***FY 2018 Plans:***	259.724	246.070	67.050

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604250D8Z / *Advanced Innovative Technologies*	**Project (Number/Name)** P250 / *Advanced Innovative Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Complete Advanced Projectile design concepts. • Complete target procurement and support flight tests. • Continue closed-loop performance demonstrations by conducting increasingly difficult fly-by engagements of live targets. • Deliver Prototype Fire Control Radar and demonstrate enhanced range and precision. • Complete Prototype Surveillance Radar modifications and support demonstrations. • Integrate subsystems and conduct target intercepts.			
Title: LiTE Saber ***Description:*** SCO will develop and demonstrate a commercial-enabled tactical command, control and communication capability to create secure tactical communications for Ground Forces in Anti-Access / Area Denial (A2/AD) environments. ***FY 2018 Plans:*** • Establish metrics and measurements. • Establish candidate operating environments (vignettes/concepts of operation). • Conduct analysis to define system characteristics and effectiveness.	-	-	65.000
Title: MAVEN ***Description:*** Leverage advanced commercial technologies to provide advantage to the warfighter in contested environments. Due to the nature of some of these projects, specific applications and detailed plans are available at a higher classification level. ***FY 2018 Plans:*** • Develop initial data sets. • Demonstrate analytics interfaces with databases. • Demonstrate initial analytic performance.	-	-	16.000
Title: Miniature Air Launched Decoy – X (MALD-X) ***Description:*** SCO will leverage existing low-cost payloads by demonstrating autonomous swarming behavior of a large number of Unmanned Aerial Vehicles (UAVs) as well as focused upgrades of the low cost Miniature Air-Launched Decoy (MALD) platform (MALD-X). This project seeks to demonstrate the operational effectiveness and tactical advantage provided by large numbers of collaborative, expendable platforms. Due to the nature of some of these projects, specific applications and detailed plans are available at a higher classification level. ***FY 2016 Accomplishments:*** • Conducted ground and air-dropped micro-UAV swarm demonstrations. • Completed MALD-X critical design review.	27.369	26.230	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Conducted initial prototype subsystem testing. • Anchored modeling and simulations, and updated operational effectiveness assessment. ***FY 2017 Plans:*** • Conduct large air-dropped micro-UAV swarm demonstration. • Conduct platform/vehicle level ground testing. • Conduct vehicle level captive-carry flight testing. • Build, integrate and checkout flight test vehicles. • Complete flight test demonstrations. • Update modeling and simulations based on completed testing and update operational effectiveness assessment. • Complete prototype development and testing in partnership with Service program offices to speed transition to a program of record.			
Title: Motley Crew ***Description:*** SCO will leverage near term technologies being developed to enable interoperability between weapons. Motley Crew will enable collaboration among existing weapons to enhance capabilities Anti-Access / Area Denial (A2/AD) environment. Due to the nature of this project, specific applications and detailed plans are available at a higher classification level. ***FY 2018 Plans:*** • Conduct detailed design and systems engineering activities in support of system architecture, hardware design and platform integration requirements. • Complete and validate lab, ground and flight test capability development activities. • Conduct component- and subsystem-level platform integration development and testing. • Perform platform testing in operationally relevant scenarios, on ground and inflight, to demonstrate basic collaborative capabilities	-	-	32.000
Title: Perdix Gen 7 ***Description:*** Develop next generation micro-UAV (unmanned air vehicle) with improved endurance and processing power to allow for a multi-mission capabilities with a focus on Intelligence, Surveillance, and Reconnaissance (ISR) capabilities. The multi-mission platform will be designed for use with multiple host platforms. ***FY 2017 Plans:*** Perform mission and systems analysis necessary to inform micro-UAV design limits (e.g. speed, endurance, stability). Develop processing architecture and image processing technology required to collect and offload imagery data from UAV to host platform.	-	1.600	7.000

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Perform a battery and power train analysis to inform build of low-cost, high performance micro-UAV. ***FY 2018 Plans:*** Finalized baseline design and begin build of both the micro-UAV and canister dispenser. Test and integrate power source.			
Title: Sea Dragon ***Description:*** A cost-effective disruptive offensive capability will be demonstrated by integrating an existing weapon system with an existing Navy platform. Due to the nature of these projects, specific applications and detailed plans are available at a higher classification level. ***FY 2016 Accomplishments:*** • Completed design of in-water test apparatus. • Completed design of the ejection body and associated hardware. • Identified and analyzed alternative targeting methods to enable down-select and follow on demonstrations. • Procured long lead range test articles. • Completed Land-Based Testing (LBT). ***FY 2017 Plans:*** • Initiate construction of launch support site. • Conduct planning for underwater testing. • Refine parameters for subsystem weapon integration and interoperability to support end-to-end demonstration. ***FY 2018 Plans:*** • Complete construction of launch support test site. • Commence underwater static testing. • Continue planning for in-water testing. • Continue kill chain analysis within platform communications and fire control system architectures.	85.421	70.760	163.000
Title: Sea Mob ***Description:*** SCO is developing a group of Unmanned Surface Vehicles (USVs) capable of cooperative swarming behaviors. This project will demonstrate the ability to generate common situational awareness among USVs and conduct coordinated dynamic planning required for sustaining cooperative behaviors. This project is funded within the Advanced Innovative Technologies Program Element 0604250D8Z in FY 2016 and FY 2017. Due to the nature of these projects, specific applications and detailed plans are available at a higher classification level.	20.186	18.120	10.160

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604250D8Z / *Advanced Innovative Technologies*	**Project (Number/Name)** P250 / *Advanced Innovative Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
FY 2016 Accomplishments: • Converted an Rigid Hull Inflatable Boat (RHIB) to operate as an autonomous USV and successfully conducted autonomous USV operations, including long-distance unmanned transit. • Demonstrated the ability to autonomously navigate. • Converted additional ship to an autonomous USV and demonstrated a logistics resupply mission from ship to shore. ***FY 2017 Plans:*** • Acquire, install, integrate, and test subsystems on additional USVs. • Demonstrate a tactical mission using multiple USVs that includes long range transit. • Develop and test cooperative behaviors between USVs to conduct complex missions. ***FY 2018 Plans:*** • Integrate payloads with USV autonomy software. • Develop human-in-the-loop targeting using existing Sea Mob USV onboard sensors and communications links. • Further develop Sea Mob USV autonomy subsystems to enhance platform operation and survivability in hostile environments. • Test USVs for specified missions using payload module. • Conduct in-water exercises against relevant targets for specified missions. • Finalize Sea Mob Technical Data Packages for transition.			
Title: Sea Stalker	-	17.390	27.240
Description: SCO will leverage existing low-cost, persistent maritime platforms to offer Combatant Commanders deterrence options during a crisis. The Sea Stalker project seeks to retire the risk of platform and payload integration to provide an immediate, flexible capability. This project is currently funded within the Advanced Innovative Analysis and Concepts Program Element 0603289D8Z and will transition to the Advanced Innovative Technologies Program Element 0604250D8Z in FY 2017. Due to the nature of these projects, specific applications and detailed plans are available at a higher classification level. ***FY 2017 Plans:*** • Manufacture and test integrated platform/payload systems. • Develop command and control algorithms and power management plan necessary for operation. • Perform platform testing in operationally relevant scenarios. • Develop and test payload design and quantify effectiveness against mission goals. ***FY 2018 Plans:*** • Perform payload field testing for operational effectiveness. • Perform in-water integrated payload/platform testing.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Demonstrate platform reliability and persistence. • Conduct in-water platform testing with optimized algorithms.			
Title: StormSystem ***Description:*** StormSystem will leverage existing capabilities to develop a suite of tools that disrupts the adversary cyber network exploitation (CNE). This effort will provide low-cost, at-scale obfuscation capabilities to government and industrial base research and development networks. ***FY 2018 Plans:*** • Conduct initial system demonstration. • Analyze system performance.	-	-	7.000
Title: Strike-X ***Description:*** The Strike-X project leverages existing long range strike capabilities and develops alternative Concepts of Employment (CONEMP) and Tactics, Techniques, and Procedures (TTP) to deliver near-term innovative long range strike capabilities to Combatant Commanders. Due to the nature of this project, specific applications and detailed plans are available at a higher classification level. The Strike-X project transitions fully in FY 2017 from the Advanced Innovative Analysis and Concepts Program Element (PE) 0603289D8Z to the Advanced Innovative Technologies (PE) 0604250D8Z. ***FY 2017 Plans:*** • Conduct detailed design and systems engineering activities in support of system architecture, hardware design and platform integration requirements. • Develop Interface Control Documents (ICD) to manage integration of systems within Strike-X and integration on host platforms. • Procure test article hardware to support component-level testing and integration. • Continue fabrication of test articles to facilitate platform integration evaluations. • Conduct component- and subsystem-level platform integration development and testing. • Conduct test site development activities. • Conduct platform design verification live fire testing to collect performance data to validate design and identify risks. ***FY 2018 Plans:*** • Complete detailed design and systems engineering activities in support of system architecture, hardware design and platform integration requirements. • Procure and receive test article hardware to support component-level and system-level testing and integration. • Complete fabrication of system-level demonstrator and initial prototype test articles to facilitate platform integration evaluations. • Complete test site development activities.	-	121.720	114.800

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604250D8Z / *Advanced Innovative Technologies*	**Project (Number/Name)** P250 / *Advanced Innovative Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Conduct system-level live fire integration and validation engineering tests with demonstrator assets.			
Title: TEM II	18.207	-	18.000
Description: Leverage existing technologies to analyze and demonstrate a prototype solution to disrupt enemy targeting of critical U.S. assets. The first phase of this project will be demonstrated at sea and transition to the Navy in FY 2017. The second phase will leverage recent advances in commercial technology to provide additional capability. Due to the nature of these projects, specific applications and detailed plans are available at a higher classification level.			
FY 2016 Accomplishments: • Manufactured and tested major subsystems. • Conducted deployed testing of subsystems. • Collected representative ground truth data. • Conducted initial integration testing of the major subsystems.			
FY 2018 Plans: • Demonstrate prototype in a laboratory environment. • Conduct analysis of subsystem alternatives. • Begin planning for an at-sea demonstration. • Complete interface control document.			
Title: Third Eye	-	33.810	25.400
Description: Third Eye is a data architecture that leverages existing and emerging sensors to provide real-time tracking and targeting for multi-Service weapon systems. This project is currently funded within the Advanced Innovative Analysis and Concepts Program Element 0603289D8Z and will transition to the Advanced Innovative Technologies Program Element 0604250D8Z in FY 2017.			
FY 2017 Plans: • Conduct four spirals of targeting demonstrations. • Complete low latency fusion algorithms development. • Finalize analysis of data for improved data fusion. • Develop updates to Mission Planning for Weapons/Tactical Employment guides. • Provide test results and analysis to Combatant Commands.			
FY 2018 Plans: • Deploy limited operational capability.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604250D8Z / *Advanced Innovative Technologies*	**Project (Number/Name)** P250 / *Advanced Innovative Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Continue to update capability based on operator feedback.			
Title: Vanguard ***Description:*** SCO will provide a capability to detect and track troop and motorized unit movements across the battle field. Due to the classified nature of this project, specific applications and detailed plans are available at a higher classification level. ***FY 2018 Plans:*** • Initiate sensor configuration design and analysis. • Develop comprehensive program management plan and integrated master schedule. • Examine scalability and component performance characterizations. • Examine sensor and targeting prototype capabilities. • Validate suitability of proposed design.	-	-	8.500
Accomplishments/Planned Programs Subtotals	459.966	846.470	1,175.832

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

OTHER adjustments provided for FY 2017 and FY 2018.
The amended budget request for an additional of $1.600 million is required in FY 2017 and an additional $7.000 million in FY 2018 to address emergency warfighting readiness requirements.

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics are specific to each of the SCO efforts funded under the Advanced Innovative Technologies Program Element. All of which include measures identified in the management approach, Statement of Work (SOW) and Period of Performance (POP). In addition, completions and successes are monitored against schedules and deliverables stated in the initiative's management approach. Due to the nature of these projects, specific applications and detailed plans are available at a higher classification level.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604250D8Z / *Advanced Innovative Technologies*	Project (Number/Name) P250 / *Advanced Innovative Technologies*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Alternative Strike	Various	VARIOUS - TBD : VARIOUS - TBD	-	-		-		25.260	Nov 2017	-		25.260	Continuing	Continuing	-
Breaker	C/TBD	VARIOUS - TBD : VARIOUS - TBD	-	-		-		15.000	Oct 2017	-		15.000	Continuing	Continuing	-
Command and Control of the Information Environment (C2IE)	C/Various	VARIOUS - TBD : VARIOUS - TBD	-	-		-		8.570	Oct 2017	-		8.570	Continuing	Continuing	-
Contender	Various	Naval Undersea Warfare Center - Newport, Naval Surface Warfare Center - Indian Head Division, Naval Sea Systems Command - PMS404 : Newport, RI / Indian Head, MD / Navy Yard, DC	-	-		-		9.600	Oct 2017	-		9.600	Continuing	Continuing	-
Hypervelocity Gun Weapon System (HGWS)	IA	Sandia : NM	5.394	4.687	Oct 2015	4.496		-		-		-	-	-	-
Hypervelocity Gun Weapon System (HGWS)	MIPR	SOSSEC : NJ	68.128	16.330	Oct 2015	7.284		1.000	Dec 2017	-		1.000	-	-	-
Hypervelocity Gun Weapon System (HGWS)	MIPR	DOTC : NJ	41.609	42.812	Oct 2015	26.180		15.000	Nov 2017	-		15.000	-	-	-
Hypervelocity Gun Weapon System (HGWS)	MIPR	PEO IWS 7.0 : VA	16.849	26.163	Oct 2015	87.392		-		-		-	-	-	-
Hypervelocity Gun Weapon System (HGWS)	MIPR	MDA / GTRI : AL, GA	24.676	8.000		50.856		20.000	Oct 2017	-		20.000	-	-	-
Hypervelocity Gun Weapon System (HGWS)	MIPR	MDA / Parsons : AL, VA	17.576	52.509		1.575		2.550	Oct 2017	-		2.550	-	-	-
Hypervelocity Gun Weapon System (HGWS)	MIPR	US ARMY : Various	14.421	17.250	Oct 2015	42.093		-		-		-	-	-	-
Hypervelocity Gun Weapon System (HGWS)	MIPR	Defense Microelectronics	32.103	1.430	Oct 2015	24.838		-		-		-	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604250D8Z / *Advanced Innovative Technologies*	**Project (Number/Name)** P250 / *Advanced Innovative Technologies*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Activity (DMEA) : Various													
Hypervelocity Gun Weapon System (HGWS)	MIPR	Air Force Life Management Center (AFLCMC) - Hanscom AFB, Massachusetts Institute of Technology / Lincoln Laboratory (MIT / LL) : MA	0.502	53.475	Oct 2015	1.356		1.500	Oct 2017	-		1.500	-	-	-
Hypervelocity Gun Weapon System (HGWS)	MIPR	NAVSEA , Johns Hopkins Advanced Research Laboratory : DC, MD	-	9.364		-		-		-		-	-	-	-
Perdix Gen 7	C/TBD	Various - TBD : Various - TBD	-	-		1.600		7.000		-		7.000	Continuing	Continuing	-
Sea Dragon	C/TBD	VARIOUS TBD : VARIOUS TBD	-	-		-		40.000	Oct 2017	-		40.000	Continuing	Continuing	-
Sea Stalker	Various	VARIOUS - TBD : VARIOUS - TBD	-	-		-		7.000	Oct 2017	-		7.000	Continuing	Continuing	-
Strike-Ex	Various	U. S. Army Aviation and Missile Research Development and Engineering Center (AMRDEC) & Naval Surface Warfare Center, Carderock Division (NSWCCD) : AL & MD	-	-		-		14.000	Nov 2017	-		14.000	Continuing	Continuing	-
TEM II	C/TBD	VARIOUS - TBD : VARIOUS - TBD	-	-		-		15.500	Oct 2017	-		15.500	Continuing	Continuing	-
		Subtotal	221.258	232.020		247.670		181.980		-		181.980	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604250D8Z / *Advanced Innovative Technologies*	Project (Number/Name) P250 / *Advanced Innovative Technologies*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Advanced Navigation	MIPR	MIT/LL : MA	1.600	-		-		-		-		-	-	-	-
Advanced Navigation Software Development	MIPR	MIT/LL : MA	1.400	-		-		-		-		-	-	-	-
Advanced Navigation	MIPR	AFLMC : FL	12.909	16.359	Oct 2015	3.350		-		-		-	-	-	-
Air Launched Area Effects	Various	VARIOUS - TBD : VARIOUS - TBD	-	-		-		17.782	Nov 2017	-		17.782	Continuing	Continuing	-
Alternative Strike	MIPR	John Hopkins University / Advanced Physics Lab) (JHU/APL) : MD	-	-		198.030		50.000	Nov 2017	-		50.000	-	-	-
Alternative Strike	Various	VARIOUS - TBD : VARIOUS - TBD	-	-		-		100.000	Oct 2017	-		100.000	Continuing	Continuing	-
Alternative Strike	Option/ FFP	Ball Aerospace and Technologies Corporation : Boulder, CO	-	-		-		0.500	Oct 2017	-		0.500	Continuing	Continuing	-
Assured Tactical C2	MIPR	ONR, NRL, AFRL, ARL : DMV	29.280	14.473	Oct 2015	-		-		-		-	-	-	-
AVATAR	Option/ FFP	Infoscitex : Dayton, OH	-	-		-		13.000	Nov 2017	-		13.000	Continuing	Continuing	-
AVATAR	Option/ FFP	Georgia Tech Research Institute : Smyrna, GA	-	-		-		12.000	Nov 2017	-		12.000	Continuing	Continuing	-
Breaker	MIPR	U.S. Army Aviation and Missile Research : Redstone Arsenal, AL	-	-		-		15.000	Nov 2017	-		15.000	Continuing	Continuing	-
Command and Control of the Information Environment	MIPR	Army Research Laboratory : MD	-	-		31.880		-		-		-	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604250D8Z / *Advanced Innovative Technologies*	**Project (Number/Name)** P250 / *Advanced Innovative Technologies*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Command and Control of the Information Environment (C2IE)	Various	VARIOUS - TBD : VARIOUS - TBD	-	-		-		28.000	Oct 2017	-		28.000	Continuing	Continuing	-
Contender	Various	Naval Undersea Warfare Center - Newport, Naval Surface Warfare Center - Indian Head Division, Naval Sea Systems Command - PMS404 : Newport, RI / Indian Head, MD / Navy Yard, DC	-	-		-		60.000	Oct 2017	-		60.000	Continuing	Continuing	-
Enhanced Munitions	MIPR	MSIC, MDA : AL, VA	10.449	23.474	Oct 2015	41.960		29.970	Oct 2017	-		29.970	-	-	-
Ghost Fleet	MIPR	SPAWAR System Center Pacific : San Diego, CA	-	-		-		0.300	Nov 2017	-		0.300	Continuing	Continuing	-
Ghost Fleet	MIPR	Naval Surface Warfare Center : Bethesda, MD	-	-		-		2.000	Nov 2017	-		2.000	Continuing	Continuing	-
Ghost Fleet	C/Various	TBD : VARIOUS TBD	-	-		-		203.700	Nov 2017	-		203.700	Continuing	Continuing	-
Hornets Nest	MIPR	Aviation and Missile Research, Development, and Engineering Center : Redstone Arsenal, AL	-	-		-		24.000	Jan 2019	-		24.000	Continuing	Continuing	-
Hypervelocity Gun Weapon System (HGWS)	MIPR	SOSSEC : NJ	-	20.699		-		15.000	Oct 2017	-		15.000	-	-	-
Hypervelocity Gun Weapon System (HGWS)	MIPR	Naval Surface Warfare Center Port Hueneme Division (NSWC PHD), WSMR : CA	-	13.053		-		10.000	Oct 2017	-		10.000	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604250D8Z / *Advanced Innovative Technologies*	**Project (Number/Name)** P250 / *Advanced Innovative Technologies*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Hypervelocity Gun Weapon System (HGWS)	MIPR	NSWCDD : Dahlgren, VA	-	4.315		-		2.000	Nov 2017	-		2.000	-	-	-
Hypervelocity Gun Weapon System (HGWS)	MIPR	Various : TBD	-	-		35.550		-		-		-	-	-	-
Intelligence, Surveillance, and Reconnaissance (ISR) Denial	MIPR	JHU/APL : MD	19.787	19.470	Oct 2015	-		-		-		-	-	-	-
LiTE Saber	C/TBD	VARIOUS TBD : VARIOUS TBD	-	-		-		64.000	Oct 2017	-		64.000	Continuing	Continuing	-
LiTE Saber	Option/ FFP	Johns Hopkins/ Applied Physics Lab (JHU/APL) : Laurel, MD	-	-		-		1.000	Oct 2017	-		1.000	Continuing	Continuing	-
MAVEN	C/TBD	VARIOUS - TBD : VARIOUS - TBD	-	-		-		16.000	Nov 2017	-		16.000	Continuing	Continuing	-
Motley Crew	Option/ FFP	Johns Hopkins/ Applied Physics Lab (JHU/APL) : Laurel, MD	-	-		-		2.000	Nov 2017	-		2.000	Continuing	Continuing	-
Motley Crew	C/TBD	VARIOUS TBD : VARIOUS TBD	-	-		-		30.000	Oct 2017	-		30.000	Continuing	Continuing	-
Sea Dragon	MIPR	IWS, NAVSEA, NUWC, SPAWAR, NAVAIR & JHU/ APL : Various	-	81.000	Oct 2015	70.760		-		-		-	-	-	-
Sea Dragon	MIPR	Naval Sea Systems Command (073) : Washington Navy Yard DC	-	-		-		20.000	Oct 2017	-		20.000	Continuing	Continuing	-
Sea Dragon	Option/ FFP	John Hopkins University/Applied Research Laboratory (JHU/APL) : Laurel, MD	-	-		-		2.000	Oct 2017	-		2.000	Continuing	Continuing	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604250D8Z / *Advanced Innovative Technologies*	**Project (Number/Name)** P250 / *Advanced Innovative Technologies*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Sea Dragon	Option/ FFP	SEACORP : Middleton, RI	-	-		-		1.000	Oct 2017	-		1.000	Continuing	Continuing	-
Sea Dragon	C/TBD	VARIOUS TBD : VARIOUS TBD	-	-		-		100.000		-		100.000	Continuing	Continuing	-
Sea Mob	MIPR	NSWC/CCD, NSWC/ PCD, JHU/APL, PSU/ARL, JPL : Various	-	19.985	Oct 2015	18.120		10.160	Nov 2017	-		10.160	-	-	-
Sea Stalker	MIPR	Various : TBD	-	-		17.390		20.240	Oct 2017	-		20.240	-	-	-
Storm System	Option/ FFP	Pacific Northwest National Laboratory : Richland, WA	-	-		-		7.000	Oct 2017	-		7.000	Continuing	Continuing	-
Strike-Ex	MIPR	U. S. Army Aviation and Missile Research Development and Engineering Center (AMRDEC) & Naval Surface Warfare Center, Carderock Division (NSWCCD) : AL & MD	-	-		121.720		100.800	Oct 2017	-		100.800	-	-	-
TEM II	MIPR	Naval Research Laboratory : Washington, DC	-	-		-		0.500	Oct 2017	-		0.500	Continuing	Continuing	-
TEM II	MIPR	Military Sea lift Command - USNS : NORFOLK, VA	-	-		-		2.000	Oct 2017	-		2.000	Continuing	Continuing	-
Third Eye	MIPR	Naval Systems Management Activity (NSMA), Naval Research Laboratory - NRL : DC, MA, VA	-	-		33.810		25.400	Nov 2017	-		25.400	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604250D8Z / *Advanced Innovative Technologies*	**Project (Number/Name)** P250 / *Advanced Innovative Technologies*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Unmanned Aerial Vehicle Payloads	MIPR	MIT/LL, SSC Pacific, NAWCWD : Various	-	15.118	Oct 2015	26.230		-		-		-	-	-	-
Vanguard	Various	VARIOUS - TBD : VARIOUS - TBD	-	-		-		8.500	Nov 2017	-		8.500	Continuing	Continuing	-
		Subtotal	75.425	227.946		598.800		993.852		-		993.852	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	296.683	459.966		846.470		1,175.832		-		1,175.832	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604250D8Z / *Advanced Innovative Technologies*	**Project (Number/Name)** P250 / *Advanced Innovative Technologies*

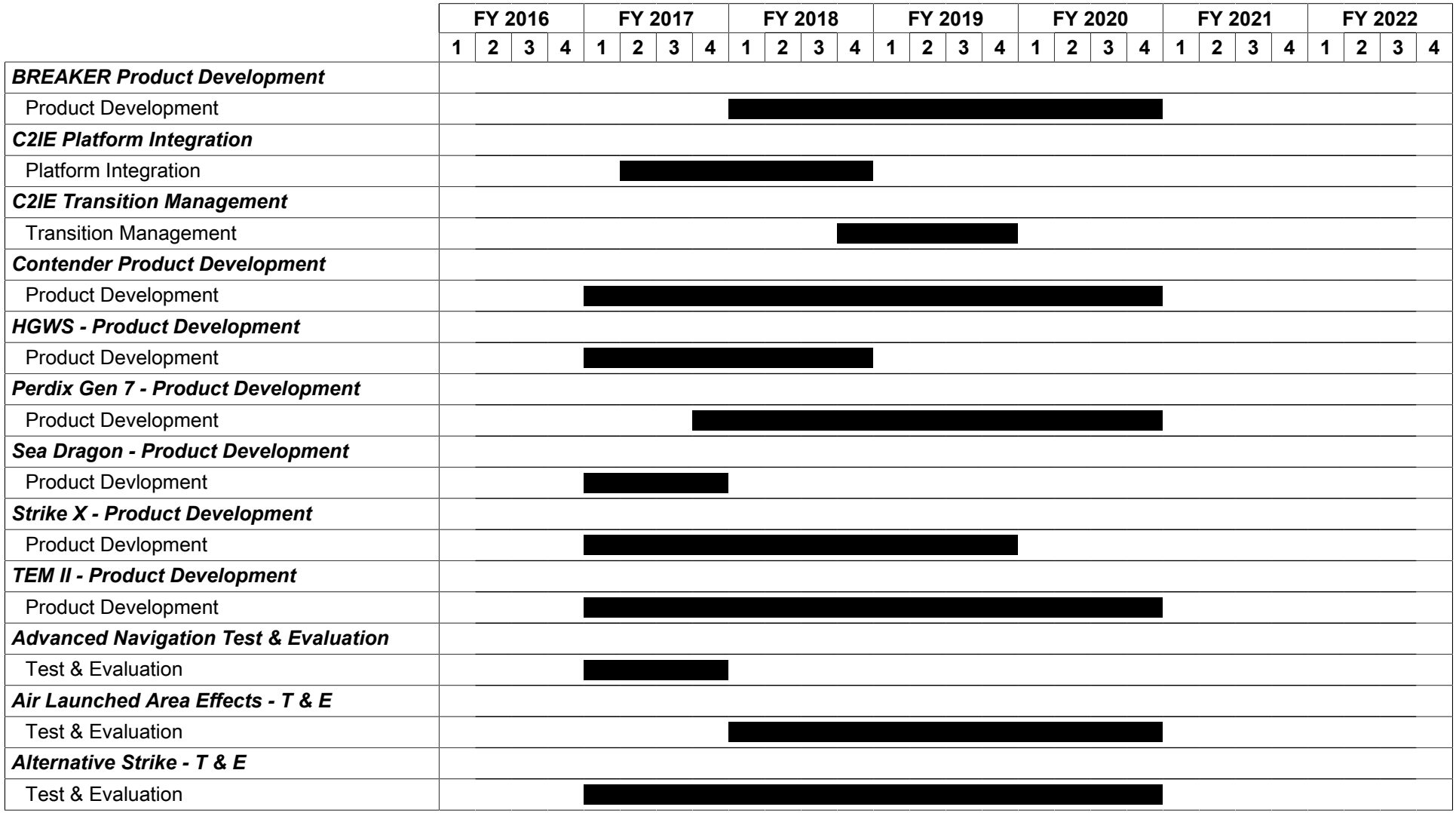

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604250D8Z / *Advanced Innovative Technologies*	**Project (Number/Name)** P250 / *Advanced Innovative Technologies*

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604250D8Z / *Advanced Innovative Technologies*	**Project (Number/Name)** P250 / *Advanced Innovative Technologies*

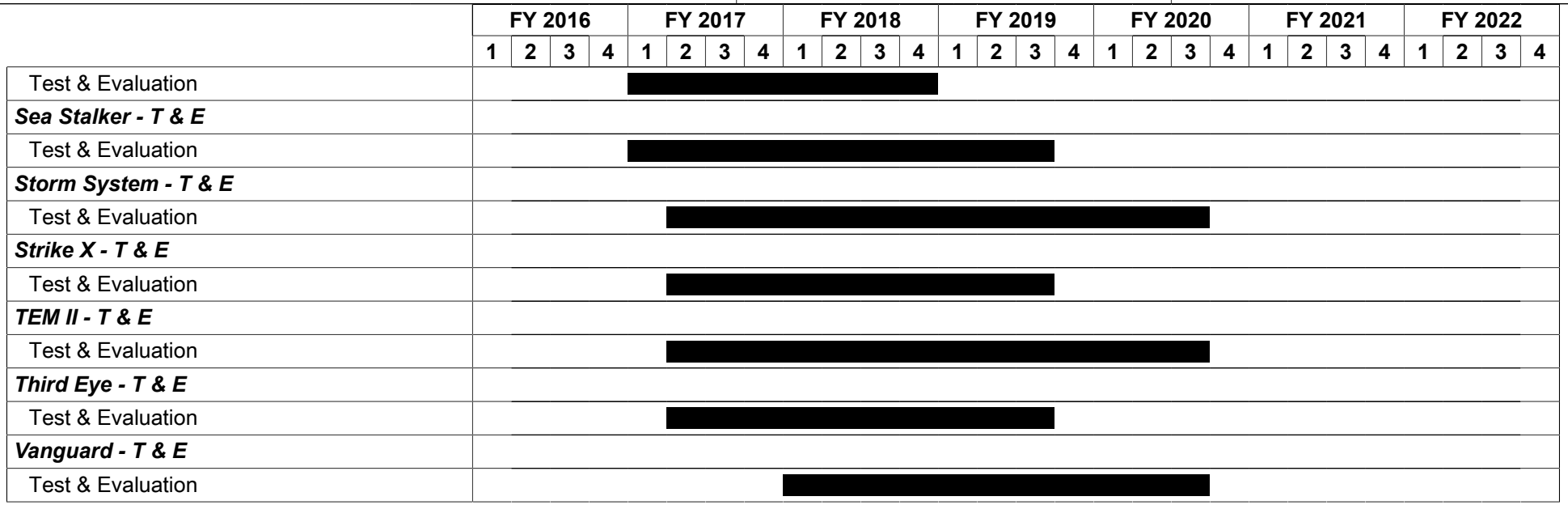

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604250D8Z / *Advanced Innovative Technologies*	**Project (Number/Name)** P250 / *Advanced Innovative Technologies*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
BREAKER Product Development				
Product Development	1	2018	4	2020
C2IE Platform Integration				
Platform Integration	2	2017	4	2018
C2IE Transition Management				
Transition Management	4	2018	4	2019
Contender Product Development				
Product Development	1	2017	4	2020
HGWS - Product Development				
Product Development	1	2017	4	2018
Perdix Gen 7 - Product Development				
Product Development	4	2017	4	2020
Sea Dragon - Product Development				
Product Devlopment	1	2017	4	2017
Strike X - Product Development				
Product Devlopment	1	2017	4	2019
TEM II - Product Development				
Product Development	1	2017	4	2020
Advanced Navigation Test & Evaluation				
Test & Evaluation	1	2017	4	2017
Air Launched Area Effects - T & E				
Test & Evaluation	1	2018	4	2020

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604250D8Z / *Advanced Innovative Technologies*	**Project (Number/Name)** P250 / *Advanced Innovative Technologies*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Alternative Strike - T & E				
Test & Evaluation	1	2017	4	2020
AVATAR - T & E				
Test & Evaluation	1	2018	4	2022
BREAKER - T & E				
Test & Evaluation	4	2017	3	2019
C2IE - T & E				
Test & Evaluation	4	2017	4	2018
Contender - T & E				
Test & Evaluation	1	2017	4	2020
Enhanced Munitions - T & E				
Test & Evaluation	1	2017	3	2018
Ghost Fleet - T & E				
Test & Evaluation	1	2018	4	2020
Hornet's Nest - T & E				
Test & Evaluation	1	2018	2	2020
HGWS - T & E				
Test & Evaluation	1	2017	3	2019
LiTE Saber - T & E				
Test & Evaluation	1	2017	3	2020
MAVEN - T & E				
Test & Evaluation	1	2018	3	2020
Motley Crew - T & E				
Test & Evaluation	1	2018	3	2020
Sea Dragon - T & E				

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Office of the Secretary Of Defense		Date: May 2017
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	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Test & Evaluation	1	2017	4	2017
Sea Mob - T & E				
Test & Evaluation	1	2017	4	2018
Sea Stalker - T & E				
Test & Evaluation	1	2017	3	2019
Storm System - T & E				
Test & Evaluation	2	2017	3	2020
Strike X - T & E				
Test & Evaluation	2	2017	3	2019
TEM II - T & E				
Test & Evaluation	2	2017	3	2020
Third Eye - T & E				
Test & Evaluation	2	2017	3	2019
Vanguard - T & E				
Test & Evaluation	1	2018	3	2020

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	83.626	-	83.626	81.712	79.670	68.917	70.858	Continuing	Continuing
P645: *V&V Capabilities and Standards for Trust*	-	0.000	0.000	41.524	-	41.524	41.649	39.934	39.112	39.892	Continuing	Continuing
P646: *New Trust Approach Development*	-	0.000	0.000	42.102	-	42.102	40.063	39.736	29.805	30.966	Continuing	Continuing

A. Mission Description and Budget Item Justification

This Program Element (PE) is a continuation of effort from the Trusted Foundry PE 0605140D8Z. FY18 funds in the amount of $84.200M are being transferred from PE 0605140D8Z for the Verification and Validation (V&V) Capabilities and Standards for Trust and the New Trust Approach Development activities planned across the Future Years Defense Program (FYDP).

This PE implements, maintains and updates the DoD's long-term microelectronics strategy. Recognizing that a trusted and assured supply of microelectronics is a Government-wide concern, this activity will interface with interagency partners to take into account interagency requirements, opportunities for collaboration, and strategic decisions that can be made to limit the overall cost of these requirements to the government. Its goal is to eliminate the Department of Defense (DoD)'s reliance on sole source foundries for trusted state-of-the-art (SOTA) microelectronics. It supports activities to ensure critical and sensitive integrated circuits are available to meet the DoD's needs. It refines strategies and management planning activities that will implement three integrated, complementary solutions that (1) provide for Intellectual Property (IP) protection of microelectronics components; (2) improve capability to evaluate and validate trust and assurance of microelectronic parts and advance standards to incentive the commercial marketplace to recognize trust as a competitive design standard; and (3) develop and demonstrate alternative approaches to assuring the trust of the microelectronics supply chain in order to enable broader DoD access to commercial SOTA microelectronics technology.

Approximately 30 percent of the DoD's Major Defense Acquisition Programs rely on the Trusted Foundry, the only Trust-accredited SOTA foundry, to build critical and sensitive integrated circuits for the DoD, Intelligence Community and Defense contractors.

This activity is being led by the Assistant Secretary of Defense for Research and Engineering (ASD(R&E)). Naval Surface Warfare Center (NSWC) Crane is responsible for day-to-day management and execution of the DoD long-term trusted and assured microelectronics strategy. This activity will include performers from the Joint Federated Assurance Center (JFAC) Steering Committee and a new Science and Technology (S&T) Advisory Board, and include performers, such as the JFAC service providers, Defense Microelectronics Activity (DMEA), the Defense Advanced Research Programs Agency (DARPA), and other DoD and Intelligence Community S&T organizations and laboratories in the area of hardware assurance (HwA) and software assurance (SwA). It will integrate and support the functions of the DoD Trusted Foundry Program, the Trusted Supplier accreditation program, JFAC, and the related HwA and SwA S&T actions. This activity is also expected to maintain and update the DoD long-term microelectronics strategy based on feedback from the execution of this PE and enable and leverage commercial and academic relationships as necessary to fulfill this mission.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604294D8Z *I Trusted and Assured Microelectronics*

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	83.626	-	83.626
Total Adjustments	0.000	0.000	83.626	-	83.626
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Funds realigned from Trusted Foundry Program in BA 5	-	-	84.459	-	84.459
• Funding realigned to offset other priorities	-	-	-0.833	-	-0.833

Change Summary Explanation

FY18 funds in the amount of $84.200M are being transferred from PE 0605140D8Z for the initiation of the Verification and Validation (V&V) Capabilities and Standards for Trust and the New Trust Approach Development activities planned across the Future Years Defense Program (FYDP).

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense											Date: May 2017	
Appropriation/Budget Activity 0400 / 4					R-1 Program Element (Number/Name) PE 0604294D8Z / *Trusted and Assured Microelectronics*				Project (Number/Name) P645 / *V&V Capabilities and Standards for Trust*			
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
P645: *V&V Capabilities and Standards for Trust*	-	0.000	0.000	41.524	-	41.524	41.649	39.934	39.112	39.892	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project improves microelectronics test and verification methodologies in support of verifying the trust and assurance of parts and develops standards and practices to foster commercial development of secure, trusted and assured parts. Verification and test technologies are required to provide direct program support for microelectronics assurance verification when DoD Trusted Foundry Program options are not available. Core technical laboratories and other HwA and SwA capabilities are chartered as a JFAC to provide this support. Out-year demands will require an increase in capacity, which will take the form of additional personnel and/or equipment to permit scaling of microelectronics assessment capabilities. Challenges have been identified, to include the ability to analyze leading-edge technology nodes (<45 nanometers (nm)), throughput/time required for analysis, ability to analyze third-party IP contained in microelectronic components, and analysis of non-application specific integrated circuit (ASIC) components that are increasingly being used for agility, e.g., Field-Programmable Gate Arrays (FPGAs). This project addresses these gaps in current technical capabilities, in coordination with the JFAC, which prioritizes this investment as required to meet the realized and projected out-year demand for JFAC services. Three capability areas core to microelectronics analysis and verification will be improved:

- Physical verification, i.e., destructive analysis of integrated circuits and printed circuit boards
- Functional analysis, i.e., non-destructive screening/verification of select, critical parts
- Design verification, i.e., verification/assurance of designs, IP, netlists, bitstreams, firmware, etc.

These improvements will address two primary attributes: (1) technical capability including laboratory equipment, IP, analysis tools, such as imaging software, and highly skilled tradecraft, and (2) the capacity to perform microelectronics assessments.

This project develops and matures assurance mitigations, evaluates the effectiveness of protections of IP in support of integrity, and develops and validates obfuscation and disaggregation technologies. The project will address physical validation tool and capability development, design software validation tool development, counterfeit detection and imaging techniques, and system vulnerability assessments and testbeds.

This project also develops standards and practices in support of trustworthy designs and supply chains and formal relationships with industry to foster commercial development of secure, trusted, and assured parts and for acquisition of government access to proprietary designs, software, development, and quality assurance processes and test procedures to develop practices that minimize security flaws in designs and facilitate verification. Two capability areas that are core to improved commercial designs will be improved, i.e., trustworthy designs and supply chains.

This project was previously funded in PE 0605140D8Z BA 5 and has been transferred to this BA 4 PE to correctly align funding in support of the mission.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** P645 / *V&V Capabilities and Standards for Trust*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: V&V Capabilities and Standards for Trust	-	-	41.524

FY 2018 Plans:

The JFAC will: (1) improve its microelectronics test and verification methodologies in support of verifying trust and assurance of parts and (2) develop standards/practices to foster commercial development of secure, trusted and assured parts.

Verification and test technologies will include:

• Improvements to the core JFAC's (1) technical capability, through the procurement of laboratory equipment, IP, analysis tools, such as imaging software, and highly skilled tradecraft, and (2) capacity to perform microelectronics assessments. FY18 and out-year demands will require an increase in capacity supporting weapon system program engagement, which will take the form of additional personnel and/or equipment to permit scaling of assessment capabilities.

• Enhancement of automation and standard processes needed to increase the throughput of information produced by individual JFAC laboratory tools as well as to facilitate information sharing across the families of tools used for analysis and testing.

• Development of common subject matter expert (SME) training and protocols based on the existing tool base, to include both commercial and government-developed tools.

• Funding for additional SME support in each core laboratory in support of the microelectronics trust verification and other JFAC-related work.

• Increased direct program support focused on addressing technical gaps and trust-related findings.

Standards and practices will include:

• Development of standards and best practices, and relationships with industry, to foster commercial development of secure, trusted and assured parts.

• Establishment of formal relationships with FPGA vendors and other key commercial suppliers to improve device and IP security.

• Acquisition of government access to proprietary designs, software, development, and quality assurance processes and test procedures to develop design practices that minimize security flaws and facilitate verification.

• Establishment of government and industry working groups to develop test procedures to validate the trust of designs.

• Documentation and promulgation of security-enhancing design practices across government, industry, and academia.

• Development of industry-wide standards and practices to establish a common understanding of what constitutes verified and trusted hardware/software/firmware at both the component and systems level.

• Development of a common lexicon for secure hardware/software/firmware in collaboration with the Committee for National Security Systems, National Institute of Standards and Technology, and the broader United States Government, industry, and academia.

• Definition of supply chain controls for assured chain of custody for critical and other microelectronics devices and IP.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** P645 / *V&V Capabilities and Standards for Trust*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Development of security training and education of government and industry system security engineers and material managers on supply chain and life-cycle management best practices using agreed-upon language, standards, and practices. • Alignment of DoD Instruction 5200.44 (Protection of Mission Critical Functions to Achieve Trusted Systems and Networks (TSN)), related policies, and NIST 800-161 (Supply Chain Risk Management Practices for Federal Information Systems and Organizations) with industry standards identifying and addressing gaps in definition and criteria and establishing accepted levels of supplier and part trustworthiness.			
Accomplishments/Planned Programs Subtotals	-	-	41.524

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

N/A

D. Acquisition Strategy

NA

E. Performance Metrics

Performance for this project is monitored in the following ways:

- Increases in throughput in current JFAC laboratories, and stand-up of additional capability and capacity as required, so that at least two laboratories will have capability in physical verification, functional analysis, and design verification to increase the DoD's overall microelectronics trust verification and test capacity for analysis of state-of-the practice parts.
- Increased Probability of Detection of malicious insertion and/or counterfeit parts.
- Decreased cost to evaluate components.
- Decreased time to evaluate components.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604294D8Z / *Trusted and Assured Microelectronics*	Project (Number/Name) P645 / *V&V Capabilities and Standards for Trust*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
V&V Capabilities and Standards for Trust	MIPR	Various (Air Force, Army, Navy, NSA) : Various	-	-		-		41.524	Mar 2018	-		41.524	Continuing	Continuing	-
		Subtotal	-	-		-		41.524		-		41.524	-	-	-

Remarks

N/A

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		0.000		41.524		-		41.524	-	-	-

Remarks

NA

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** P645 / *V&V Capabilities and Standards for Trust*

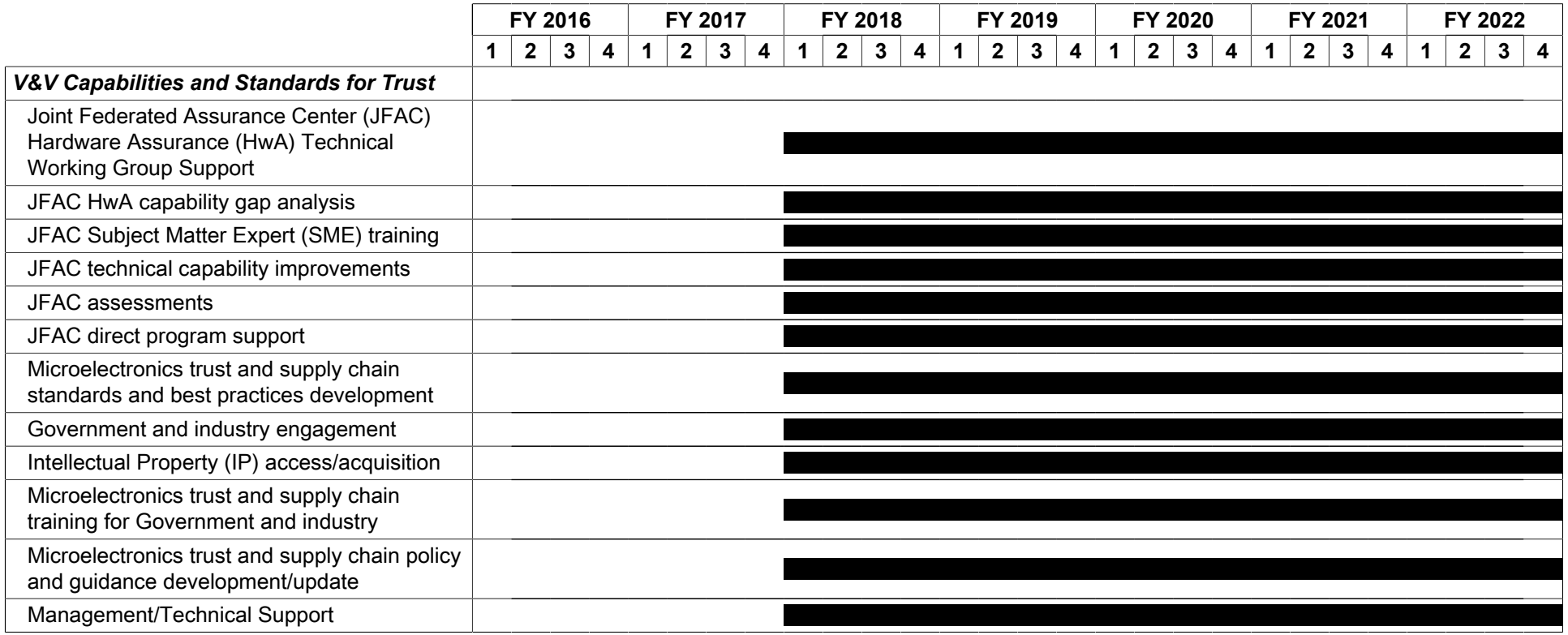

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** P645 / *V&V Capabilities and Standards for Trust*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
V&V Capabilities and Standards for Trust				
Joint Federated Assurance Center (JFAC) Hardware Assurance (HwA) Technical Working Group Support	1	2018	4	2022
JFAC HwA capability gap analysis	1	2018	4	2022
JFAC Subject Matter Expert (SME) training	1	2018	4	2022
JFAC technical capability improvements	1	2018	4	2022
JFAC assessments	1	2018	4	2022
JFAC direct program support	1	2018	4	2022
Microelectronics trust and supply chain standards and best practices development	1	2018	4	2022
Government and industry engagement	1	2018	4	2022
Intellectual Property (IP) access/acquisition	1	2018	4	2022
Microelectronics trust and supply chain training for Government and industry	1	2018	4	2022
Microelectronics trust and supply chain policy and guidance development/update	1	2018	4	2022
Management/Technical Support	1	2018	4	2022

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604294D8Z / *Trusted and Assured Microelectronics*	Project (Number/Name) P646 / *New Trust Approach Development*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P646: *New Trust Approach Development*	-	0.000	0.000	42.102	-	42.102	40.063	39.736	29.805	30.966	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project funds a program of research to develop the next generation, technology-driven approach to microelectronics trust and assurance, to include SOTA microelectronics, to ensure continued access to SOTA microelectronic technologies while maintaining the required level of trust in all environments. DoD's ability to access commercial technology for its custom secure, trusted and assured needs is diminishing as SOTA suppliers become fewer and more focused on serving the global commercial market. DoD's technology needs are broad, and relying on a single source supplier is not feasible. Alternative, advanced manufacturing methods, technologies, and design tools are needed to produce secure, trusted and assured SOTA parts from commercial sources and to preserve access to these advanced nodes while protecting DoD and Defense Industrial Base IP from exploitation. It also is intended to dramatically improve the capabilities of the JFAC with regard to verification and validation of microelectronics trust and assurance.

This program of research will develop innovative design, manufacturing, imaging, tagging, and control and assessment approaches for protecting DoD's microelectronics supply chain and IP, including alternatives for trusted, strategic radiation-hardened electronics in advanced technology nodes for next-generation strategic systems, obfuscation and disaggregation technology development, and other assurance mitigations. It will develop advanced imaging technologies and forensics, Design for Trust techniques, active hardware trust control, electronic component markers, and a data and analysis capability to enable auditing and independent verification and validation of commercial designs. It also develops, demonstrates, and implements concepts for the cost-effective production of custom microelectronics in low volumes and protection of sensitive IP from exploitation.

Technologies that assure trust and assurance in a broad range of trusted and commercial environments can mitigate the risks associated with sole-source suppliers and increase the Government's ability to leverage commercial capabilities. The suite of developed technologies, e.g., alternative manufacturing methods and design tools, will enable DoD to obfuscate the purpose of sensitive devices, verify their origin and function, and protect sensitive IP from exploitation even while using the global supply chain for most hardware. In cases where the risk involved precludes that level of commercial collaboration, low-volume manufacturing technologies developed under this project would permit DoD to more cheaply produce low volumes of sensitive microelectronics in trusted environments. The project would also support using a repository of third-party IP to expedite circuit design and transition promising technologies to use.

Funding for this project has been transferred from BA 5 PE 0605140D8Z.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: New Trust Approach Development	-	-	42.102
FY 2018 Plans:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** P646 / *New Trust Approach Development*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
FY18 activities will mature and evaluate trust technologies and techniques through efforts that may include the conduct of studies and Broad Agency Announcements (BAAs) and other efforts to coordinate research programs across government research and development (R&D) organizations, academia and industry. The JFAC will initiate the conduct of identified acquisition program pilots and technology demonstrations in coordination with research programs across government R&D organizations, academia and industry. Initiate or support at least one research program in each of the following technical areas: • Design-For-Trust techniques • IP protection • Low-volume SOTA manufacturing • Electronic component markers • Imaging technologies and forensics • Computing infrastructure and processing methods. Primary efforts will include reducing-to-practice technologies enabling trusted (1) design, (2) access, (3) component integrity and (4) IP protection. FY18 and FY19 primary activities include development of these technologies, followed by transition of these capabilities to new programs in the following fiscal years under PE 0605140D8Z. This project will engage early on with potential stakeholders to identify potential transition issues and aid in transition through joint collaboration between research teams and stakeholders with a focus on evaluations of prototypes, test articles and beta versions of tools, IP, techniques, methods, etc. and their use in operationally-realistic scenarios.			
Accomplishments/Planned Programs Subtotals	-	-	42.102

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

N/A

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** P646 / *New Trust Approach Development*

E. Performance Metrics

Performance for this project is monitored in the following ways:

- Enhanced capability in physical verification, functional analysis, and design verification.
- Increased Probability of Detection of malicious insertion and/or counterfeit parts.
- Effectiveness of developed technologies, as measured by:

o The speed and reliability of new validation and verification techniques in identifying known microelectronics issues (e.g., tampering) in laboratory and non-laboratory situations;

o Successful testing of advanced, alternative manufacturing techniques, such as disaggregated manufacturing; and

o Resilience of microelectronics protected by new trust approach technologies in red teaming exercises.

- Adoption of next-generation trust technologies, as measured by:

o The number of DoD and other government programs employing these trust technologies, design approaches, or best practices, possibly as facilitated by the provision of use models;

o The volume and criticality of components employing these technologies, design approaches, or best practices; and

o Promulgation in DoD guidance and program protection plans.

- Commercial partnerships established for or enhanced by the development and manufacture of DoD microelectronics using next-generation trust technologies.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604294D8Z / *Trusted and Assured Microelectronics*	Project (Number/Name) P646 / *New Trust Approach Development*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
New Trust Approach Development	MIPR	Various (DARPA, Air Force, Army, Navy, NSA) : Various	-	-		-		42.102	Mar 2018	-		42.102	Continuing	Continuing	-
		Subtotal	-	-		-		42.102		-		42.102	-	-	-

	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		0.000		42.102		-		42.102	-	-	-

Remarks

NA

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** P646 / *New Trust Approach Development*

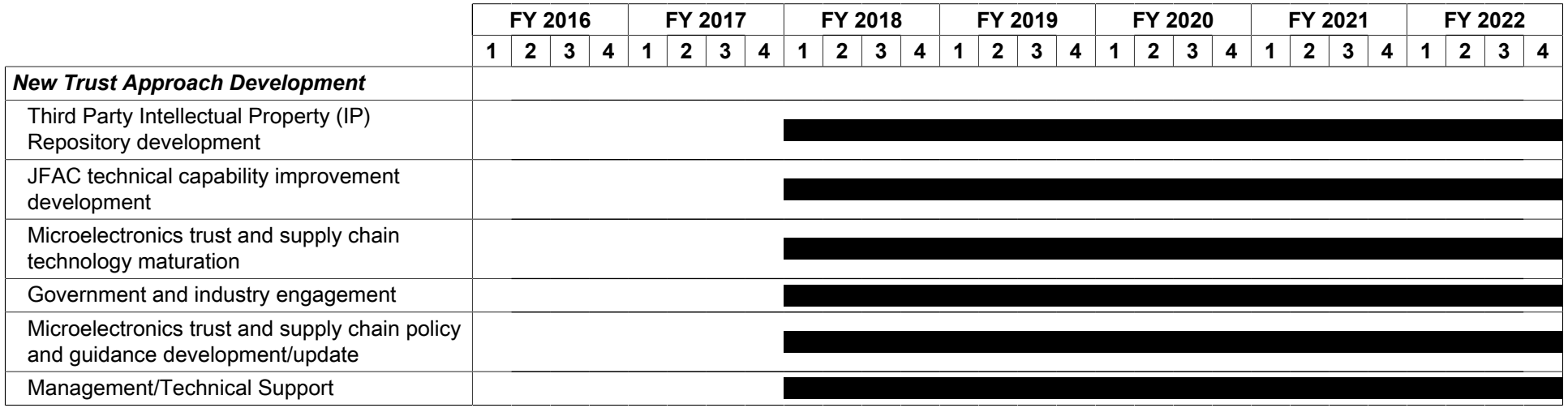

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** P646 / *New Trust Approach Development*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
New Trust Approach Development				
Third Party Intellectual Property (IP) Repository development	1	2018	4	2022
JFAC technical capability improvement development	1	2018	4	2022
Microelectronics trust and supply chain technology maturation	1	2018	4	2022
Government and industry engagement	1	2018	4	2022
Microelectronics trust and supply chain policy and guidance development/update	1	2018	4	2022
Management/Technical Support	1	2018	4	2022

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604331D8Z / *Rapid Prototyping Program*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	100.000	-	100.000	100.000	100.000	100.000	100.000	Continuing	Continuing
638: *Rapid Prototyping Program*	-	0.000	0.000	100.000	0.000	100.000	100.000	100.000	100.000	100.000	Continuing	Continuing
639: *Rapid Prototyping Program - Congressional Add*	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

Note

This is a new program element in FY 2018.

A. Mission Description and Budget Item Justification

This program provides funds to develop prototypes that drive down technical and integration risk; obtain warfighter feedback and result in affordable and realistic requirements. The program supports the development of fieldable prototypes that can be demonstrated in an operational environment in timelines supportive of warfighter requirements.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	100.000	0.000	100.000
Total Adjustments	0.000	0.000	100.000	0.000	100.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustment to Budget Years	-	-	100.000	0.000	100.000

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2016	FY 2017
Project: 638: *Rapid Prototyping Program*		
Congressional Add: *None*	0.000	0.000
Congressional Add Subtotals for Project: 638	0.000	0.000
Project: 639: *Rapid Prototyping Program - Congressional Add*		

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604331D8Z *I Rapid Prototyping Program*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2016	FY 2017
Congressional Add: *N/A*	0.000	0.000
Congressional Add Subtotals for Project: 639	0.000	0.000
Congressional Add Totals for all Projects	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604331D8Z / *Rapid Prototyping Program*	Project (Number/Name) 638 / *Rapid Prototyping Program*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
638: *Rapid Prototyping Program*	-	0.000	0.000	100.000	0.000	100.000	100.000	100.000	100.000	100.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project provides funds to develop prototypes to drive down technical and integration risk; obtain warfighter feedback and result in affordable and realistic requirements. The program supports the development of fieldable prototypes that can be demonstrated in an operational environment in timelines supportive of warfighter requirements.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Prototype Development ***Description:*** This effort funds prototype development to inform and facilitate the delivery of capabilities to the warfighter. A cross functional team, led by the Office of the Secretary of Defense for Research and Engineering, reviews and selects one or more prototyping proposal(s) from across the Department of Defense. ***FY 2018 Base Plans:*** This project will pursue one or more technology-enabled prototyping effort(s) focused on capability development and risk reduction for future programs of record.	-	-	100.000	-	100.000
Accomplishments/Planned Programs Subtotals	-	-	100.000	-	100.000

	FY 2016	FY 2017
Congressional Add: None ***FY 2016 Accomplishments:*** N/A ***FY 2017 Plans:*** N/A	0.000	0.000
Congressional Adds Subtotals	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604331D8Z / *Rapid Prototyping Program*	**Project (Number/Name)** 638 / *Rapid Prototyping Program*

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604331D8Z / *Rapid Prototyping Program*	**Project (Number/Name)** 638 / *Rapid Prototyping Program*

Remarks

TBD

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604331D8Z / *Rapid Prototyping Program*	**Project (Number/Name)** 638 / *Rapid Prototyping Program*

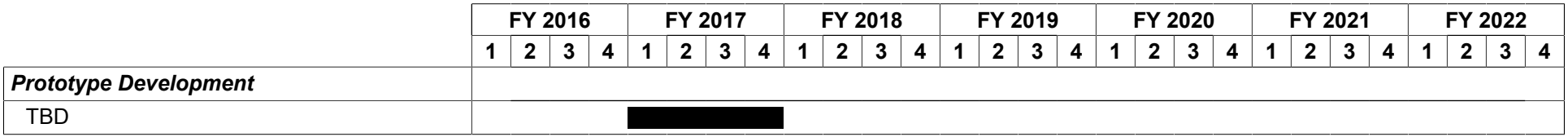

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604331D8Z / *Rapid Prototyping Program*	**Project (Number/Name)** 638 / *Rapid Prototyping Program*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Prototype Development				
TBD	1	2017	4	2017

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604331D8Z / *Rapid Prototyping Program*	Project (Number/Name) 639 / *Rapid Prototyping Program - Congressional Add*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
639: *Rapid Prototyping Program - Congressional Add*	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

N/A

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: N/A ***Description:*** N/A ***FY 2016 Accomplishments:*** N/A ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A	0.000	0.000	0.000	0.000	0.000
Accomplishments/Planned Programs Subtotals	0.000	0.000	0.000	0.000	0.000

	FY 2016	FY 2017
Congressional Add: N/A ***FY 2016 Accomplishments:*** N/A ***FY 2017 Plans:*** N/A	0.000	0.000
Congressional Adds Subtotals	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604331D8Z / *Rapid Prototyping Program*	**Project (Number/Name)** 639 / *Rapid Prototyping Program - Congressional Add*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604342D8Z / *Defense Technology Offset*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	0.000	71.500	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
841: *Defense Technology Offset*	0.000	71.500	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

Note

This program element is a new start in FY 2016 based on an increase in the FY 2016 Omnibus.

A. Mission Description and Budget Item Justification

Funds will be used to support the acceleration of the fielding or commercialization of offset technologies that would help counter the technological advantage of potential adversaries. Examples of offset technology areas include directed energy, low-cost high speed munitions, autonomous systems, undersea warfare, cyber technology, and intelligence data analysis. These funds will enable the Department to build and maintain the military technological superiority of the United States.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	75.000	0.000	0.000	-	0.000
Current President's Budget	71.500	0.000	0.000	-	0.000
Total Adjustments	-3.500	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-3.500	-			
• SBIR/STTR Transfer	-	-			

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2016	FY 2017
Project: 841: *Defense Technology Offset*		
Congressional Add: *Defense Technology Offset*	71.500	-
Congressional Add Subtotals for Project: 841	71.500	-
Congressional Add Totals for all Projects	71.500	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604342D8Z / *Defense Technology Offset*	Project (Number/Name) 841 / *Defense Technology Offset*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
841: *Defense Technology Offset*	0.000	71.500	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This program element is a new start in FY 2016 based on an increase in the FY 2016 Omnibus.

A. Mission Description and Budget Item Justification

Funds will be used to support the acceleration of the fielding or commercialization of offset technologies that would help counter the technological advantage of potential adversaries. Examples of offset technology areas include directed energy, low-cost high speed munitions, autonomous systems, undersea warfare, cyber technology, and intelligence data analysis. These funds will enable the Department to build and maintain the military technological superiority of the United States.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017
Congressional Add: Defense Technology Offset	71.500	-
FY 2016 Accomplishments: Funds will be used to support the acceleration of the fielding or commercialization of offset technologies that would help counter the technological advantage of potential adversaries. Examples of offset technology areas include directed energy, low-cost high speed munitions, autonomous systems, undersea warfare, cyber technology, and intelligence data analysis. These funds will enable the Department to build and maintain the military technological superiority of the United States.		
Congressional Adds Subtotals	71.500	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604400D8Z / *Department of Defense (DoD) Unmanned Systems Common Development*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	50.945	7.731	3.320	3.967	-	3.967	3.811	3.826	3.898	3.975	Continuing	Continuing
P440: *UAS Airspace Integration*	29.028	3.660	0.990	1.000	-	1.000	1.000	1.000	1.000	1.000	Continuing	Continuing
P442: *Interoperability*	20.834	3.859	1.980	2.617	-	2.617	2.461	2.476	2.548	2.625	Continuing	Continuing
P443: *Unmanned Systems Roadmap*	1.083	0.212	0.350	0.350	-	0.350	0.350	0.350	0.350	0.350	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Department of Defense (DoD) Unmanned Systems (UxS) Common Development program is a joint effort to develop and demonstrate common standards, architectures, and technologies that address unmanned systems' issues across all Military Services. The intent is to increase interoperability and effectiveness by promoting cooperative development of solutions that are applicable across all unmanned systems. This effort initially focused on addressing DoD unmanned aircraft system (UAS) integration into the National Airspace System (NAS) and a demonstration of a common, interoperable ground station architecture and associated interface standards. While UAS initially were the primary focus, interoperability among all unmanned and manned systems is the long-term goal.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	7.786	3.320	3.998	-	3.998
Current President's Budget	7.731	3.320	3.967	-	3.967
Total Adjustments	-0.055	0.000	-0.031	-	-0.031
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.055	-			
• Management Realignment	-	-	-0.004	-	-0.004
• DTIC Offset Bill	-	-	-0.027	-	-0.027

Change Summary Explanation

The FY2017 funding request was reduced by $ 0.063 million to account for the availability of prior year execution balances.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604400D8Z / *Department of Defense (DoD) Unmanned Systems Common Development*	**Project (Number/Name)** P440 / *UAS Airspace Integration*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P440: *UAS Airspace Integration*	29.028	3.660	0.990	1.000	-	1.000	1.000	1.000	1.000	1.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Airborne Sense-and-Avoid (ABSAA) and Ground Based Sense-and-Avoid (GBSAA) technology development transitioned to UAS programs of record during FY2013.

A. Mission Description and Budget Item Justification

Global Hawk and Triton, as well as other Group 3-5 UAS, need a sense-and-avoid (SAA) capability as an alternate means of compliance to Title 14 Code of Federal Regulations, Part 91.111 and Part 91.113, requirement to see-and-avoid other aircraft. The Air Force is leading the effort to develop an ABSAA system that is suitable to support operations within US and foreign national airspace. The RQ-4 Global Hawk, MQ-4C Triton, MQ-1B Predator, MQ-1C Gray Eagle, and MQ-9 Reaper all have a requirement for SAA capability and will leverage the technology being developed by the Air Force. The Army is leading the development of a GBSAA system to provide a solution for improved airspace access in terminal operations as well as operations/training within the GBSAA system's coverage area (e.g., Gray Eagle at Fort Hood, Shadow operations at Cherry Point). This system will provide a near-term solution and is an integral part of the long-term permanent solution.

This joint funding also supports development of common operating concepts, policy, standards, modeling and simulation, and technology to enable DoD UAS to routinely access the national and international airspace systems.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Unmanned Aircraft System Airspace Integration Initiatives	3.660	0.990	1.000
Description: Starting in FY 2010 the Department's sense-and-avoid (SAA) developmental efforts are enhanced by this defense-wide program element. This program has provided joint funding to accelerate the development of SAA technology and standards to enable UAS to routinely access the national and international airspace systems. This program also supports development of UAS airspace integration policy and standards, as well as the modeling, simulation, and operational analysis needed to validate the standards. In FY 2013 ABSAA and GBSAA efforts transitioned to the Services.			
FY 2016 Accomplishments: Completed updates to and implemented DoD/FAA MOA. Implemented findings from the Joint Test of UAS operation in US airspace. Completed small UAS Groups 1-3 airworthiness requirements study and provided a document that identifies gaps and recommends courses of action. Completed survey and analysis of UAS CONUS operating locations and airspace requirements. Continued analysis of UAS AI Safety Case issues to expand UAS access to the NAS. Developed and validated separation minima that enabled low-altitude military UA to remain well clear of other aircraft. Identified and addressed key capability gaps for broad-spectrum military UAS operations at low altitudes. Through the SARP, coordinated with and leverage the resources			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604400D8Z / *Department of Defense (DoD) Unmanned Systems Common Development*	**Project (Number/Name)** P440 / *UAS Airspace Integration*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
of the FAA, NASA and DHS to work common integration challenges. Investigated and identified best-candidate solutions for low size, weight, power and cost approaches supporting military small UAS (sUAS) operations in national, international and foreign national airspace. Finalized and reported recommended criteria and methods to quantify the contribution of the UAS pilot performance of the SAA function to overall airspace safety. Engaged with FAA to discuss concepts, architectures, functional requirements as well as policy and procedural issues regarding UAS Spectrum, Communications, Command and Control and other infrastructure that was enhanced, improved or replaced in order to facilitate DoD UAS integration into the NAS. Collaborated to develop and implemented operating systems in the NAS that support UAS integration, such as GBSAA. Identified specific use cases of current operations and identified the gaps/deltas between current UAS operations in the NAS under a Certificate of Waiver or Authorization (COA) and UAS operating as fully integrated into the NAS. Identified specific scenarios for research, implementation, and testing. Identified operational use cases for research, development, and testing, and provided semantic decision support, and modeling and simulation. ***FY 2017 Plans:*** Evaluate and validate identified best-candidate solutions for low size, weight, power and cost technology supporting military sUAS operations in national, international and foreign national airspace. Develop and finalize quantitative safety assessment approaches that support unique UAS operations to support emerging DoD needs and inform future rulemaking. Make formal recommendations for separation minima that enable low-altitude military UAS to remain well clear of other aircraft. Continue to engage the FAA to advance DoD UAS airspace integration. Finalize implementation of the UAS Airspace Integration Joint Test into Service regulations and training. ***FY 2018 Plans:*** Evaluate and validate identified best-candidate solutions for low size, weight, power and cost technology supporting military sUAS operations in national, international and foreign national airspace. Develop and finalize quantitative safety assessment approaches that support unique UAS operations to support emerging DoD needs and inform future rulemaking. Make formal recommendations for separation minima that enable low-altitude military UAS to remain well clear of other aircraft. Continue to engage the FAA to advance DoD UAS airspace integration. Finalize implementation of the UAS Airspace Integration Joint Test into Service regulations and training.			
Accomplishments/Planned Programs Subtotals	3.660	0.990	1.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604400D8Z / *Department of Defense (DoD) Unmanned Systems Common Development*	**Project (Number/Name)** P440 / *UAS Airspace Integration*

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604400D8Z / *Department of Defense (DoD) Unmanned Systems Common Development*	**Project (Number/Name)** P442 / *Interoperability*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P442: *Interoperability*	20.834	3.859	1.980	2.617	-	2.617	2.461	2.476	2.548	2.625	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Interoperability project will develop and demonstrate an interoperable, standards-based, open ground station architecture for cross-domain (air, ground, maritime) unmanned systems. The intent is to improve joint and coalition interoperability and to promote competition through the implementation of open standards and open architectures.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Interoperability	3.859	1.980	2.617

Description: Develop and demonstrate an interoperable, standards-based, open ground station architecture for cross-domain (air, ground, maritime) unmanned systems; improve joint and coalition interoperability; and promote competition through the implementation of open standards and open architectures.

FY 2016 Accomplishments:

Joint Service along with Industry demonstrated a combined UAV Tactical C2 capability with the Marine Corps KMAX Platform. The combined C2 capability demonstrated a Navy Common Control Station (CCS) and Air Force Common Mission Command Center (CMCC) working together and sharing mission and telemetry data using UAS Control Segment Architecture (UCS) interfaces.

Developed a Joint Communication Architecture for Unmanned Systems (JCAUS) which aims to establish a Government and Industry framework for unmanned systems communications. The architecture aligns with modular open systems architecture principles and allows PoRs to encourage competitive business environments and to react to emerging and urgent communication requirements faster by providing a framework for rapid technology insertions.

Established an MOA between Navy and Army Unmanned Ground Systems (UGS) PoRs to assess their Joint Architecture Unmanned System (JAUS) based test tools to develop a plan that will combine and standardize the tools sets.

Sponsored an Unmanned Systems Interoperability and Integration workshop/technical exchange that focused on the integration aspects of unmanned systems, rather than the technology of the systems themselves. Focus areas were Unmanned Systems Integration with Platforms (integration of UxS to Aircraft, Ships, Ground Vehicles); with other Systems (integration of payloads,

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604400D8Z / *Department of Defense (DoD) Unmanned Systems Common Development*	**Project (Number/Name)** P442 / *Interoperability*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
weapons, sensors); with Humans (operator interaction, human-robot interface, controllers, trust issues, training etc.) and Integration with the Force/Fleet (mission integration). Assessed the Unmanned Systems Safety Guidance Document, publish in 2007, for technology advancement gaps due to the evolution of autonomous technology and unmanned systems. The identified gaps were categorized as “critical”, “substantial” and “other”. The six critical gaps resulted largely from the evolution of unmanned systems into more autonomous and learning systems, increased weaponization of the systems, easier access to such systems by all nations and even non-nation actors, and the increasingly robotic (or mobile) nature of unmanned systems. ***FY 2017 Plans:*** Continue SAE working group support for UAS Control Segment Architecture (UCS) interfaces and Joint Architecture Unmanned System (JAUS). Develop JCAUS compliant prototypes to validate and further mature the architecture. Continue support for Unmanned Systems Interoperability and Integration workshop/technical exchange meeting. Sponsor development effort to standardize the UGS test suite tool set. Update the Unmanned Systems Safety Guidance Document. Establish and align DoD Interoperability Strategic Goals with DoD Third Off-set Strategy. ***FY 2018 Plans:*** Continue SAE working group support for UAS Control Segment Architecture (UCS) interfaces and Joint Architecture Unmanned System (JAUS). Continue JCAUS compliant prototypes to validate and further mature the architecture. Continue support for Unmanned Systems Interoperability and Integration workshop/technical exchange meeting. Continue support to DoD Interoperability IPT.			
Accomplishments/Planned Programs Subtotals	3.859	1.980	2.617

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

n/a

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604400D8Z / *Department of Defense (DoD) Unmanned Systems Common Development*	**Project (Number/Name)** P442 / *Interoperability*

E. Performance Metrics

n/a

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604400D8Z / *Department of Defense (DoD) Unmanned Systems Common Development*	**Project (Number/Name)** P443 / *Unmanned Systems Roadmap*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P443: *Unmanned Systems Roadmap*	1.083	0.212	0.350	0.350	-	0.350	0.350	0.350	0.350	0.350	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This effort supports the Department's Unmanned Systems Integrated Roadmap and updates. The roadmap provides a DoD vision for the continuing development, fielding and employment of unmanned systems technologies; establishes the current state of unmanned systems in today's force; and outlines a strategy to address common challenges to achieve the shared vision across all unmanned domains (air, ground, and maritime).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Unmanned Systems Roadmap	0.212	0.350	0.350
Description: Develops and updates the Department's Unmanned Systems Integrated Roadmap. ***FY 2016 Accomplishments:*** Updated and published the Department's "Unmanned Systems Integrated Roadmap, 2016-2041" and performed related studies supporting the Department's vision for unmanned systems. ***FY 2017 Plans:*** Update the Department's Unmanned Systems Integrated Roadmap and perform related studies supporting the Department's vision for unmanned systems. ***FY 2018 Plans:*** Update the Department's Unmanned Systems Integrated Roadmap and perform related studies supporting the Department's vision for unmanned systems.			
Accomplishments/Planned Programs Subtotals	0.212	0.350	0.350

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604400D8Z / *Department of Defense (DoD) Unmanned Systems Common Development*	**Project (Number/Name)** P443 / *Unmanned Systems Roadmap*

E. Performance Metrics

Provide up-to-date Unmanned Systems Roadmap providing a DoD vision for the continuing development, fielding and employment of unmanned systems technologies.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604682D8Z / *Wargaming & Support for Strategic Analysis (SSA)*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	0.000	0.000	4.000	3.833	-	3.833	3.805	3.793	3.791	3.869	Continuing	Continuing
104: *Wargaming & Support for Strategic Analysis*	0.000	0.000	4.000	3.833	-	3.833	3.805	3.793	3.791	3.869	Continuing	Continuing

A. Mission Description and Budget Item Justification

A. Mission Description and Budget Item Justification

This was a new start program in FY 2017. This program supports the Office of the Director, Cost Assessment & Program Evaluation (CAPE). It funds activities that help CAPE to implement the Department's intent to reinvigorate wargaming. CAPE will accomplish this by leading wargaming activities, developing and managing the Wargaming Portal, and supporting the design, execution, and analysis of wargames.

This program provides for analytical research across a spectrum of issues and concerns. The research agenda is focused on near- to long-term problems identified by the Deputy Secretary of Defense, and addresses difficult and complex questions linked to program alternatives for current and future capabilities and forces in order to enhance the senior leadership's deliberations and decision-making.

This program provides the scientific and technical engineering services needed for research studies in the development of models and simulations and the evaluation of current analytical tools and scientific methods used to evaluate and assess scenarios and concepts of operations (CONOPS) for a wide range of warfighting environments and scenarios. Deliverables from this program will include reports, briefings, and analyses designed to illuminate findings and assessments from wargaming excursions. Outcomes include the compilation and analysis of wargaming data in the Wargaming Portal and support for data use by wargaming participants.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	0.000	4.000	4.000	-	4.000
Current President's Budget	0.000	4.000	3.833	-	3.833
Total Adjustments	0.000	0.000	-0.167	-	-0.167
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Internal Realignment	0.000	0.000	-0.004	0.000	-0.004
• SRRB Efficiencies Savings	0.000	0.000	-0.163	0.000	-0.163

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604682D8Z / *Wargaming & Support for Strategic Analysis (SSA)*

Change Summary Explanation

In FY 2017 this program was added to reinvigorate Wargaming and Support for Strategic Analysis to implement an important Deputy Secretary of Defense priority.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604682D8Z / *Wargaming & Support for Strategic Analysis (SSA)*	Project (Number/Name) 104 / *Wargaming & Support for Strategic Analysis*	

COST ($ in Millions)	Prior Years (+)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
104: *Wargaming & Support for Strategic Analysis*	0.000	0.000	4.000	3.833	-	3.833	3.805	3.793	3.791	3.869	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

(+) The sum of all Prior Years is $0.000 million less than the represented total due to several projects ending

A. Mission Description and Budget Item Justification

A. Mission Description and Budget Item Justification

This program supports the Office of the Director, Cost Assessment & Program Evaluation (CAPE). It funds activities that help CAPE to implement the vision of the Deputy Secretary of Defense to reinvigorate wargaming in the Department of Defense. CAPE will accomplish this by leading wargaming activities; developing and managing the Wargaming Portal, and supporting the design, execution, and analysis of wargames.

This program provides for analytical research across a spectrum of issues and concerns. The research agenda is focused on near to long-term problems identified by the Deputy Secretary of Defense, and addresses difficult and complex questions linked to program alternatives for current and future capabilities and forces in order to enhance the senior leadership's deliberations and decision-making.

This program provides the scientific and technical engineering services needed for research studies in the development of models and simulations and the evaluation of current analytical tools and scientific methods used to evaluate and assess scenarios and concepts of operations (CONOPS) for a wide range of warfighting environments and scenarios. Deliverables from this program will include reports, briefings, and analyses designed to illuminate findings and assessments from wargaming excursions. Outcomes include the compilation and analysis of wargaming data in the Wargaming Portal and support for data use by wargaming participants.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Wargaming & Support for Strategic Analysis	0.000	4.000	3.833
Description: This program provides for analytical research across a spectrum of issues and concerns. The research agenda is focused on near- to long-term problems identified by the Deputy Secretary of Defense, and addresses difficult and complex questions linked to program alternatives for current and future capabilities and forces in order to enhance the senior leadership's deliberations and decision-making.			
FY 2016 Accomplishments: New Start in FY 2017			
FY 2017 Plans: Studies, analyses, and assessments will be focused on:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604682D8Z / *Wargaming & Support for Strategic Analysis (SSA)*	**Project (Number/Name)** 104 / *Wargaming & Support for Strategic Analysis*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Developing wargaming objectives from senior leader priorities and Strategic Support Analysis activities - Overseeing planning, design, and scheduling of excursion wargames - Leading, participating in, and assessing outcomes of all excursion wargames - Participating in some near-, mid-, and far-term scenarios and CONOPS wargames. - Analyzing wargame insights and data in the Wargaming Repository. - Providing requirements for the Wargaming Portal as needed. - Providing guidance to DoD on best practices for mid-term wargames. ***FY 2018 Plans:*** Studies, analyses, and assessments will be focused on: - Developing and refining wargaming objectives from senior leader priorities and Strategic Support Analysis activities. - Overseeing planning, design, and scheduling of additional excursion wargames - Leading, participating in, and assessing outcomes of all excursion wargames - Participating in some near-, mid-, and far-term scenarios and CONOPS wargames - Analyzing wargame insights and data in the Wargaming Repository. - Providing requirements for the Wargaming Portal as needed - Providing guidance to DoD on best practices for mid-term wargames.			
Accomplishments/Planned Programs Subtotals	0.000	4.000	3.833

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

A mix of competitive contracts with commercial firms and research provided by university-affiliated research centers (UARCs), and Federally Funded Research and Development Centers (FFRDCs).

E. Performance Metrics

The products or expected outcomes of this program are studies and analyses to support issues of high interest to the Deputy Secretary of Defense. Products will also include the Wargaming Repository to provide a knowledge base for the Department of Defense. Performance is measured by the quality of the analyses and is monitored through the review of the organizational assessment process. The primary goal is to ensure that study and analytical products are timely, clear, complete, accurate, responsive, balanced, and objective.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604775D8Z / *Defense Rapid Innovation Program*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	817.918	250.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
P775: *Defense Rapid Innovation Program*	817.918	250.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

The National Defense Authorization Act (NDAA) for FY2015 and the Consolidated Appropriations Act, 2015, provide the Department of Defense with authorities and funds to facilitate the rapid insertion of innovative technologies into military systems and programs. The purpose of the DoD-wide Rapid Innovation Fund (RIF) program is to perform a solicitation, evaluation and award of contracts that support the aforementioned Congressional authorities and support the DoD goals of emphasis on rapid, responsive acquisition and engagement of small, innovative businesses in solving defense challenges.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	250.000	0.000	0.000	-	0.000
Current President's Budget	250.000	0.000	0.000	-	0.000
Total Adjustments	0.000	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	0.000	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2016	FY 2017
Project: P775: *Defense Rapid Innovation Program*		
Congressional Add: *Defense Rapid Innovation Fund*	250.000	-
Congressional Add Subtotals for Project: P775	250.000	-
Congressional Add Totals for all Projects	250.000	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604775D8Z / *Defense Rapid Innovation Program*	Project (Number/Name) P775 / *Defense Rapid Innovation Program*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P775: *Defense Rapid Innovation Program*	817.918	250.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The National Defense Authorization Act (NDAA) for FY2016 and the Consolidated Appropriations Act, 2016, provide the Department of Defense with authorities and funds to facilitate the rapid insertion of innovative technologies into military systems and programs. The purpose of the DoD-wide Rapid Innovation Fund (RIF) program is to perform a solicitation, evaluation and award of contracts that support the aforementioned Congressional authorities and support the DoD goals of emphasis on rapid, responsive acquisition and engagement of small, innovative businesses in solving defense challenges.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017
Congressional Add: Defense Rapid Innovation Fund	250.000	-
FY 2016 Accomplishments: Funds will be used for research and development in the key areas defined by the Army, Navy, Air Force and various Agencies/Programs within the Office of the Secretary of Defense. Investments are targeted to defense requirements within the budget year of execution. The defense wide focus areas for the FY2015 Rapid Innovation Fund Program include; 1) Deliver near term, emerging technologies to enhance the capabilities for current Military operations; 2) Innovative technologies that enhance position, navigation, timing accuracies, improve targeting/delivery in GPS-denied environments and prevent exploitation of systems lost in denied areas (e.g., anti-tamper capabilities); 3) Develop and demonstrate breakthrough technologies for future Military capabilities. FY2015 funds will be distributed evenly between the services (Army, Navy, Air Force) and the 4th estate agencies.		
Congressional Adds Subtotals	250.000	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604775D8Z / *Defense Rapid Innovation Program*	**Project (Number/Name)** P775 / *Defense Rapid Innovation Program*

E. Performance Metrics

Each RIF project is evaluated at its conclusion based on two measures: 1) technical performance, or extent the RIF project is meeting its technical goals, with an assessment of cost, schedule, and deliverables against stated objectives; and 2) transition status, or the extent to which an acquisition program or customer has been identified and is participating in procuring the technology, assuming the RIF project is successful.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0303191D8Z / *Joint Electromagnetic Technology (JET) Program*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	5.800	2.656	2.636	2.902	-	2.902	3.071	3.103	3.164	3.235	Continuing	Continuing
192: *Joint Electromagnetic Technology (JET) Program*	5.800	2.656	2.636	2.902	-	2.902	3.071	3.103	3.164	3.235	Continuing	Continuing

A. Mission Description and Budget Item Justification

The JET Program supports the Defense Community in general with a particular emphasis on the communication requirements of Special Forces and Intelligence. Details of the program are classified. This program is funded under Budget Activity 4, Demonstration and Validation.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	2.656	2.636	2.849	-	2.849
Current President's Budget	2.656	2.636	2.902	-	2.902
Total Adjustments	0.000	0.000	0.053	-	0.053
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• SRRB Efficiency	-	-	-0.097	-	-0.097
• Program Adjustment	-	-	0.150	-	0.150

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0303191D8Z / *Joint Electromagnetic Technology (JET) Program*	Project (Number/Name) 192 / *Joint Electromagnetic Technology (JET) Program*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
192: *Joint Electromagnetic Technology (JET) Program*	5.800	2.656	2.636	2.902	-	2.902	3.071	3.103	3.164	3.235	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The JET Program supports the Defense Community in general with a particular emphasis on the communication requirements of Special Forces and Intelligence. Details of the program are classified. This program is funded under Budget Activity 4, Demonstration and Validation.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: JET Program Initiatives	2.656	2.636	2.902
FY 2016 Accomplishments: Program Planning and Support			
FY 2017 Plans: Program Planning and Support			
FY 2018 Plans: Program Planning and Support			
Accomplishments/Planned Programs Subtotals	2.656	2.636	2.902

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

- Numbers of operational field demonstrations.
- Numbers of false-positive results.
- Successful technology transfer to service component.
- Number of service requirements satisfied.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0604161D8Z / *Nuclear and Conventional Physical Security/Countering Nuclear Threats*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	42.438	8.590	10.324	12.536	-	12.536	13.574	14.802	11.412	15.156	Continuing	Continuing
P163: *Nuclear and Conventional Physical Security*	37.519	5.007	6.903	7.900	-	7.900	6.890	7.009	7.132	7.280	Continuing	Continuing
P042: *CNT Prevention SDD*	4.919	3.583	3.421	4.636	-	4.636	6.684	7.793	4.280	7.876	Continuing	Continuing

A. Mission Description and Budget Item Justification

This Program Element (PE) addresses the need to defend and deter against weapons of mass destruction (WMD) threats and to safeguard personnel; prevent unauthorized access to equipment, installations, material, and documents; and to safeguard the foregoing against espionage, sabotage, damage, and theft. This program oversees advanced engineering development throughout DoD for an integrated and systemic RDT&E approach for countering nuclear threats and nuclear and conventional physical security technology and systems. The funding has been centralized in this Defense-wide PE since the early 1990s and represents a substantial portion of all DoD physical security RDT&E funding. Priorities for this PE RDT&E efforts are driven by inputs from Quadrennial Defense Review guidance, Combatant Command and Service requirements, analysis reports such as “Protecting the Force: Lessons from Fort Hood,” January 2010, the Integrated Unit, Base, and Installation Protection Cost Benefits Analysis, Multi-national Work Plans established through the Nuclear Security Summit process, and DoD Directive 5210.41, Security Policy for Protecting Nuclear Weapons-directed requirements and associated security deviation reports.

Under this integrated approach, funds are used to provide system development and demonstration for the Department in seven capability areas: (1) Detection and Assessment; (2) Access Controls; (3) Installation and Transport Security; (4) Storage and Safeguards; (5) Prevention; (6) Decision Support Systems; and (7) Analytical Support. The program will develop systems that are producible, supportable, and affordable and to demonstrate system integration, interoperability, and utility prior to full-rate production. The projects under the PE become technology insertions into existing programs or advance to being a certified Commercial/Government off-the-shelf product. The PE initiatives are coordinated by the Physical Security Enterprise and Analysis Group. This group is responsible for avoiding duplication of effort and when applicable ensure systems integration and promote interoperability and sustainability.

This PE can fund travel to support the requirements of this program.

This appropriation will finance work, including manpower, performed by a government agency or by private individuals or organizations under a contractual or grant arrangement with the government who conduct research (systematic study directed toward fuller scientific knowledge or understanding of the subject studied), development (systematic use of the knowledge and understanding gained from research, for the production of useful materials, devices, systems, or methods, including the design and development of prototypes and processes) and test and evaluation efforts.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0604161D8Z *I Nuclear and Conventional Physical Security/Countering Nuclear Threats*

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	8.783	10.324	11.276	-	11.276
Current President's Budget	8.590	10.324	12.536	-	12.536
Total Adjustments	-0.193	0.000	1.260	-	1.260
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.193	-			
• Internal Realignment	-	-	1.354	-	1.354
• Internal Directed Reduction	-	-	-0.010	-	-0.010
• DTIC Offset	-	-	-0.084	-	-0.084

Change Summary Explanation

Internally realigned funding to this RDT&E Program Element to address additional advanced development for the Radiological Detection System

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0604161D8Z / *Nuclear and Conventional Physical Security/Countering Nuclear Threats*	**Project (Number/Name)** P163 / *Nuclear and Conventional Physical Security*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P163: *Nuclear and Conventional Physical Security*	37.519	5.007	6.903	7.900	-	7.900	6.890	7.009	7.132	7.280	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Program Element (PE) addresses the need to defend and deter against weapons of mass destruction (WMD) threats and to safeguard personnel; prevent unauthorized access to equipment, installations, material, and documents; and to safeguard the foregoing against espionage, sabotage, damage, and theft. This program oversees advanced engineering development throughout DoD for an integrated and systemic RDT&E approach for countering nuclear threats and nuclear and conventional physical security technology and systems. The funding has been centralized in this Defense-wide PE since the early 1990s and represents a substantial portion of all DoD physical security RDT&E funding. Priorities for this PE RDT&E efforts are driven by inputs from Quadrennial Defense Review guidance, Combatant Command and Service requirements, analysis reports such as “Protecting the Force: Lessons from Fort Hood,” January 2010, the Integrated Unit, Base, and Installation Protection Cost Benefits Analysis, Multi-national Work Plans established through the Nuclear Security Summit process, and DoD Directive 5210.41, Security Policy for Protecting Nuclear Weapons-directed requirements and associated security deviation reports.

Under this integrated approach, funds are used to provide system development and demonstration for the Department in seven capability areas: (1) Detection and Assessment; (2) Access Controls; (3) Installation and Transport Security; (4) Storage and Safeguards; (5) Prevention; (6) Decision Support Systems; and (7) Analytical Support. The program will develop systems that are producible, supportable, and affordable and to demonstrate system integration, interoperability, and utility prior to full-rate production. The projects under the PE become technology insertions into existing programs or advance to being a certified Commercial/Government off-the-shelf product. The PE initiatives are coordinated by the Physical Security Enterprise and Analysis Group. This group is responsible for avoiding duplication of effort and when applicable ensure systems integration and promote interoperability and sustainability.

This PE can fund travel to support the requirements of this program.

This appropriation will finance work, including manpower, performed by a government agency or by private individuals or organizations under a contractual or grant arrangement with the government who conduct research (systematic study directed toward fuller scientific knowledge or understanding of the subject studied), development (systematic use of the knowledge and understanding gained from research, for the production of useful materials, devices, systems, or methods, including the design and development of prototypes and processes) and test and evaluation efforts.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Detection and Assessment	3.137	3.138	3.686

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0604161D8Z / *Nuclear and Conventional Physical Security/Countering Nuclear Threats*	**Project (Number/Name)** P163 / *Nuclear and Conventional Physical Security*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Description: The ability to detect an adversary and assess their intentions is a basic physical security tenant. This capability area will design equipment to identify and warn of unauthorized access to a specified area or installation as well as equipment related to the notification and identification of explosive threats or hazards. ***FY 2016 Accomplishments:*** • Developed Millimeter Wave Asymmetric Threat Detection • Developed Sonar Propagation Acoustics Model Transition to Operational Initial Capability • Developed Hand-Held Explosive Detection Equipment for Maritime Operations ***FY 2017 Plans:*** • Conduct a Comparative Evaluation of Colorimetric Explosive Detection Systems • Develop Linear Sensor System Development for Multi-Threat Detection • Develop Automated tracking and classification of UUVs utilizing the AN/WQX-2 • Develop Multi-Sensor Detection and Discrimination ***FY 2018 Plans:*** • Develop Linear Sensor System Development for Multi-Threat Detection • Develop PL1N/PL1 Portable Intrusion Detection System			
Title: Access Controls ***Description:*** Controlling access to safeguard personnel and their families and to prevent unauthorized access to critical infrastructure and materials is paramount. This capability area will focus on programs and processes related to the validity and verification of individuals entering or already within, a facility. ***FY 2016 Accomplishments:*** • Developed an access control capability that leverages information housed in local law enforcement databases ***FY 2017 Plans:*** • Further the development of the Defense Installation Access Control ***FY 2018 Plans:*** • Continue the development of the Defense Installation Access Control capability	0.890	1.010	1.834
Title: Installation and Transport Security	-	0.550	1.794

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0604161D8Z / *Nuclear and Conventional Physical Security/Countering Nuclear Threats*	**Project (Number/Name)** P163 / *Nuclear and Conventional Physical Security*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Description: Robust installation and transport security are vital to preventing a weapon of mass destruction attack or the unauthorized access to key assets such as nuclear weapons and special nuclear material. This capability area will focus on programs and equipment intended to improve the physical security profile of fixed sites and facilities, as well as critical items while in-transit. ***FY 2017 Plans:*** • Integrate detection options and response capabilities previously identified, to include the full spectrum of non-lethal to lethal tactical weapon systems, to protect personnel and assets against the terrorist threat in an in transit maritime environment. ***FY 2018 Plans:*** • Conduct a comprehensive concept demonstration in an operational environment with technologies and systems deployed and integrated across land, rail and waterside operating areas to address physical security detection gaps.			
Title: Prevention ***Description:*** The security procedures taken to discourage an adversary from accessing weapons of mass destruction or gaining unauthorized access to critical assets are at the heart of prevention. This capability area will focus on broad spectrum, generic efforts which have the ability to influence multiple areas. ***FY 2017 Plans:*** • Develop capability to share and automate content across the defense security, biosurveillance, and countering weapons of mass destruction integration mission areas	-	0.660	-
Title: Storage and Safeguards ***Description:*** Properly securing critical assets to prevent access by unauthorized persons and implementing control measures that ensure access is limited to authorized persons is the foundation of physical security. This capability area will focus on equipment (e.g., locks, doors, etc.) designed to delay or stop unauthorized entry/access to a specified/localized area. ***FY 2018 Plans:*** No efforts currently planned.	-	-	0.000
Title: Decision Support Systems ***Description:*** Decision support systems serve the management, operations, and planning levels of the DoD physical security enterprise to help to make decisions, which may be rapidly changing and not easily specified in advance. This capability area will	0.980	0.880	0.279

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0604161D8Z / *Nuclear and Conventional Physical Security/Countering Nuclear Threats*	**Project (Number/Name)** P163 / *Nuclear and Conventional Physical Security*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
focus on command and control equipment and projects related to the creation and enhancement of common operating pictures, and the establishment of common architectures / interface standards. ***FY 2016 Accomplishments:*** • Developed a Defense Security Enterprise Environment that would link/harmonize disparate and sub-optimal capabilities utilizing existing and emerging Component capabilities to better close known physical security gaps ***FY 2017 Plans:*** • Continue to develop Response Force Command, Control & Communications • Continue to develop C2 Enhanced Capability Suite ***FY 2018 Plans:*** • Continue to develop Response Force Command, Control & Communications • Continue to develop C2 Enhanced Capability Suite			
Title: Analytical Support ***Description:*** This capability area will focus on studies related to physical security topics and operational and management efforts related to day-to-day activities of the DoD Physical Security Enterprise RDT&E Program. ***FY 2017 Plans:*** • Conduct physical security test and evaluation efforts • Provide DOD and industry the means to achieve PSE interoperability ***FY 2018 Plans:*** • Conduct physical security test and evaluation efforts • Provide DOD and industry the means to achieve PSE interoperability	-	0.665	0.307
Accomplishments/Planned Programs Subtotals	5.007	6.903	7.900

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0604161D8Z / *Nuclear and Conventional Physical Security/Countering Nuclear Threats*	**Project (Number/Name)** P163 / *Nuclear and Conventional Physical Security*

E. Performance Metrics

The program performance metrics are established/approved through the Office of the Deputy Assistant Secretary of Defense for Nuclear, Chemical, and Biological Defense Programs / Nuclear Matters. The cost, schedule and technical progress of each project is reviewed at quarterly PSEAG. Performance variances are addressed and corrective action is implemented as necessary.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0604161D8Z / *Nuclear and Conventional Physical Security/Countering Nuclear Threats*	**Project (Number/Name)** P042 / *CNT Prevention SDD*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P042: *CNT Prevention SDD*	4.919	3.583	3.421	4.636	-	4.636	6.684	7.793	4.280	7.876	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Establish a Defense-wide Countering Nuclear Threats (CNT) Materiel Development Program focused on prevention. Addresses capability gaps identified by Services, Combatant Commands, and Joint Staff. The CNT acquisition strategy directly applies to Joint requirements for CNT materiel development and addresses the materiel and sustainment gaps for general purpose Joint Forces including the US Army 20th Support Command / Navy Visit, Board, Search, and Seizure / Technical Support Groups (NIMBLE ELDER and the US Special Operations Command).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: CNT Rad/Nuc Passive Defense	3.583	3.421	4.636

Description: Advanced Development of Joint Radiological and Nuclear passive defense systems (i.e. Radiological Detection System and the Joint Personal Dosimeter).

The Radiological Detection System will provide a ruggedized Radiation Detection, Indication, and Computation for real time gamma radiation monitoring and low energy x-ray, beta, alpha, and neutron detection.

The Joint Personal Dosimeter will provide a joint solution to increase capability and reduce life-cycle costs.

Both systems will address Operation TOMODACHI (response to Japan's Fukushima Daiichi nuclear power plant incident) lessons learned for common, interoperable equipment with adequate sensitivity and common units of measure.

FY 2016 Accomplishments:
Continued the development of Joint Radiological and Nuclear passive defense systems (i.e. Radiological Detection System and the Joint Personal Dosimeter)

FY 2017 Plans:
Continue the development of Joint Radiological and Nuclear passive defense systems (i.e. Radiological Detection System and the Joint Personal Dosimeter)

FY 2018 Plans:

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0604161D8Z / *Nuclear and Conventional Physical Security/Countering Nuclear Threats*	**Project (Number/Name)** P042 / *CNT Prevention SDD*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Complete the development of Joint Radiological and Nuclear passive defense systems (i.e. Radiological Detection System and the Joint Personal Dosimeter)			
Accomplishments/Planned Programs Subtotals	3.583	3.421	4.636

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

The program performance metrics are established/approved through the Countering Nuclear Threats Program Manager. The cost, schedule and technical progress is reviewed on a quarterly basis. Performance variances are addressed and corrective action(s) is(are) implemented as necessary.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0604165D8Z / *Prompt Global Strike Capability Development*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	984.616	88.660	181.303	201.749	-	201.749	217.231	220.480	224.733	229.367	Continuing	Continuing
P164: *Hypersonic Glide Experiment and Concepts Demonstration Support*	371.124	2.617	2.000	1.000	-	1.000	2.000	2.000	2.000	2.000	Continuing	Continuing
P166: *Alternate Re-Entry System/Warhead Engineering*	489.001	73.700	174.013	197.440	-	197.440	211.174	214.274	218.088	223.367	Continuing	Continuing
P167: *Test Range Development*	62.446	0.000	2.000	0.000	-	0.000	1.000	1.000	1.000	1.000	Continuing	Continuing
P168: *OSD CPGS Studies*	62.045	12.343	3.290	3.309	-	3.309	3.057	3.206	3.645	3.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

This Program Element (PE) was established to develop and demonstrate technologies and applications that advance conventional prompt global strike (CPGS) warfighting capabilities. The program uses a national team with participation from the Services, Agencies, national research laboratories, and further involvement of competitive industry. Program emphasis is on demonstrating component and subsystem technology maturity with risk reduction initiatives highlighted by flight tests. The program funds the design, development, and experimentation of boosters, payload delivery vehicles (PDVs), non-nuclear warheads, thermal protection systems, guidance systems, test range modernization, and mission planning and enabling capabilities. To support these development activities, the program procures modeling and simulation capabilities, ground testing, command and control interfaces, test range support, and launch system infrastructure. Additionally, expert resources address strategic policy and treaty issues. Program timing will be driven by the outcome of flight and ground test events as well as DoD budgets. In FY 2018, as in previous years, funding for the individual Service initiatives will be contingent upon their abilities to execute and achieve satisfactory progress towards project goals as determined by the CPGS portfolio manager.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	78.660	181.303	203.907	-	203.907
Current President's Budget	88.660	181.303	201.749	-	201.749
Total Adjustments	10.000	0.000	-2.158	-	-2.158
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	10.000	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• SRRB Reduction/Management Realignment	-	-	-0.786	-	-0.786

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense					Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 5: *System Development & Demonstration (SDD)*			R-1 Program Element (Number/Name) PE 0604165D8Z / *Prompt Global Strike Capability Development*		
• DTIC Offset	-	-	-1.372	-	-1.372

Change Summary Explanation

CPGS program funding aligned with CPGS program plan.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 5	R-1 Program Element (Number/Name) PE 0604165D8Z / *Prompt Global Strike Capability Development*	Project (Number/Name) P164 / *Hypersonic Glide Experiment and Concepts Demonstration Support*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P164: *Hypersonic Glide Experiment and Concepts Demonstration Support*	371.124	2.617	2.000	1.000	-	1.000	2.000	2.000	2.000	2.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Program Element (PE) was established to develop and demonstrate technologies and applications that advance conventional prompt global strike (CPGS) warfighting capabilities. The program uses a national team with participation from the Services, Agencies, national research laboratories, and further involvement of competitive industry. Program emphasis is on demonstrating component and subsystem technology maturity with risk reduction initiatives highlighted by flight tests. The program funds the design, development, and experimentation of boosters, payload delivery vehicles (PDVs), non-nuclear warheads, thermal protection systems, guidance systems, test range modernization, and mission planning and enabling capabilities. To support these development activities, the program procures modeling and simulation capabilities, ground testing, command and control interfaces, test range support, and launch system infrastructure. Additionally, expert resources address strategic policy and treaty issues. Program timing will be driven by the outcome of flight and ground test events as well as DoD budgets. In FY 2018, as in previous years, funding for the individual Service initiatives will be contingent upon their abilities to execute and achieve satisfactory progress towards project goals as determined by the CPGS portfolio manager.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Hypersonic Glide Experiments and Concept Demonstration Development/Support	2.617	2.000	1.000
Description: This sub-project develops technologies and applications that could lead to a system with the following characteristics: effects on targets in a very short-period of time from execution order; non-ballistic flight over the majority of the flight path; positive control from launch to impact; adequate cross-range/ maneuverability to avoid overflight issues; controlled stage drop over Broad Ocean Area. This sub-project also oversees development of non-nuclear warhead technologies to defeat time-sensitive targets for near and longer-term CPGS applications. The technologies developed will have cross-Service and cross-concept applicability and will be developed through close coordination among DoD components. This activity will support both ground and flight tests, and provide all national data to inform a potential acquisition program.			
FY 2016 Accomplishments: - Conduct trade studies to evaluate system alternatives, affordability, end-to-end system concepts that will study a weaponized integrated system complete with system architecture, and industrial manufacturing readiness - Continue aerodynamic and weapon risk reduction and technology maturation efforts through ground and wind tunnel tests to improve modeling and simulation capabilities and technology readiness, assessing readiness to conduct component technology tests of alternative warheads			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0604165D8Z / *Prompt Global Strike Capability Development*	**Project (Number/Name)** P164 / *Hypersonic Glide Experiment and Concepts Demonstration Support*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Update the Technology Development Strategy and System Engineering documentations based on updated CPGS community engineering and test data, trade studies, and on-going risk reduction/technology development efforts - Continue Systems Engineering support to CPGS program and acquisition. Apply support to Integrated Product Teams to facilitate judgments of feasibility and risks of all CPGS concepts. Continue to support outreach and strategic messaging to entire CPGS community and COCOMs. ***FY 2017 Plans:*** - Conduct trade studies to evaluate system alternatives, affordability, end-to-end system concepts that will study a weaponized integrated system complete with system architecture, and industrial manufacturing readiness - Continue aerodynamic and weapon risk reduction and technology maturation efforts through ground and wind tunnel tests to improve modeling and simulation capabilities and technology readiness, assessing readiness to conducted integrated penetrator component technology tests - Continue Systems Engineering support to CPGS program and acquisition. Apply support to Integrated Product Teams to facilitate judgments of feasibility and risks of all CPGS concepts. Continue to support outreach and strategic messaging to entire CPGS community and COCOMs. ***FY 2018 Plans:*** - Conduct trade studies to evaluate system alternatives, affordability, end-to-end system concepts that will study a weaponized integrated system complete with system architecture, and industrial manufacturing readiness - Continue aerodynamic and weapon risk reduction and technology maturation efforts through ground and wind tunnel tests to improve modeling and simulation capabilities and technology readiness, assessing readiness to conducted integrated penetrator component technology tests - Continue Systems Engineering support to CPGS program and acquisition. Apply support to Integrated Product Teams to facilitate judgments of feasibility and risks of all CPGS concepts. Continue to support outreach and strategic messaging to entire CPGS community and COCOMs.			
Accomplishments/Planned Programs Subtotals	2.617	2.000	1.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0604165D8Z / *Prompt Global Strike Capability Development*	**Project (Number/Name)** P164 / *Hypersonic Glide Experiment and Concepts Demonstration Support*

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 5	R-1 Program Element (Number/Name) PE 0604165D8Z / *Prompt Global Strike Capability Development*	Project (Number/Name) P166 / *Alternate Re-Entry System/Warhead Engineering*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P166: *Alternate Re-Entry System/Warhead Engineering*	489.001	73.700	174.013	197.440	-	197.440	211.174	214.274	218.088	223.367	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Program Element (PE) was established to develop and demonstrate technologies and applications that advance conventional prompt global strike (CPGS) warfighting capabilities. The program uses a national team with participation from the Services, Agencies, national research laboratories, and further involvement of industry. Program emphasis is on demonstrating component and subsystem technology maturity with risk reduction initiatives highlighted by flight tests. The program funds the design, development, and experimentation of boosters, payload delivery vehicles (PDVs), non-nuclear warheads, thermal protection systems, guidance systems, test range modernization, and mission planning and enabling capabilities. To support these development activities, the program procures modeling and simulation capabilities, ground testing, command and control interfaces, test range support, and launch system infrastructure. Additionally, expert resources address strategic policy and treaty issues. Program timing will be driven by the outcome of flight and ground test events as well as DoD budgets. In FY 2018, as in previous years, funding for the individual Service initiatives will be contingent upon their abilities to execute and achieve satisfactory progress towards project goals as determined by the CPGS portfolio manager.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Alternative Re-Entry System/Warhead Engineering and Delivery Vehicle Options/Development	73.700	174.013	197.440
Description: This sub-project will test and evaluate alternative booster and delivery vehicle options and will assess the feasibility of producing an affordable solution to fill the CPGS capability gap. It will mature technologies that could lead to advanced systems with the following characteristics: effects on targets in a very short-period of time from execution order; non-ballistic flight over the majority of the flight path; positive control from launch to impact; adequate cross-range/maneuverability to avoid over flight issues; and controlled stage drop over Broad Ocean Area. The technologies developed will have cross-Service and cross-concept applicability and will be developed through close coordination among DoD components. This activity will support both ground and flight tests, and provide all national data to inform a potential acquisition program.			
FY 2016 Accomplishments: - Complete Critical Design Review for FE-1 through collaboration with national CPGS team - Leverage AHW FT-2 engineering workup, design algorithms and lessons learned for application to FE-1 - Begin integrated system-level test, evaluation, and assembly for FE-1 - Support development of future flight test systems for CPGS concepts as required - Conduct System Requirements Review (SRR) and begin design for technology FE-2 Booster (Competitive Industry led effort)			
FY 2017 Plans:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0604165D8Z / *Prompt Global Strike Capability Development*	**Project (Number/Name)** P166 / *Alternate Re-Entry System/Warhead Engineering*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Finalize manufacturing and testing of Hypersonic Glide Body and Booster to be used in FE-1 - Continue intermediate range technology booster development for FE-3 with competitive industry; to include hardware procurement and fabrication - Support development of future flight test systems for CPGS concepts as required - Update the Technology Development Strategy and system engineering documentation based on updated CPGS engineering and test data, trade studies, and on-going risk reduction/technology development efforts			
FY 2018 Plans: - Finalize testing of Hypersonic Glide Body and Booster to be used in FE-1,and begin manufacturing and testing of Hypersonic Glide Booster to be used in FE-2 - Continue intermediate range objective technology booster development for FE-3 with competitive industry; to include hardware procurement and fabrication - Support development of future flight test systems for CPGS concepts as required - Update the Technology Development Strategy and system engineering documentation based on updated CPGS engineering and test data, trade studies, and on-going risk reduction/technology development efforts			
Accomplishments/Planned Programs Subtotals	73.700	174.013	197.440

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 5	R-1 Program Element (Number/Name) PE 0604165D8Z / *Prompt Global Strike Capability Development*	Project (Number/Name) P166 / *Alternate Re-Entry System/Warhead Engineering*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Alternative Reentry System/Warhead Engineering and Delivery Vehicle Options/ Development	Allot	Army Space and Missile Defense Center/Navy Strategic Systems Program : Huntsville AL/Washington DC	489.001	73.700		174.013		197.440		-		197.440	Continuing	Continuing	-
		Subtotal	489.001	73.700		174.013		197.440		-		197.440	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	489.001	73.700		174.013		197.440		-		197.440	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0604165D8Z / *Prompt Global Strike Capability Development*	**Project (Number/Name)** P166 / *Alternate Re-Entry System/Warhead Engineering*

P166 CPGS Flight Experiment 1 (order 10)

	FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				FY 2021			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Planning/Design																								
Fabrication/Integration	■	■	■	■																				
Test Execution					■	■	■	■																
Post Test Analysis & Reporting					■	■	■	■	■	■	■	■												

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0604165D8Z / *Prompt Global Strike Capability Development*	**Project (Number/Name)** P166 / *Alternate Re-Entry System/Warhead Engineering*

P166 CPGS Flight Experiment 2 (order 20)

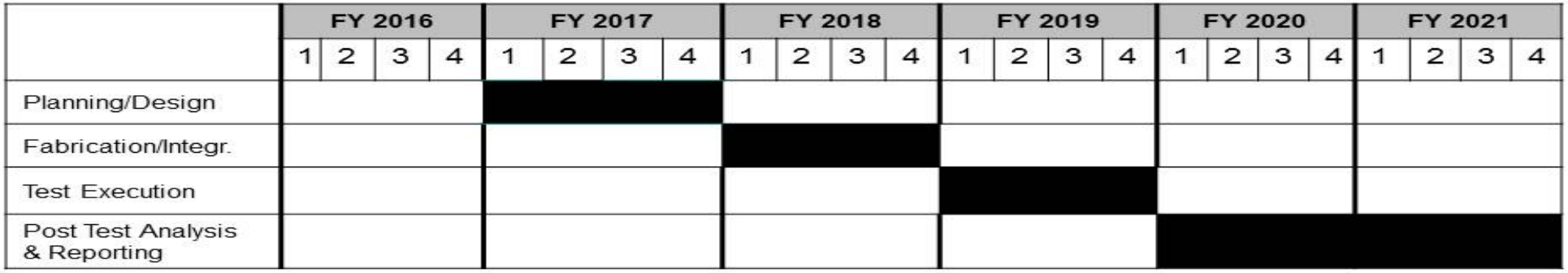

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0604165D8Z / *Prompt Global Strike Capability Development*	**Project (Number/Name)** P166 / *Alternate Re-Entry System/Warhead Engineering*

P166 Alternate Re-Entry System/Warhead Engineering

	FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				FY 2021			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Trade Studies, Ground Testing and Systems Engineering																								

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0604165D8Z / *Prompt Global Strike Capability Development*	**Project (Number/Name)** P166 / *Alternate Re-Entry System/Warhead Engineering*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Navy Flight Experiment 1	1	2014	4	2017
Navy Flight Experiment 2	4	2017	4	2020

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 5	R-1 Program Element (Number/Name) PE 0604165D8Z / *Prompt Global Strike Capability Development*	Project (Number/Name) P167 / *Test Range Development*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P167: *Test Range Development*	62.446	0.000	2.000	0.000	-	0.000	1.000	1.000	1.000	1.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Program Element (PE) was established to develop and demonstrate technologies and applications that advance conventional prompt global strike (CPGS) warfighting capabilities. The program uses a national team with participation from the Services, Agencies, national research laboratories, and further involvement of industry. Program emphasis is on demonstrating component and subsystem technology maturity with risk reduction initiatives highlighted by flight tests. The program funds the design, development, and experimentation of boosters, payload delivery vehicles (PDVs), non-nuclear warheads, thermal protection systems, guidance systems, test range modernization, and mission planning and enabling capabilities. To support these development activities, the program procures modeling and simulation capabilities, ground testing, command and control interfaces, test range support, and launch system infrastructure. Additionally, expert resources address strategic policy and treaty issues. Program timing will be driven by the outcome of flight and ground test events as well as DoD budgets. In FY 2018, as in previous years, funding for the individual Service initiatives will be contingent upon their abilities to execute and achieve satisfactory progress towards project goals as determined by the CPGS portfolio manager.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Test Range Development	-	2.000	-
Description: This sub-project will complete design, assembly and delivery of power/telemetry subsystems; assemble and integrate components to check command/control and verify range safety functions. ***FY 2017 Plans:*** - Continue to improve telemetry collection and range safety infrastructure in preparation for future flight testing of system concepts - Continue to support test range infrastructure for long term use			
Accomplishments/Planned Programs Subtotals	-	2.000	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0604165D8Z / *Prompt Global Strike Capability Development*	**Project (Number/Name)** P167 / *Test Range Development*

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 5	R-1 Program Element (Number/Name) PE 0604165D8Z / *Prompt Global Strike Capability Development*	Project (Number/Name) P168 / *OSD CPGS Studies*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P168: *OSD CPGS Studies*	62.045	12.343	3.290	3.309	-	3.309	3.057	3.206	3.645	3.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Program Element (PE) was established to develop and demonstrate technologies and applications that advance conventional prompt global strike (CPGS) warfighting capabilities. The program uses a national team with participation from the Services, Agencies, national research laboratories, and further involvement of industry. Program emphasis is on demonstrating component and subsystem technology maturity with risk reduction initiatives highlighted by flight tests. The program funds the design, development, and experimentation of boosters, payload delivery vehicles (PDVs), non-nuclear warheads, thermal protection systems, guidance systems, test range modernization, and mission planning and enabling capabilities. To support these development activities, the program procures modeling and simulation capabilities, ground testing, command and control interfaces, test range support, and launch system infrastructure. Additionally, expert resources address strategic policy and treaty issues. Program timing will be driven by the outcome of flight and ground test events as well as DoD budgets. In FY 2018, as in previous years, funding for the individual Service initiatives will be contingent upon their abilities to execute and achieve satisfactory progress towards project goals as determined by the CPGS portfolio manager.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: OSD CPGS Studies	12.343	3.290	3.309
Description: This sub-project supports emergent CPGS study efforts. In addition, it supports the application of the Prompt Global Strike Analysis of Alternatives (AoA) results and any AoA updates; requirements development; CPGS basing alternatives; analysis and defining of mission enabling technologies; and measures to avoid conventional missile launch ambiguity with nuclear weapon systems. Finally, it supports administrative activities associated with the management and execution of this Program Element.			
FY 2016 Accomplishments: - Continued Flight Test instrumentation, Range Support, and Data Analysis - Began FE-1 Battery Fabrication and Qualification - Began FE-1 Component Testing and Integration - Initiated FE-1 NG&C Computer Design, Fabrication, and Qualification - Began Booster Studies Initiated Program of Record Planning support and Statutory & Regulatory Document Preparation			
FY 2017 Plans: - Continue cost assessment studies for future system development - Continue lethality and warhead fuzing studies - Continue thermal and aerodynamic modeling and simulation			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0604165D8Z / *Prompt Global Strike Capability Development*	**Project (Number/Name)** P168 / *OSD CPGS Studies*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Continue senior steering group panel review and strategic messaging activities - Conduct command, control, and operational overlay exercises in parallel with CPGS flight tests - Continue program management reviews, ground test status and planning summits, and administrative support of ground test integrated product teams			
FY 2018 Plans: - Continue cost assessment studies for future system development - Continue lethality and warhead fuzing studies - Continue thermal and aerodynamic modeling and simulation - Continue senior steering group panel review and strategic messaging activities - Conduct command, control, and operational overlay exercises in parallel with CPGS flight tests - Continue program management reviews, ground test status and planning summits, and administrative support of ground test integrated product teams			
Accomplishments/Planned Programs Subtotals	12.343	3.290	3.309

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0604771D8Z / *Joint Tactical Information Distribution System (JTIDS)*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	71.605	13.774	16.288	15.358	-	15.358	13.973	14.125	14.401	14.702	Continuing	Continuing
771: *Link-16 Tactical Data Link (TDL) Transformation*	71.605	9.849	11.793	11.258	-	11.258	9.973	10.125	10.301	10.702	Continuing	Continuing
105: *Cyber Capability & Platform Resilience*	0.000	3.925	4.495	4.100	-	4.100	4.000	4.000	4.100	4.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	14.257	16.288	16.078	-	16.078
Current President's Budget	13.774	16.288	15.358	-	15.358
Total Adjustments	-0.483	0.000	-0.720	-	-0.720
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.483	-			
• SRRB Reductions/Management Realignment	-	-	-0.614	-	-0.614
• DTIC Offset Bill	-	-	-0.106	-	-0.106

Change Summary Explanation

Decrease in FY16 Actuals due to SBIR/STTR adjustments

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 5	R-1 Program Element (Number/Name) PE 0604771D8Z / *Joint Tactical Information Distribution System (JTIDS)*	Project (Number/Name) 771 / *Link-16 Tactical Data Link (TDL) Transformation*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
771: *Link-16 Tactical Data Link (TDL) Transformation*	71.605	9.849	11.793	11.258	-	11.258	9.973	10.125	10.301	10.702	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Funds will be used to provide technical and systems engineering, acquisition assistance and management oversight of critical Command, Control, Communications (C3), non-intelligence space, and cyber programs, projects and activities to maximize the return on investment in information technology resources and assist programs to be successful as the Department migrates to a structure implementing Joint Information Environment (JIE) technical standards. The Joint Tactical Information Distribution System (JTIDS) funding fulfills the Department's requirement for joint and combined network-enabled tactical data link (TDL) capabilities, netcentric/JIE communications which comply to standards for interoperability and seamless integration with joint communication systems as well as the mission functionality that uses these systems. Also, these funds underwrite assessment of design and procurement and execution correction of critical information systems from initial definition through development to successfully delivered configurations. Funds provide expertise supporting technical oversight of design, performance and cost parameters of key Defense IT and National Security Systems and supporting infrastructure including critical cyber assessments. Resources in this program fund architecture design and development, portfolio management, enterprise-wide systems engineering and operational impact analyses related to C3, non-intelligence space, and cyber activities. Typical deliverables associated with the instantiation of net-centric capabilities for these mission areas include network and vulnerability assessments, migration plans, investment strategies, architectures, roadmaps and technical guidance documentation.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Common Joint Tactical Information Initiatives	9.849	11.793	11.258
FY 2016 Accomplishments: - Common Data Link (CDL) Principal Staff Assistant: Continued to coordinate with CDL Executive Agent to develop and maintain a technology roadmap and terminal database to improve interoperability, configuration management, and focused technology investments. Developed policy to reflect modernization in CDL waveforms and encryption. Continued to oversee development and validation of cryptographic core modernization, Small Unmanned Aircraft System (SUAS) Common Data Link (CDL) terminals, CDL waveform, CDL Compliance Test Tool, and Reference Implementation Laboratory development efforts. Continue development of transition strategy to modernize DoD ISR waveforms to converge on a DoD standard for tactical ISR communications. Updated and publish the CDL enterprise roadmap that includes platform schedules and waveform modernization opportunities. Analyzed and assess mitigation strategies and technologies with regard to emerging activities that could restrict CDL spectrum access to ensure continued robust ISR communications capabilities. Updated Independent Assessment Update of CCM Technology Readiness. Continued planning and conduct of CDL SRP and IPT meetings to develop and refine the CDL investment portfolio and to identify strategic ISR communications issues the DoD will face in the future.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0604771D8Z / *Joint Tactical Information Distribution System (JTIDS)*	**Project (Number/Name)** 771 / *Link-16 Tactical Data Link (TDL) Transformation*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Conducted analysis of Airborne ISR communications transport infrastructure in coordination with Joint Staff, Services and Combatant Commands in order to identify a way ahead for establishing an effective/efficient global enterprise capability. - Acquisition Management and Oversight: Provided technical assistance in developing IT related acquisition policy, including updates to DoD Series 5000 necessitated by changes in statue, regulation and management direction. Provide technical assessments and programmatic recommendations across DASD functional areas to address interoperability gaps and work early in the systems engineering. - FAB-T: Analyzed readiness for DT&E and OT&E as command post terminal and PNVC production units begin to be delivered and integrated for test. Provided risk assessments of system integration into the various airborne, ground fixed and ground transportable systems prior to installation. Worked with Air Force to implement DSD's direction as end-to-end integrator of PNVC capability. - Wideband SATCOM Capability: Execute plans for expansion of SMC's COMSATCOM role. Support Wideband Requirements Review by Joint Staff and prepare for an AoA to determine the way forward after launching remaining WGS satellites, and COMSATCOM as an integrated wideband SATCOM capability. - AEHF: Provided programmatic analysis, technical reviews, and assessments of the AEHF program to reduce development, integration, and procurement risks. Provided risk assessments as the program continues to launch spacecraft and improve the Mission Planning Element, and develop KMI to replace EKMS. - EPS: Provided programmatic analysis, technical reviews, and assessments of the EPS program to reduce development, integration, and procurement risks. Assessed risk as the TT&C system is integrated and tested prior to operations. Protected SATCOM AoA: Finalized assessment through analysis and synthesis of performance, cost and resilience data for cross-domain alternatives to support Protected SATCOMs (including infrastructure to support NC3 requirements). Documented analysis of alternatives in Final Report to provide recommendations for technology investments and associate acquisition strategy for Protected SATCOM capability. - National Leadership Command Capability (NLCC): Continued in lead role as primary action office for AT&L in his role as co-chair of the Council on Oversight of the National Leadership Command, Control, and Communications System (CONLC3S). Worked directly with the Executive Secretariat (DOD CIO) to oversee all aspects of preparation and conduct of CONLC3S meetings, as well as the SSG and EMB meetings that are held to essentially prepare/tee up decisions for the CONLC3S to make at their meetings. Also lead review process for any NLCC related documents. Supports the Joint Staff led Nuclear C2 CBA to its completion and identify capability gaps to be addressed by the CONLC3S. – Mobile User Objective System (MUOS): Provided technical and programmatic analysis and insights in support of C3CB oversight of the completion of the MUOS Multi-Service OT&E-2 and follow-on development and operational test activities. Continue to support vendor efforts to develop MUOS capable terminals and get them tested and certified for operation over MUOS, and for Service procurement. Prepared program documentation including ADM for follow-on sustainment activities for MUOS. Continue to track MUOS contract and management performance through interaction with the MUOS Program Manager,			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
ASN RDA staff, and the Defense Contract Management Agency. Continue interaction with the Combatant Commanders and the Army Forces Strategic Command in support of Early Operational Acceptance and Full Operational Acceptance. - Navy Multiband Terminal. Continued to track progress toward completion of NMT deliverables. Interact with the NMT program manager, ASN RDA staff and the Defense Contract Management Agency (DCMA). Reviewed monthly DCMA Performance Assessment Reports (PARs) advising C3CB leadership should any issues arise with NMT execution status. - Cooperative Engagement Capability. Participated in the CEC Configuration Steering Board, Gate 6 review hosted by the Military Deputy, ASN RDA. Performed follow-up briefings with the CEC Program Manager and DOT&E. Interactacted with the CEC Program Manager, ASN RDA staff and the Defense Contract Management Agency (DCMA). Reviewed monthly DCMA Performance Assessment Reports (PARs) advising C3CB leadership of CEC execution status especially with regard to the Common Array Block antenna. - Handheld, Manpack, and Small Form Fit (HMS) JTRS: Assessed the HMS program to include the risk of vendor selected radios (Modified Non-Developmental Item). Conduct independent technical reviews and recommend program performance improvement options to meet cost, schedule and performance objectives. Provided a technical assessment of full and open competition process for both Rifleman and Manpack radios. Provide technical and programmatic analysis to support the Defense Acquisition Executive' Full Rate Production decision review. Assessed the results of Initial Operational Test and Evaluation (IOT&E) as well as the existing manufacturing process, performance and reliability, and sustainment capabilities to formulate a recommendation for Full-Rate Production. - Joint Tactical Networking Center (JTNC) JTRS: Provided technical and programmatic analysis to support the Defense Acquisition Executive's role as the co-chair of the JTNC Board of Directors (BoD). Provided Secretariat functions for the JTNC BoD. - All JTRS (HMS, MNVR, AMF, JTN) Programs - Provided assessments of program compliance with IT related acquisition policy, in accordance with DoD Series 5000 and applicable senior management direction. Assessed readiness for major acquisition program milestone reviews, to include adequate documentation of compliance with statute/regulation/policy associated with acquisition program oversight. Provided programmatic recommendations regarding cost/schedule/performance tradeoffs. - Mid-Tier Networking Vehicular Radio (MNVR) JTRS: Assessed the AMNVR program to include the risk of vendor selected radios (Modified Non-Developmental Item). Conduct independent technical reviews and recommend program performance improvement options to meet cost, schedule and performance objectives. Provided a technical assessment of full and open competition process for MNVR radios. - Provide assessments of DoD Business System programs with related acquisition policy, in accordance with DoD Series 5000 and applicable senior management direction. Assessed readiness for major acquisition program milestone reviews, to include adequate documentation of compliance with statute/regulation/policy associated with acquisition program oversight. Provided programmatic recommendations regarding cost/schedule/ performance tradeoffs.			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Ground Tactical Networks Advanced Capabilities: Matured narrowband dismounted communications capability with radio hardware prototype, robust modeling and simulation, and reusable software code. Form industry engagement to promote transition into non-developmental item radios. - Integrated Electromagnetic Spectrum Operations (EMSO): Track implementation of iEMSO strategy in radio and EW device development plans. Assess and down-select technical interoperability and architectural approaches. Ensure adequate funding and testing to assess maturity of solutions. Develop science and technology roadmap to synchronize transition of key technologies to programs of record for spectrum-dependent systems. FY16 work will focus will focus on selected sensor and electronic warfare systems and continue work on communications systems. - Tactical Data Link Modernization: Accelerated improvements in TDLs to address A2AD and contested operations. Built case for an Executive Agent (EA) for Airborne Tactical Data Networking to bring cross-Service high level focus to TDL improvements and coordinated S&T investments for future capabilities. Structure Link 16 evolution plans. Worked with F-35 program to baseline Multi-function Advanced Data Link (MADL) and develop open architecture implementation of MADL waveform. Developed initial concepts for common open architecture TDL terminal for potential use on next generation aircraft and F-35 block upgrades. Strengthen acquisition oversight, system engineering, standards and interoperability in use of TDLs on Network Enabled Weapons (NEW). - Warfighter Information Network – Tactical (WIN-T): Provided assessment of the transition of Increment 3 Network Operations and Net Centric Waveform software enhancements into the Increment 2 hardware units for fielding. Provided final assessment of the Highband Networking Waveform 3.0 capability and track its progress for entry into the Waveform Repository. - Joint C2 Portfolio Management: Supported development, integration and test activities across the Services, Agencies and Combatant Commands and deliver the FY17-21 version of the Joint C2 Sustainment and Modernization Plan. - C2 Data: Provided technical expertise for ensuring C2 data are visible, accessible, understandable, trustable and interoperable. Provide technical assessment and assistance for implementation of National Information Exchange Model (NIEM)-based information exchanges across the DoD. Update the C2 Authoritative Data Source roadmap and update C2 data architecture. - Joint C2 Architecture: Provided technical expertise for the update the Joint C2 Architecture to guide Joint C2 capability area development activities across the Services, Agencies and Combatant Commands. - Friendly Force Tracking/ Combat Identification: Provided technical assessment, assistance and recommendations for achieving Mode 5 IFF IOC and FOC. Provided technical support to DoD implementation of Mode 5 including supporting spectrum certification and assignment. – Acquisition Management: Provided technical assistance in developing related acquisition policy, including updates to DoD Series 5000 necessitated by changes in statue, regulation and management direction. - Environmental Monitoring: Developed DoD inputs for annual Federal Plan for Meteorological Services and Supporting Research; Supported various Federal and OSD offices on the subjects of: Space Weather, Spectrum losses and weather, Ionospheric capabilities, National Plan for Hurricanes, Space Situational Awareness, and DoD representation for METOC; Updated as required METOC/Weather Enterprise Strategy and Roadmap and oversee implementation of results of Defense Weather Analysis			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
of Alternatives (AoA); conduct assessment of USG weather satellite common ground system compliance; implement METOC data strategy; implemented DoD National Space Weather Strategy; advise Defense Space Acquisition Board, FCB/JROC/JCIDS process, other OSD PSAs, EA for Space office, COIs, etc. on METOC matters. - Space Ops: Conduct SATOPS Modernization technical assessments; provide technical Oversight/AFSCN Modernization Implementation; conduct AFSCN Event Driven Net Centric Review/Technical Assessment. - Space Control/Space C2/SSA: Performed continued monitoring of cyber testing and cyber vulnerabilities of critical space programs. - Non-Intelligence Space Programs Technical Assessments: Performed cyber vulnerability and cyber suitability assessments on space, PNT, METOC programs and others. Reviewed system design documents, control plans, remote management control ports and methods. Recommend corrective actions to specific space, PNT, and METOC programs to address cyber vulnerabilities and to inform milestone decisions. Conducted non-intelligence space program technical reviews on to include data strategies, systems engineering, risks and mitigations. Supported acquisition milestone decisions for programs including weather satellite follow-on activities. - PNT Programs Technical Assessments: Continued OIPT leadership role. Developed and implement Annual GPS Enterprise Review to verify readiness of GPS III, MGUE, and OCX programs to progress to next phase of the acquisition process. Ensure synchronization of the three programs to meet the direction of the DAE. Conduct deep dive technical analyses to understand all phases of the GPS enterprise programs and predecessor programs that are part of the GPS Enterprise. Review PNT programs for data strategies, systems engineering, risks and mitigations in support of milestone decisions. Initiate and conduct studies to expedite fielding and support of M Code capability for forces in the field. - PNT Portfolio Management: Continued implementation of GPSEM/PNT Assurance Investment Strategy and Roadmap, ensuring AoA recommendations are addressed. Continued to support major program milestones and internal OSD reviews such as Strategic Portfolio Reviews, DMAGs, etc.			
FY 2017 Plans: - Common Data Link (CDL) Principal Staff Assistant: Continue to coordinate with CDL Executive Agent to develop and maintain a technology roadmap and terminal database to improve interoperability, configuration management, and focused technology investments. Continue implementation and oversight of an enterprise transition strategy to modernize DoD ISR waveforms to converge on a DoD standard for tactical ISR communications. Update CDL technology development roadmap to reflect current trends in technology that can add enhanced capabilities to CDL systems. Continue planning and conduct of CDL SRP and IPT meetings to develop and refine the CDL investment portfolio and to identify strategic ISR communications issues the DoD will face in the future. Conduct analysis of Airborne ISR communications transport infrastructure in coordination with Joint Staff, Services and Combatant Commands in order to identify a way ahead for establishing an effective/efficient global enterprise capability. - Acquisition Management and Oversight: Provide technical assistance in developing IT related acquisition policy, including updates to DoD Series 5000 necessitated by changes in statue, regulation and management direction. Provide technical			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
assessments and programmatic recommendations across DASD functional areas to address interoperability gaps and work early in the systems engineering. - FAB-T: Support IOT&E execution. Work to assure the program has a successful LRIP-2 decision. Continue to support PNVC integration and test. Provide risk assessments of system integration into the various airborne, ground fixed an ground transportable systems prior to installation. - Wideband SATCOM AoA: Conduct AoA plan assessing material solutions for WGS replenishment and for supporting other traditional commercial supplied users considering life-cycle cost, performance, suitability, operational effectiveness, and resiliency. Support implementation and execution of the AoA plan including Senior Advisory Group meetings and evaluation of the space and control segments with associated user terminals for contested and benign operating environments. - AEHF: Provide programmatic analysis, technical reviews, and assessments of the AEHF program to reduce development, integration, and procurement risks. Provide risk assessments as the program continues to launch spacecraft and improve the Mission Planning Element. Work to start efforts for the follow-on system to AEHF. - EPS: Provide programmatic analysis, technical reviews, and assessments of the EPS program to reduce development, integration, and procurement risks. Assess risk as the TT&C system is integrated and tested prior to operations. Work to start efforts for the follow-on system to EPS. - National Leadership Command Capability (NLCC): Continue in lead role as primary action office for AT&L in his role as co-chair of the Council on Oversight of the National Leadership Command, Control, and Communications System (CONLC3S). Work directly with the Executive Secretariat (DOD CIO) to oversee all aspects of preparation and conduct of CONLC3S meetings, as well as the SSG and EMP meetings that are held to essentially prepare/tee up decisions for the CONLC3S to make at their meetings. Also lead review process for any NLCC related documents. - Handheld, Manpack, and Small Form Fit (HMS) JTRS: Assess the HMS program to include the risk of vendor selected radios (Modified Non-Developmental Item). Conduct independent technical reviews and recommend program performance improvement options to meet cost, schedule and performance objectives. Provide a technical assessment of full and open competition process for both Rifleman and Manpack radios. Provide technical and programmatic analysis to support the Defense Acquisition Executive' Full Rate Production decision review. Assess the results of Initial Operational Test and Evaluation (IOT&E) as well as the existing manufacturing process, performance and reliability, and sustainment capabilities to formulate a recommendation for Full-Rate Production. - Joint Tactical Networking Center (JTNC) JTRS: Provide technical and programmatic analysis to support the Defense Acquisition Executive's role as the co-chair of the JTNC Board of Directors (BoD). Provide Secretariat functions for the JTNC BoD. - All JTRS(HMS, MNVR, AMF, JTN)Programs - Provide assessments of program compliance with IT related acquisition policy, in accordance with DoD Series 5000 and applicable senior management direction. Assess readiness for major acquisition program milestone reviews, to include adequate documentation of compliance with statute/regulation/policy associated with acquisition program oversight. Provide programmatic recommendations regarding cost/schedule/performance tradeoffs.			

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Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0604771D8Z / *Joint Tactical Information Distribution System (JTIDS)*	**Project (Number/Name)** 771 / *Link-16 Tactical Data Link (TDL) Transformation*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Joint C2 Architecture: Provide technical expertise for the update the Joint C2 Architecture to guide Joint C2 capability area development activities across the Services, Agencies and Combatant Commands. - Friendly Force Tracking/ Combat Identification: Provide technical assessment, assistance and recommendations for achieving Mode 5 IFF IOC and FOC. Provide technical support to DoD implementation of Mode 5 including supporting spectrum certification and assignment. – Acquisition Management: Provide technical assistance in developing related acquisition policy, including updates to DoD Series 5000 necessitated by changes in statue, regulation and management direction. - Space Ops: Conduct SATOPS Modernization technical assessments; provide technical Oversight/AFSCN Modernization Implementation; conduct AFSCN Event Driven Net Centric Review/Technical Assessment. - Space Control/Space C2/SSA: Perform continued monitoring of cyber testing and cyber vulnerabilities of critical space programs. - Non-Intelligence Space Programs Technical Assessments: Perform cyber vulnerability and cyber suitability assessments on space, PNT, METOC programs and others. Review system design documents, control plans, remote management control ports and methods. Recommend corrective actions to specific space, PNT, and METOC programs to address cyber vulnerabilities and to inform milestone decisions. Conduct non-intelligence space program technical reviews on to include data strategies, systems engineering, risks and mitigations. Support acquisition milestone decisions for programs including weather satellite follow-on activities. - PNT Programs Technical Assessments: Continue OIPT leadership role. Develop and implement Annual GPS Enterprise Review to verify readiness of GPS III, MGUE, and OCX programs to progress to next phase of the acquisition process. Ensure synchronization of the three programs to meet the direction of the DAE. Conduct deep dive technical analyses to understand all phases of the GPS enterprise programs and predecessor programs that are part of the GPS Enterprise. Review PNT programs for data strategies, systems engineering, risks and mitigations in support of milestone decisions. Initiate and conduct studies to expedite fielding and support of M Code capability for forces in the field. - PNT Portfolio Management: Continue implementation of GPSEM/PNT Assurance Investment Strategy and Roadmap, ensuring AoA recommendations are addressed. Continue to support major program milestones and internal OSD reviews such as Strategic Portfolio Reviews, DMAGs, etc.			
Accomplishments/Planned Programs Subtotals	9.849	11.793	11.258

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0604771D8Z / *Joint Tactical Information Distribution System (JTIDS)*	**Project (Number/Name)** 771 / *Link-16 Tactical Data Link (TDL) Transformation*

D. Acquisition Strategy

In executing JTDL tasking, existing fixed-price and cost-plus contracts will be utilized.

- Program reviews in support of the JCIDS, acquisition and PPBE processes.

E. Performance Metrics

Enterprise-Wide Alignment: Accelerate DoD information age transformation to increase the effectiveness and efficiency of the warfighting, intelligence and business missions.

Measures:

- Timely development and issuance of policy and guidance
- Instantiation of enterprise-wide system engineering for the Joint Information Environment (JIE)

Portfolio Management: Provide for the timely and effective delivery of key Net-Centric capabilities through portfolio management of associated technology development and Major Defense Acquisition Programs (MDAPS) and Major Automated Information Systems (MAIS).

Measures:

- Key milestones completed for major net-centric acquisitions
- Number of major systems successfully completing net-centric critical performance reviews

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 5	R-1 Program Element (Number/Name) PE 0604771D8Z / *Joint Tactical Information Distribution System (JTIDS)*	Project (Number/Name) 771 / *Link-16 Tactical Data Link (TDL) Transformation*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Link-16 Tactical Data Link (TDL) Transformation	C/TBD	OUSD(AT&L)/ OASD(A)/ DASD(C3CB) : Pentagon	71.605	9.849		11.793		11.258		-		11.258	-	-	-
		Subtotal	71.605	9.849		11.793		11.258		-		11.258	-	-	-

	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	71.605	9.849		11.793		11.258		-		11.258	-	-	-

Remarks

Resources will be used to provide technical, systems engineering and acquisition management oversight of programs, projects and activities to maximize the Department's return on investment in information technology resources and to affect a comprehensive approach for assessing and procuring critical information systems from initial design, through development to capability delivery in support of improved weapons systems performance and military operations.

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0604771D8Z / *Joint Tactical Information Distribution System (JTIDS)*	**Project (Number/Name)** 771 / *Link-16 Tactical Data Link (TDL) Transformation*

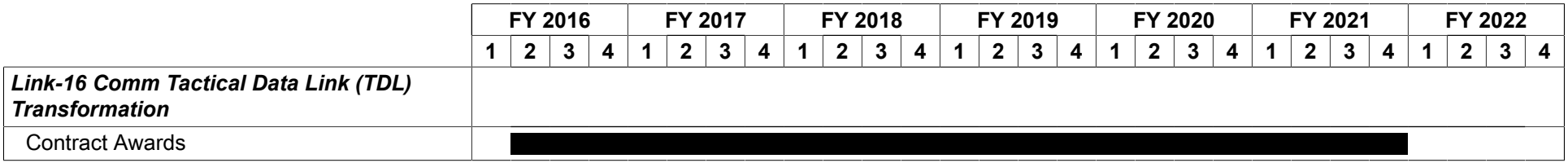

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0604771D8Z / *Joint Tactical Information Distribution System (JTIDS)*	**Project (Number/Name)** 771 / *Link-16 Tactical Data Link (TDL) Transformation*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Link-16 Comm Tactical Data Link (TDL) Transformation				
Contract Awards	2	2016	4	2021

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 5	R-1 Program Element (Number/Name) PE 0604771D8Z / *Joint Tactical Information Distribution System (JTIDS)*	Project (Number/Name) 105 / *Cyber Capability & Platform Resilience*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
105: *Cyber Capability & Platform Resilience*	0.000	3.925	4.495	4.100	-	4.100	4.000	4.000	4.100	4.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Provides resources for developmental acquisition support and management (to include the Cyber Investment and Management Board (CIMB)) oversight of Cyber capabilities as the Department conceives, develops, and rapidly fields cyber capabilities for Cyberspace Operations and the instantiation of cyber resilient platforms and weapons systems for priority kinetic and non-kinetic missions. The CIMB was established in 2012 in response to the FY2011 NDAA Section 933, where DoD was directed to provide a “strategy for the rapid acquisition of cyber capabilities, for cyber warfare for USCC and the Cyber Service components of the military departments. USD(AT&L) is responsible for compliance with the FY2011 NDAA and Chairs the CIMB.

Funds provide technical, systems engineering, trend analysis, and oversight of programs, projects and activities developing cyber capabilities to maximize the Department's return on investment of cyberspace resources and effect a comprehensive approach for assessing, procuring, and sustaining critical cyber capabilities and cyber resilient systems and platforms from initial design, through development to capability delivery in support of weapons systems performance and military operations. Additionally, these funds will provide systems analyses, portfolio management, executive support of CIMB, enterprise wide systems engineering and operational impact analyses related to Cyber capabilities and ensuring cyber resilience within systems and platforms. Resources will also be used to provide expertise required for exercising technical direction over design, performance, cost parameters, determining and mitigating cyber risks of key systems and their dependencies. The goal of this funding is to assure capability advantage, reduce time to the field, evaluate projects and concepts, minimize cyber related performance and operational risk of developing and fielding complex systems, ensure program dependencies are documented and included in acquisition decisions and address cyber security requirements, gaps and required technical solutions.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Cyber Capability and Platform Resilience	3.925	4.495	4.100
Description: Provides resources for developmental acquisition support and management (to include the Cyber Investment and Management Board (CIMB)) oversight of Cyber capabilities as the Department conceives, develops, and rapidly fields cyber capabilities for Cyberspace Operations and the instantiation of cyber resilient platforms and weapons systems for priority kinetic and non-kinetic missions. The CIMB was established in 2012 in response to the FY2011 NDAA Section 933, where DoD was directed to provide a “strategy for the rapid acquisition of cyber capabilities, for cyber warfare for USCC and the Cyber Service components of the military departments. USD(AT&L) is responsible for compliance with the FY2011 NDAA and Chairs the CIMB. Funds provide technical, systems engineering, trend analysis, and oversight of programs, projects and activities developing cyber capabilities to maximize the Department's return on investment of cyberspace resources and effect a comprehensive approach for assessing, procuring, and sustaining critical cyber capabilities and cyber resilient systems and platforms from initial design, through development to capability delivery in support of weapons systems performance and military			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0604771D8Z / *Joint Tactical Information Distribution System (JTIDS)*	**Project (Number/Name)** 105 / *Cyber Capability & Platform Resilience*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018

operations. Additionally, these funds will provide systems analyses, portfolio management, executive support of CIMB, enterprise wide systems engineering and operational impact analyses related to Cyber capabilities and ensuring cyber resilience within systems and platforms. Resources will also be used to provide expertise required for exercising technical direction over design, performance, cost parameters, determining and mitigating cyber risks of key systems and their dependencies. The goal of this funding is to assure capability advantage, reduce time to the field, evaluate projects and concepts, minimize cyber related performance and operational risk of developing and fielding complex systems, ensure program dependencies are documented and included in acquisition decisions and address cyber security requirements, gaps and required technical solutions.

FY 2016 Accomplishments:

- Cyber Investment Management: Synchronized and coordinated cyberspace acquisition activities, conduct quantitative assessments, and ensure cyberspace investments align with Department priorities, required capabilities and evolving cyber threats. Provided support of the Cyber Investment Management Board and develop implementation guidance and associated direction. Continued to plan and conduct CIMB/CCT meetings to refine the cyber investment portfolio and to identify strategic cyber issues the DoD will face in the future.
- Refined the Cyber investment portfolio results, ensuring return on investment and risk ultimately leading to an optimization phase focusing on process improvement is included.
- Conducted investment analysis of the DoD-wide Cyber Special Access Program (SAP) portfolio to include return on investment and risk analysis.
- Utilized the results of the Cyber Rapid Acquisition Process Pilots to implement the new rapid cyber acquisition processes across DoD, ensuring DoD Acquisition Policy is updated to reflect processes.
- Managed Cyber security Guidebook for Program Managers. Contribute to any follow on efforts to revise policy or guidance regarding Cyber security within the Acquisition process.
- Continued oversight of implementation of the Cyber Situational Awareness EoA (phase I and II) recommendations.
- Initiated capability development of recommendations of the Unified Platform AoA.
- Continued oversight of Joint Cyber Command and Control (C2) capability development.
- Ensured Platform Resilience/Mission Assurance (PR/MA); Oversaw implementation of the recommendations on Cyber vulnerabilities of Department of Defense weapon systems and tactical communications systems.
- Continued to synchronize and provide oversight for DoD Cyber Ranges that support Cyber Training and Testing & Evaluations through the Cyber Range Focal Point.
- Implemented DoD Cyber Range strategy, working with T&E and DOT&E and JS.
- Conducted technical analysis to determine tools necessary to help collect, measure, assess DCO/OCO effectiveness and suitability in a Cyber Range Environment.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0604771D8Z / *Joint Tactical Information Distribution System (JTIDS)*	**Project (Number/Name)** 105 / *Cyber Capability & Platform Resilience*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Oversaw DoD efforts to equip the cyber mission force. Support developments of requirements documents and architectures as required in collaboration with USCYBERCOM. ***FY 2017 Plans:*** Cyber Investment Management: Synchronize and coordinate cyberspace acquisition activities, conduct quantitative assessments, and ensure cyberspace investments align with Department priorities, required capabilities and evolving cyber threats. Provide support of the Cyber Investment Management Board and develop implementation guidance and associated direction. Continue to plan and conduct CIMB/CCT meetings to refine the cyber investment portfolio and to identify strategic cyber issues the DoD will face in the future. - Refine the Cyber investment portfolio results, ensuring return on investment and risk ultimately leading to an optimization phase focusing on process improvement is included. - Conduct investment analysis of the DoD-wide Cyber Special Access Program (SAP) portfolio to include return on investment and risk analysis. - Utilize the results of the Cyber Rapid Acquisition Process Pilots to implement the new rapid cyber acquisition processes across DoD, ensuring DoD Acquisition Policy is updated to reflect processes. - Manage Cyber security Guidebook for Program Managers. Contribute to any follow on efforts to revise policy or guidance regarding Cyber security within the Acquisition process. - Continue oversight of implementation of the Cyber Situational Awareness EoA (phase II) recommendations. - Initiate capability development of recommendations of the Unified Platform AoA. - Continue oversight of Joint Cyber Command and Control (C2) capability development. - Ensure Platform Resilience/Mission Assurance (PR/MA); Oversee implementation of the recommendations on Cyber vulnerabilities of Department of Defense weapon systems and tactical communications systems. - Continue to synchronize and provide oversight for DoD Cyber Ranges that support Cyber Training and Testing & Evaluations through the Cyber Range Focal Point. - Implement DoD Cyber Range strategy, working with T&E and DOT&E and JS. - Conduct technical analysis to determine tools necessary to help collect, measure, assess DCO/OCO effectiveness and suitability in a Cyber Range Environment. - Oversee DoD efforts to equip the cyber mission force. Support developments of requirements documents and architectures as required in collaboration with USCYBERCOM. ***FY 2018 Plans:*** Cyber Investment Management: Synchronize and coordinate cyberspace acquisition activities, conduct quantitative assessments, and ensure cyberspace investments align with Department priorities, required capabilities and evolving cyber threats. Provide support of the Cyber Investment Management Board and develop implementation guidance and associated direction. Continue			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0604771D8Z / *Joint Tactical Information Distribution System (JTIDS)*	**Project (Number/Name)** 105 / *Cyber Capability & Platform Resilience*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
to plan and conduct CIMB/CCT meetings to refine the cyber investment portfolio and to identify strategic cyber issues the DoD will face in the future. - Refine the Cyber investment portfolio results, ensuring return on investment and risk ultimately leading to an optimization phase focusing on process improvement is included. - Conduct investment analysis of the DoD-wide Cyber Special Access Program (SAP) portfolio to include return on investment and risk analysis. - Utilize the results of the Cyber Rapid Acquisition Process Pilots to implement the new rapid cyber acquisition processes across DoD, ensuring DoD Acquisition Policy is updated to reflect processes. - Manage Cyber security Guidebook for Program Managers. Contribute to any follow on efforts to revise policy or guidance regarding Cyber security within the Acquisition process. - Continue oversight of implementation of the Cyber Situational Awareness EoA (phase II) recommendations. - Initiate capability development of recommendations of the Unified Platform AoA. - Continue oversight of Joint Cyber Command and Control (C2) capability development. - Ensure Platform Resilience/Mission Assurance (PR/MA); Oversee implementation of the recommendations on Cyber vulnerabilities of Department of Defense weapon systems and tactical communications systems. - Continue to synchronize and provide oversight for DoD Cyber Ranges that support Cyber Training and Testing & Evaluations through the Cyber Range Focal Point. - Implement DoD Cyber Range strategy, working with T&E and DOT&E and JS. - Conduct technical analysis to determine tools necessary to help collect, measure, assess DCO/OCO effectiveness and suitability in a Cyber Range Environment. - Oversee DoD efforts to equip the cyber mission force. Support developments of requirements documents and architectures as required in collaboration with USCYBERCOM.			
Accomplishments/Planned Programs Subtotals	3.925	4.495	4.100

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Existing firm fixed priced and cost plus contracts will be utilized.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0604771D8Z / *Joint Tactical Information Distribution System (JTIDS)*	**Project (Number/Name)** 105 / *Cyber Capability & Platform Resilience*

E. Performance Metrics

Enterprise-Wide Cyber Investments: instantiation of cyber capabilities for resilient systems include risk assessments, vulnerability assessments, mitigation plans, prototype architectures, investment strategies, trends analyses, Evaluation/Analysis of Alternatives, integrated mission analyses, technical and policy guidance directives.

Measures:
- Timely development and issuance of policy and guidance
- Timely delivery and development of key investment strategies, trend analysis and outcomes of the Evaluation/Analysis of Alternatives.

Portfolio Management: Provide for the timely and effective delivery of portfolio management support of associated with Cyber Security and Major Defense Acquisition Programs (MDAPS) and Major Automated Information Systems (MAIS).
Measures:
- Key milestones completed for major cyber related acquisitions

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0605022D8Z / *Defense Exportability Program*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	10.360	3.165	2.920	3.162	-	3.162	2.960	2.852	2.910	2.974	Continuing	Continuing
P013: *Defense Exportability Features (DEF) Program*	10.360	3.165	2.920	3.162	-	3.162	2.960	2.852	2.910	2.974	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Defense Exportability Features (DEF) Pilot Program is a result of a USD (AT&L) sponsored legislative proposal for authorities to better prepare warfighting systems for non-US use. This program funds activities to support identification of major defense acquisition programs for possible export, and the planning for design and incorporation of exportability features during the research and development phases of these programs. Features include, but are not limited to, technology and engineering design activity such as capability differentials, anti-tamper, system assurance, and software assurance. Activities include the development of program protection strategies for the program; the design and incorporation of exportability features into the system; implementation of exportability requirements onto contracts; and research, development, test, and evaluation activities.

Defense exportability features play a critically important role in United States Government/DoD efforts to build partnership capacity. Funds support building joint and coalition environments by enabling the export of DoD systems to a wide range of partner nations, resulting in improved security and interoperability. In addition to the operational benefits, by providing these resources up front, the United States and partner nations will save significant resources by more efficiently designing and producing exportable U.S. systems.

A number of designated systems participating in the DEF Pilot Program in FY18 will continue defining and implementing DEF ‘best practices’ related to designing and developing technology protection in the areas of program management, system engineering, and technology protection measures in the DoD acquisition process. Failure to consider export variant designs early in the acquisition process results in increased costs, delayed delivery, and higher risk of sensitive technology compromise due to ad-hoc sales later in production. Early development of export variants, including systems design approaches to integrate adequate domestic and exportable anti-tamper protection and differential capability requirements to lower production costs, makes it possible to improve quality and timely deliveries to allies and friends, and may enhance US industry share of the global marketplace.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0605022D8Z / *Defense Exportability Program*

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	3.267	2.920	3.371	-	3.371
Current President's Budget	3.165	2.920	3.162	-	3.162
Total Adjustments	-0.102	0.000	-0.209	-	-0.209
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.001	-			
• SBIR/STTR Transfer	-0.101	-			
• DTIC Offset Bill	-	-	0.004	-	0.004
• SRRB	-	-	-0.213	-	-0.213

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 5	R-1 Program Element (Number/Name) PE 0605022D8Z / *Defense Exportability Program*	Project (Number/Name) P013 / *Defense Exportability Features (DEF) Program*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P013: *Defense Exportability Features (DEF) Program*	10.360	3.165	2.920	3.162	-	3.162	2.960	2.852	2.910	2.974	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Defense Exportability Features (DEF) Pilot Program is a result of a USD (AT&L) sponsored legislative proposal for authorities to better prepare warfighting systems for non-US use. This program funds activities to support identification of major defense acquisition programs for possible export, and the planning for design and incorporation of exportability features during the research and development phases of these programs. Features include, but are not limited to, technology and engineering design activity such as capability differentials, anti-tamper, system assurance, and software assurance. Activities include the development of program protection strategies for the program; the design and incorporation of exportability features into the system; implementation of exportability requirements onto contracts; and research, development, test, and evaluation activities.

Defense exportability features play a critically important role in United States Government/DoD efforts to build partnership capacity. Funds support building joint and coalition environments by enabling the export of DoD systems to a wide range of partner nations, resulting in improved security and interoperability. In addition to the operational benefits, by providing these resources up front, the United States and partner nations will save significant resources by more efficiently designing and producing exportable U.S. systems.

A number of designated systems participating in the DEF Pilot Program in FY18 will continue defining and implementing DEF 'best practices' related to designing and developing technology protection in the areas of program management, system engineering, and technology protection measures in the DoD acquisition process. Failure to consider export variant designs early in the acquisition process results in increased costs, delayed delivery, and higher risk of sensitive technology compromise due to ad-hoc sales later in production. Early development of export variants, including systems design approaches to integrate adequate domestic and exportable anti-tamper protection and differential capability requirements to lower production costs, makes it possible to improve quality and timely deliveries to allies and friends, and may enhance US industry share of the global marketplace.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Defense Exportability Features (DEF) Program	3.165	2.920	3.162
FY 2016 Accomplishments: Funding was slightly increased in FY 2016 to expand the number of systems included in the Defense Exportability Features Pilot Program that are used to define and implement DEF 'best practice' program management, system engineering, and technology protection measures in the DoD acquisition process, and to cover more expensive follow-on DEF export design activities.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605022D8Z / *Defense Exportability Program*	**Project (Number/Name)** P013 / *Defense Exportability Features (DEF) Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
In FY16, the DEF Pilot Program is initiating or continuing contracts for DEF feasibility studies or DEF design activities on the following previously selected systems (plus any new DEF Pilot Program designated systems selected by OSD for FY 2016 - 2017): - Height of Burst Fuzing (US Air Force) - Three Dimensional Expeditionary Long Range Radar (US Air Force) - Small Diameter Bomb II (US Air Force) - Joint Air to Ground Missile (US Army) - Air and Missile Defense Radar (US Navy) - Miniature Air Launched Decoy (US Air Force) - Indirect Fire Protection Capability (US Army) - Review of major defense acquisition programs for exportability as part of the major milestone review process. - Identify and select new pilot program candidates from Service Acquisition Executive nominations. - Identify Service leads and subject matter experts, to provide support to programs, prior to Milestone B, to develop plans for exportability features. - Manage, fund, and track the completion of the contractor exportability feasibility studies and design activities. - Oversee drafting of DEF Lessons Learned and Interim Progress Reviews and Final Reports from DEF studies conducted in FY 2016. - Draft and submit the annual Report to Congress on the program. The focus for FY 2016 for the DEF pilot program will be to execute initial or follow-on feasibility studies for selected DEF Pilot Programs, and to conduct initial or follow-on DEF design studies on designated DEF pilot programs. As with the FY 2015 programs, FY 2016 feasibility studies will define the required actions for incorporating DEF into programs, begin DEF designs on select designated programs, and assess the potential costs of those actions. OUSD (AT&L) will continue to engage with program offices through the Military Department DEF POCs, and serve as a liaison among the program offices, the Military Departments, and other defense agencies to facilitate the feasibility studies. For pre-MS A and B systems, OUSD(AT&L)/IC will ensure the DEF feasibility studies are addressed in their program Acquisition Strategies and Program Protection Plans (PPP). For Post-MS B platforms, when there is already a contract in place, OUSD (AT&L) will work with the program managers and contracting officers to implement the necessary contractual modifications to ensure that the feasibility studies were executed.			
FY 2017 Plans: - Funding will decrease in FY 2017 to account for the availability of prior year execution balances and to fund other programs as part of an internal OSD realignment of funds to achieve efficiencies. Funding will be sufficient to support the number of systems included in the Defense Exportability Features Pilot Program that are used to define and implement DEF 'best practice'			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605022D8Z / *Defense Exportability Program*	**Project (Number/Name)** P013 / *Defense Exportability Features (DEF) Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
program management, system engineering, and program protection measures in the DoD acquisition process, and to cover more expensive follow-on DEF export design activities. In FY 2017, the pilot program is anticipating initiating or continuing contracts for DEF feasibility studies or DEF design activities on the following previously selected systems (plus any new DEF Pilot Program designated systems selected by OSD for FY 2017 - 2018): - Height of Burst Fuzing (US Air Force) - Three-Dimensional Expeditionary Long-Range Radar (US Air Force) - Joint Air to Ground Missile (US Army) - Air and Missile Defense Radar (US Navy) - Indirect Fires Protection Capability (US Army) - Next Generation Jammer (US Navy) - Miniature Air Launched Decoy (US Air Force) - Land Mine Removal System (US Army) (plus any new programs selected in FY16-17 that commence DEF studies or design activities) - Review of major defense acquisition programs for exportability as part of the major milestone review process. - Identify and select new pilot program candidates from Service Acquisition Executive nominations. - Identify Service leads and subject matter experts, to provide support to programs, prior to Milestone B, to develop plans for exportability features. - Manage, resource, and track the completion of the contractor exportability feasibility studies and design activities. - Oversee drafting of DEF Lessons Learned, Interim Progress Review briefings, and Final Reports from DEF studies conducted in FY 2017. - Draft and submit the annual Report to Congress on the program. The focus for FY 2017 for the DEF pilot program will be to execute feasibility studies from newly selected DEF Pilot Programs that have yet to receive DEF funding, and to conduct follow-on DEF design studies on designated DEF pilot programs. As with the FY 2016 programs, FY 2017 feasibility studies will define the required actions for incorporating DEF into programs, begin DEF designs on select designated programs, and assess the potential costs of those actions. OUSD (AT&L) will continue to engage with program offices through the Military Department DEF POCs, and serve as a liaison among the program offices, the Military Departments, and other defense agencies to facilitate the feasibility studies. For pre-MS A and B systems, OUSD(AT&L)/IC will ensure the DEF feasibility studies are addressed in their program Acquisition Strategies and Program Protection Plans (PPP).			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605022D8Z / *Defense Exportability Program*	**Project (Number/Name)** P013 / *Defense Exportability Features (DEF) Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
For Post-MS B platforms, when there is already a contract in place, OUSD (AT&L) will work with the program managers and contracting officers to implement the necessary contractual modifications to ensure that the feasibility studies were executed. ***FY 2018 Plans:*** - Funding will increases in FY 2018 will be sufficient to support the number of systems included in the Defense Exportability Features Pilot Program that are used to define and implement DEF 'best practice' program management, system engineering, and program protection measures in the DoD acquisition process, and to cover more expensive follow-on DEF export design activities. In FY 2018, the pilot program is anticipating initiating or continuing contracts for DEF feasibility studies or DEF design activities on the following previously selected systems (plus any new DEF Pilot Program designated systems selected by OSD for FY 2018 - 2019): - Three-Dimensional Expeditionary Long-Range Radar (US Air Force) - Joint Air to Ground Missile (US Army) - Air and Missile Defense Radar (US Navy) - Indirect Fires Protection Capability (US Army) - Height of Burst Fuzing (US Army) - Miniature Air Launched Decoy (US Air Force) - Land Mine Removal System (US Army) - Lower Tier Air Missile Defense (US Army) (plus any new programs selected in FY17-18 that commence DEF studies or design activities) - Review of major defense acquisition programs for exportability as part of the major milestone review process. - Identify and select new pilot program candidates from Service Acquisition Executive nominations. - Identify Service leads and subject matter experts, to provide support to programs, prior to Milestone B, to develop plans for exportability features. - Manage, resource, and track the completion of the contractor exportability feasibility studies and design activities. - Oversee drafting of DEF Lessons Learned, Interim Progress Review briefings, and Final Reports from DEF studies conducted in FY 2018. - Draft and submit the annual report to Congress on the program. The focus for FY 2018 for the DEF pilot program will be to execute feasibility studies from newly selected DEF Pilot Programs that have yet to receive DEF funding, and to conduct follow-on DEF design studies on designated DEF pilot programs. As with the FY 2017 programs, FY 2018 feasibility studies will define the required actions for incorporating DEF into programs, begin DEF			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605022D8Z / *Defense Exportability Program*	**Project (Number/Name)** P013 / *Defense Exportability Features (DEF) Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
designs on select designated programs, and assess the potential costs of those actions. OUSD (AT&L) will continue to engage with program offices through the Military Department DEF POCs, and serve as a liaison among the program offices, the Military Departments, and other defense agencies to facilitate the feasibility studies. OUSD(AT&L)/IC will ensure the DEF feasibility studies are addressed in program Acquisition Strategies and Program Protection Plans (PPP). For Post-MS B platforms, when there is already a contract in place, OUSD (AT&L) will work with the program managers and contracting officers to implement the necessary contractual modifications to ensure that the feasibility studies were executed.			
Accomplishments/Planned Programs Subtotals	3.165	2.920	3.162

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0605027D8Z / *OUSD(C) IT Development Initiative*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	33.667	13.457	16.524	21.353	-	21.353	8.154	8.221	8.270	8.403	-	-
927: *Next Generation Resource Management System*	33.667	4.807	7.224	8.853	-	8.853	8.154	8.221	8.270	8.403	Continuing	Continuing
929: *Financial Management Certification Tracking and Reporting Tool*	0.000	0.000	2.000	2.000	-	2.000	0.000	0.000	0.000	0.000	Continuing	Continuing
930: *Universe of Transactions*	0.000	8.650	7.300	10.500	-	10.500	0.000	0.000	0.000	0.000	Continuing	Continuing

Note

BUDGET REQUEST JUSTIFICATION: +$21.353 million is required to support the following efforts:

Next Generation Resource Management System (NGRMS): funds are realigned from the Defense Logistics Agency to OSD to align funding with the program office for more efficient execution.

Financial Management Certification Tracking and Reporting Tool (FM-CTRT): +$2.000M new start support to plan, develop, test and implement the Department of Defense FM-CTRT. The DoD FM-CTRT replaces the WHS FM Learning Management System (LMS) DoD Financial Management Certification Program (DFMCP) system of record. After three years, FM LMS has performed barely adequately in implementing section 1051 of the FY 2012 NDAA, Public Law 112-8 for improved audit readiness and analytical capability for the 54,000 DoD FM workforce.

Universe of Transactions: +$10.500 million is for the first phase of the Auditable Universe of Data Intelligence Tool implementation with U.S. Special Operations Command (USSOCOM) and other Defense Agency systems to develop a baseline application and configuration to support financial statement audits. When the first phase has been successfully completed, the second phase will integrate into the full solution any remaining accounting and business feeder systems that execute TI-97 funds and be the solution for DATA Act. The current time line for the first phase is estimated to be completed by December 2017. The follow on phase for DATA Act and remaining systems in scope will require development activities through September 2018. This effort complies with the NDAA requirement to use big data technologies to support financial audits.

A. Mission Description and Budget Item Justification

As the Department of Defense strategic, operational, and tactical plans and objectives transform the war fighter with new capabilities and doctrine, the budgeting and accountability of funds used to pursue the Department objectives will become more complicated and detailed for senior leaders to make decisions with supporting rationale for the taxpayer. Incorporating information technology toward current and emerging business processes manifesting into a state-of-the art system of systems will result in increasing efficiencies, timely diagnostics, and reducing lifecycle costs to maintain, sustain and repair.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0605027D8Z / *OUSD(C) IT Development Initiative*

This initiative exploits emerging technology, processes, trends, capabilities, and techniques to incorporate state-of-the-art information technology enabling the ability, agility, and level of fidelity to collect, process, administrate and report resource management data and to automate business processes within a more robust analytical environment within the Office of the Under Secretary of Defense (Comptroller) OUSD(C).

NEXT GENERATION RESOURCE MANAGEMENT SYSTEM:
The Department's budget focuses on institutionalizing and financing our capabilities to fight the wars we are in today and the scenarios we are most likely to face in the years ahead, while at the same time mitigating risk and providing for contingency operations. It also includes a fundamental overhaul of the DoD's approach to procurement, acquisition, and contracting. As such, the complex details of budgeting and tracking of funds become increasingly critical to senior leader decision making and to provide accountability to the taxpayer. Incorporating information technology toward current and emerging business processes manifesting into a state-of-the art system of systems will result in increasing efficiencies, timely diagnostics, and reducing lifecycle costs to maintain, sustain and repair.

Today, the Office of the Under Secretary of Defense Comptroller OUSD(C) and the Cost Analysis and Program Evaluation (CAPE) use various distinct automated systems (Comptroller Information System (CIS), Program Resource Collection Process (PRCP), Supplemental Resource Collection Process (SRCP), Budget Exhibits Generator and Standard Data Collection System (SDCS)) to formulate, justify, and execute DoD budgets. These six or more systems interact with at least several computer-based systems controlled by external organizations and agencies. These systems manage very similar financial information, yet each uses its own scheme for representing information. Much of the information managed by these systems is redundant. Cross-system data representations and redundancies make it difficult to exchange and to reconcile information. The capabilities provided by Comptroller systems, in some cases, fail to deliver services needed by its users, or fail to operate in ways that complement current and emerging business practices. They fail to give executives information in a comprehensible form, making it difficult to draw conclusions. Data disparities and functional redundancy make these systems more costly to maintain than they need to be.

There is a critical need for the development of a state-of-the-art information technology system to modernize and replace multiple, antiquated legacy systems and processes used to formulate, justify, present and defend the entire Department of Defense Budget in the Office of the Under Secretary of Defense (Comptroller) (OUSD(C)) to meet Title 10 and Title 31 mission and reporting requirements. The Comptroller's plan for mitigating the deficiencies and capability gaps associated with current systems is development of the Next Generation Resource Management System.

This initiative exploits emerging technology, processes, trends, capabilities, and techniques to incorporate state-of-the-art information technology enabling the ability, agility, and level of fidelity to collect, process, administer and report resource management data and to automate business processes within a more robust analytical environment within the Office of the Under Secretary of Defense (Comptroller) OUSD(C). Funded efforts will improve the timeliness of resource management reviews and decisions for senior leaders and Congress.

FINANCIAL MANAGEMENT CERTIFICATION TRACKING AND REPORTING TOOL:

The Defense Financial Management Certification Program (DFMCP) meets the business requirement to comply with section 1051 of the FY 2012 National Defense Authorization Act (NDAA), Public Law 112-81, authorizing the Secretary of Defense to establish a certification program for the 54,000 Financial Management (FM) workforce in order to improve audit readiness and analytic capability.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0605027D8Z / *OUSD(C) IT Development Initiative*

The Department of Defense has a requirement to strengthen the professional development of the DoD financial management workforce and to ensure that DoD financial managers are properly trained to meet current and future requirements to support the Warfighter. The DFMCP is the approved strategy to meet this requirement. The DFMCP needs a tracking and reporting tool for web-based course training and exams, a robust reporting capability for standard and ad hoc reports, a course search capability, sort filtering capability, and a capability to attach multiple documents once the training certification requirements are completed. The tool will self-guides users through the policies and procedures required by the program, without the burden of extensive training on how to use the system itself. The tool will enable program operations, with embedded business rules, that represent policy and procedures, and have internal controls that prevent improper actions. The tool will be intuitive, track and record activities, and enable users to perform correct actions the first time. The tool will provide a reporting tool that furnishes leadership with near real time management reports concerning FM Workforce Certification Qualifications and be adaptable to reasonable changes in DFMCP policies and procedures.

UNIVERSE OF TRANSACTIONS:
Funding will support financial audit. A Universe of Transaction (UoT) inclusive of all Department of Defense (DoD) Wide Appropriation General Fund (TI-97) information is needed to support reconciliation of fifteen General Fund accounting systems, reconciliation of eighteen business feeder systems to general fund accounting system, and validating UoT capabilities through the audit examinations of DCMA and DoDEA.

The DoD TI-97 UoT requires:
• All supporting TI-97 data that rolls up to the DoD financial statement (detailed accounting data reconciled to the financial statement)
• Proof of the completeness of all transactional data reported within the UoT (detailed accounting data reconciled to business events)
• Ability to extract subset populations
• Ability to secure and protect the data within the UoT

The failure to meet these requirements will result in the Department unable to successfully conduct and pass an audit.

To achieve these requirements, the Office of the Under Secretary of Defense (Comptroller) is creating a tool called the Auditable Universe of Data Intelligence Tool (AUD-IT). This tool has the potential to significantly improve DoD's capability and capacity to handle large volumes of standard and non-standard financial data. Both an application and analytical platform, the AUD-IT leverages an open-source software framework for storing data and running applications to deliver a complete UoT for TI-97.

The first phase of AUD-IT implementation is a proof of concept with the U.S. Special Operations Command (USSOCOM) systems to develop a baseline application and configuration. When the first phase has been successfully completed, the second phase will integrate into the full solution any remaining accounting and business feeder systems that execute TI-97 funds and be the solution for DATA Act. The current timeline for the proof of concept is estimated to be completed by December 2017.

AUD-IT is a joint effort between Office of the Deputy Chief Financial Officer (ODCFO), Office of the Deputy Chief Management Officer (ODCMO), Office of the Chief Information Officer (OCIO), USSOCOM, and the Defense Finance and Accounting Service (DFAS).

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0605027D8Z / *OUSD(C) IT Development Initiative*

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	13.457	16.524	0.000	-	0.000
Current President's Budget	13.457	16.524	21.353	-	21.353
Total Adjustments	0.000	0.000	21.353	-	21.353
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Program Adjustments	-	-	21.353	-	21.353

Change Summary Explanation

BUDGET REQUEST JUSTIFICATION: +$21.410 million is required to support the following efforts:

Next Generation Resource Management System (NGRMS) +$8.910 million and out years (Program transfer from DLA to OSD)
Financial Management Certification Tracking and Reporting Tool +$2.000 million
Universe of Transactions (UoT) +$10.500 million

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense											Date: May 2017	
Appropriation/Budget Activity 0400 / 5					R-1 Program Element (Number/Name) PE 0605027D8Z / *OUSD(C) IT Development Initiative*				Project (Number/Name) 927 / *Next Generation Resource Management System*			
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
927: *Next Generation Resource Management System*	33.667	4.807	7.224	8.853	-	8.853	8.154	8.221	8.270	8.403	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The initial plan was to move funding to DLA starting in FY2017 for more efficient execution. However, due to delays in the NGRMS environment and no significant progress in the program execution by the DLA Program Management Office, the funding should move back to OUSD(C) to allow Comptroller to get the project back on track and determine a way forward.

A. Mission Description and Budget Item Justification

The Department's budget focuses on institutionalizing and financing our capabilities to fight the wars we are in today and the scenarios we are most likely to face in the years ahead, while at the same time mitigating risk and providing for contingency operations. It also includes a fundamental overhaul of the DoD's approach to procurement, acquisition, and contracting. As such, the complex details of budgeting and tracking of funds become increasingly critical to senior leader decision making and to provide accountability to the taxpayer. Incorporating information technology toward current and emerging business processes manifesting into a state-of-the art system of systems will result in increasing efficiencies, timely diagnostics, and reducing lifecycle costs to maintain, sustain and repair.

Today, the Office of the Under Secretary of Defense Comptroller OUSD(C) and the Cost Analysis and Program Evaluation (CAPE) use various distinct automated systems (Comptroller Information System (CIS), Program Resource Collection Process (PRCP), Supplemental Resource Collection Process (SRCP), Budget Exhibits Generator and Standard Data Collection System (SDCS)) to formulate, justify, and execute DoD budgets. These six or more systems interact with at least several computer-based systems controlled by external organizations and agencies. These systems manage very similar financial information, yet each uses its own scheme for representing information. Much of the information managed by these systems is redundant. Cross-system data representations and redundancies make it difficult to exchange and to reconcile information. The capabilities provided by Comptroller systems, in some cases, fail to deliver services needed by its users, or fail to operate in ways that complement current and emerging business practices. They fail to give executives information in a comprehensible form, making it difficult to draw conclusions. Data disparities and functional redundancy make these systems more costly to maintain than they need to be.

There is a critical need for the development of a state-of-the-art information technology system to modernize and replace multiple, antiquated legacy systems and processes used to formulate, justify, present and defend the entire Department of Defense Budget in the Office of the Under Secretary of Defense (Comptroller) (OUSD(C)) to meet Title 10 and Title 31 mission and reporting requirements. The Comptroller's plan for mitigating the deficiencies and capability gaps associated with current systems is development of the Next Generation Resource Management System.

This initiative exploits emerging technology, processes, trends, capabilities, and techniques to incorporate state-of-the-art information technology enabling the ability, agility, and level of fidelity to collect, process, administer and report resource management data and to automate business processes within a more robust analytical

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605027D8Z / *OUSD(C) IT Development Initiative*	**Project (Number/Name)** 927 / *Next Generation Resource Management System*

environment within the Office of the Under Secretary of Defense (Comptroller) OUSD(C). Funded efforts will improve the timeliness of resource management reviews and decisions for senior leaders and Congress.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Next Generation Resource Management System	4.807	7.224	8.853
Description: Plan, develop, test and evaluate the system components (i.e. unified database, expert system, cross domain security, enterprise service bus, applications, services) and supportability requirements in modernizing the budget formulation, programming execution and reporting capabilities for the Department of Defense. Activities will include, but not be limited to, the preparation of all documentation required for Clinger-Cohen Compliance and acquisition regulations, developing requests for proposals, and oversight and management of contracts and deliverables. ***FY 2016 Accomplishments:*** Continue Program Management Office 1Q FY 2016-4Q FY 2016 Increment 1.0 Deployment 2Q 2016 Increment 2.0 Milestone B 4Q FY 2016 ***FY 2017 Plans:*** The initial plan was to move funding to DLA starting in FY2017 for more efficient execution. However, due to delays in the NGRMS environment and no significant progress in the program execution by the DLA Program Management Office, the funding should move back to OUSD(C) to allow Comptroller to get the project back on track and determine a way forward. ***FY 2018 Plans:*** The initial plan was to move funding to DLA starting in FY2017 for more efficient execution. However, due to delays in the NGRMS environment and no significant progress in the program execution by the DLA Program Management Office, the funding should move back to OUSD(C) to allow Comptroller to get the project back on track and determine a way forward.			
Accomplishments/Planned Programs Subtotals	4.807	7.224	8.853

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

IDIQ with Contractor Teaming Arrangement (CTA) partners, 40% small business participation
Materiel Development Decision (MDD) 2Q FY2013
Approval to Enter Acquisition LifeCycle at Milestone B by the MDA 4Q FY2013
NGRMS Contract Award Date 4Q FY2014

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605027D8Z / *OUSD(C) IT Development Initiative*	**Project (Number/Name)** 927 / *Next Generation Resource Management System*

Milestone B for Increment 1.0 2Q FY2015
Milestone C for Increment 1.0 2Q FY2016
Full Deployment Decision for Increment 1.0 2Q FY2016
Increment 2.0 Contract Award 4Q FY2015
Milestone B for Increment 2.0 4Q FY2016

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 5	R-1 Program Element (Number/Name) PE 0605027D8Z / *OUSD(C) IT Development Initiative*	Project (Number/Name) 929 / *Financial Management Certification Tracking and Reporting Tool*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
929: *Financial Management Certification Tracking and Reporting Tool*	0.000	0.000	2.000	2.000	-	2.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

+$2.000M new start support to plan, develop, test and implement the Department of Defense Financial Management - Certification Tracking and Reporting Tool (FM-CTRT). The DoD FM-CTRT replaces the WHS FM Learning Management System (LMS) DoD Financial Management Certification Program (DFMCP) system of record. After three years, FM LMS has performed barely adequately in implementing section 1051 of the FY 2012 NDAA, Public Law 112-8 for improved audit readiness and analytical capability for the 54,000 DoD FM workforce.

A. Mission Description and Budget Item Justification

The Investment Review Board approved the Department of Defense Financial Management Certification Program (DFMCP) Problem Statement on July 28th, 2016. The DFMCP meets the business requirement to comply with section 1051 of the FY 2012 NDAA, Public Law 112-8 for improved audit readiness and analytic capability of the 54,000-strong Financial Management (FM) workforce.

The Department of Defense continues to use the Washington Headquarter Services Learning Management System (LMS) DFMCP system of record. LMS has performed barely adequately in implementing the certification program. A fair assessment by the program office is that despite three years of providing, improving and proliferating training, most FM LMS users and administrators cannot use the LMS proficiently. The result from the users' perspectives is that the program is flawed, that achievement of certification is unnecessarily difficult, and that instead of enabling the DFMCP, the FM LMS is an obstacle to be surmounted. The FM workforce's frustration with the FM LMS was raised by the Military Department Comptrollers and the Directors of the DFAS and DCAA as the most significant issue with the new FM Certification Program and an issue requiring immediate resolution. This culminated with an Under Secretary of Defense (Comptroller) decision to explore other alternatives to the current FM LMS. The existing FM LMS is a cumbersome and expensive system.

This effort is to plan, develop, test and implement the DoD Financial Management Certification Tracking and Reporting Tool (FM-CTRT) as a more efficient and cost effective solution.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Financial Management Certification Tracking and Reporting Tool	0.000	2.000	2.000
Description: Plan, develop, test and implement the DoD Financial Management Certification Tracking and Reporting tool (FM-CTAR). This tool implements the internal controls outlined in DODI 1300.26, Financial Management Certification Program. The tool will provide the DoD Financial Management workforce with the on-line capability to work toward and track their FM			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605027D8Z / *OUSD(C) IT Development Initiative*	**Project (Number/Name)** 929 / *Financial Management Certification Tracking and Reporting Tool*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
certification. Further it must promote the efficiency and effectiveness of the DoD FM workforce to meet the requirements the FY12 NDAA authorizing the Certification of the DOD FM community. ***FY 2016 Accomplishments:*** Developed and executed an Academic Course library Developed and executed an interactive Learning History Worksheet ***FY 2017 Plans:*** Pre-contract award in Q2 through Q3. Award contract in Q4. ***FY 2018 Plans:*** Pre-contract award in Q2 through Q3. Award contract in Q4.			
Accomplishments/Planned Programs Subtotals	0.000	2.000	2.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Leveraging existing contracts for award.

E. Performance Metrics

N/A.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 5	R-1 Program Element (Number/Name) PE 0605027D8Z / *OUSD(C) IT Development Initiative*	Project (Number/Name) 930 / *Universe of Transactions*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
930: *Universe of Transactions*	0.000	8.650	7.300	10.500	-	10.500	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

+$10.500 million is for the first phase of the Auditable Universe of Data Intelligence Tool implementation with U.S. Special Operations Command (USSOCOM) and other Defense Agency systems to develop a baseline application and configuration to support financial statement audits. When the first phase has been successfully completed, the second phase will integrate into the full solution any remaining accounting and business feeder systems that execute TI-97 funds and be the solution for DATA Act. The current time line for the first phase is estimated to be completed by December 2017. The follow on phase for DATA Act and remaining systems in scope will require development activities through September 2018. This effort complies with the NDAA requirement to use big data technologies to support financial audits.

A. Mission Description and Budget Item Justification

Without a single UoT to support the TI97 General Fund for the 4th Estate the Department will be incapable of asserting readiness for an independent audit of the consolidated financial statements. All DoD organizations are pursuing the current statutory goal of achieving the state of audit readiness (target September 30, 2017) that supports entry into a full financial statement of audit in FY 2018 (target start date March 2018) with an initial opinion rendered in mid-FY 2019. Without an automated capability to provide a transactional universe for sampling and evidentiary proof the department will not be in compliance with public law.

The requested funds will be used to buy “Big Data” software and hardware infrastructure and required contractor services to implement the technology to meet the UoT requirement.
This UFR includes subject matter expertise costs for DCFO and funds to be placed on a contract for hardware, software, and labor. This will not result in hiring additional government personnel.

The UoT will have the capability to:
• Ingest data from multiple accounting and financial feeder systems
• Normalize data from multiple sources providing a common data architecture
• Reconcile transactional details to summary financial data
• Provide auditor’s the ability to sample TI-97 detailed transactions
• Business Analytics/Reporting
• DATA Act which is a statutory requirement to be completed by May 2017
• Provide NIPR and SIPR capability for non-sensitive and sensitive data

This effort is a proof of concept focused on USSOCOM, but will apply to all TI-97 general fund entities. The scope is to bring in data from an estimated 50 systems and demonstrate existence and completeness of business and accounting transaction data, which are capabilities required for audit readiness.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605027D8Z / *OUSD(C) IT Development Initiative*	**Project (Number/Name)** 930 / *Universe of Transactions*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Universe of Transactions Defense Wide Appropriation General Fund	8.650	7.300	10.500
Description: Plan, develop, test and evaluate the system components (i.e. unified database, cross domain security, applications, services) and supportability requirements in creating a universe of transactions for the Defense Wide General Fund Appropriation financial audit. The funds will be used to support increments three, four, five, and six per the schedule. ***FY 2016 Accomplishments:*** Created project management office Q4 2016. Ingested and completed reconciliation for nine DoD accounting systems data Q4 2016. ***FY 2017 Plans:*** Reconcile fifteen General Fund accounting systems Reconcile eighteen business feeder systems to general fund accounting system. Validate UoT capabilities through the audit examinations of DCMA and DoDEA ***FY 2018 Plans:*** Reconcile fifteen General Fund accounting systems Reconcile eighteen business feeder systems to general fund accounting system. Validate UoT capabilities through the audit examinations of DCMA and DoDEA			
Accomplishments/Planned Programs Subtotals	8.650	7.300	10.500

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Contract will be awarded by the Army Research Lab in June 2017. That contract will have an option year for 2018.

E. Performance Metrics

97% of the Defense Agencies accounting systems reconcile to the unadjusted trial balance

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605027D8Z / *OUSD(C) IT Development Initiative*	**Project (Number/Name)** 930 / *Universe of Transactions*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Universe of Transactions Defense Wide Appropriation General Fund	C/T&M	OUSD(C) : Pentagon	0.000	6.847	Jun 2017	5.900	May 2017	7.500	Apr 2018	-		7.500	Continuing	Continuing	-
		Subtotal	0.000	6.847		5.900		7.500		-		7.500	-	-	-

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Universe of Transactions Defense Wide Appropriation General Fund	C/T&M	OUSD(C) : Pentagon	0.000	1.803	Jan 2017	1.400	Jan 2017	3.000	Apr 2018	-		3.000	Continuing	Continuing	-
		Subtotal	0.000	1.803		1.400		3.000		-		3.000	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	8.650		7.300		10.500		-		10.500	-	-	-

Remarks

N/A

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605027D8Z / *OUSD(C) IT Development Initiative*	**Project (Number/Name)** 930 / *Universe of Transactions*

UoT Schedule Overview

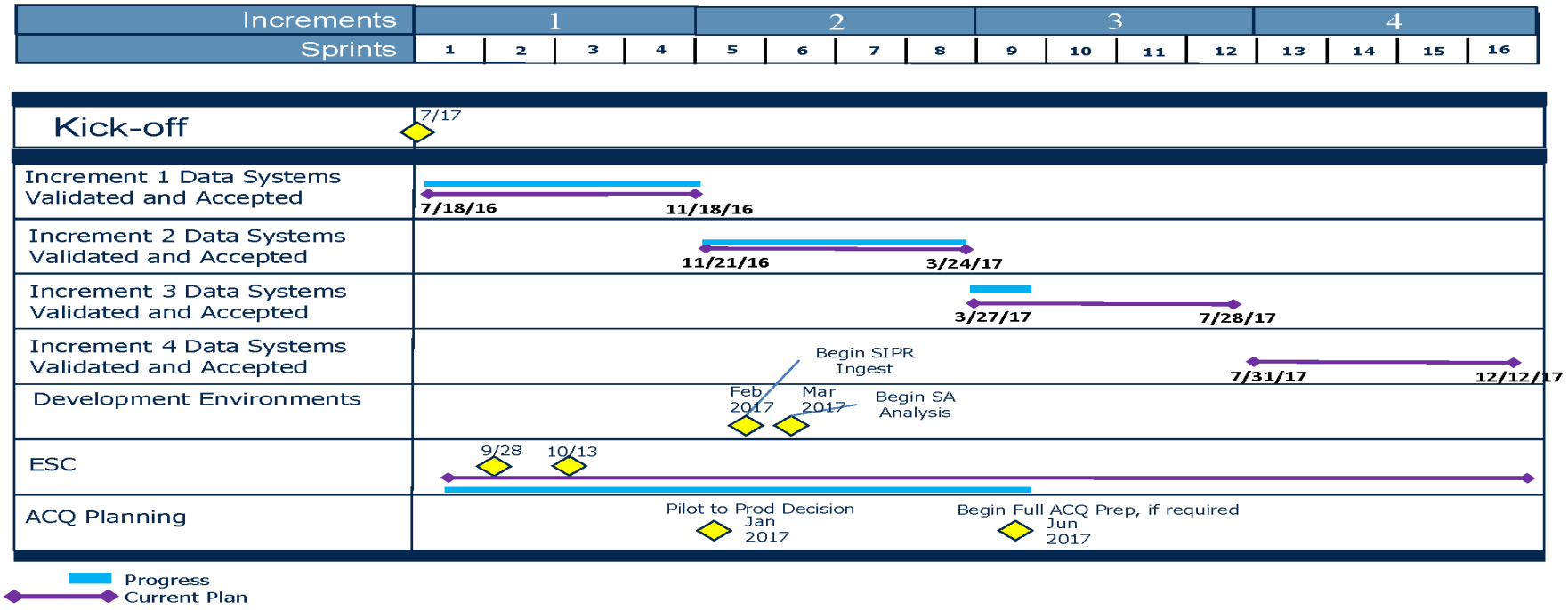

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Exhibit R-4, RDT&E Schedule Profile: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605027D8Z / *OUSD(C) IT Development Initiative*	**Project (Number/Name)** 930 / *Universe of Transactions*

UoT Schedule Overview Cont.

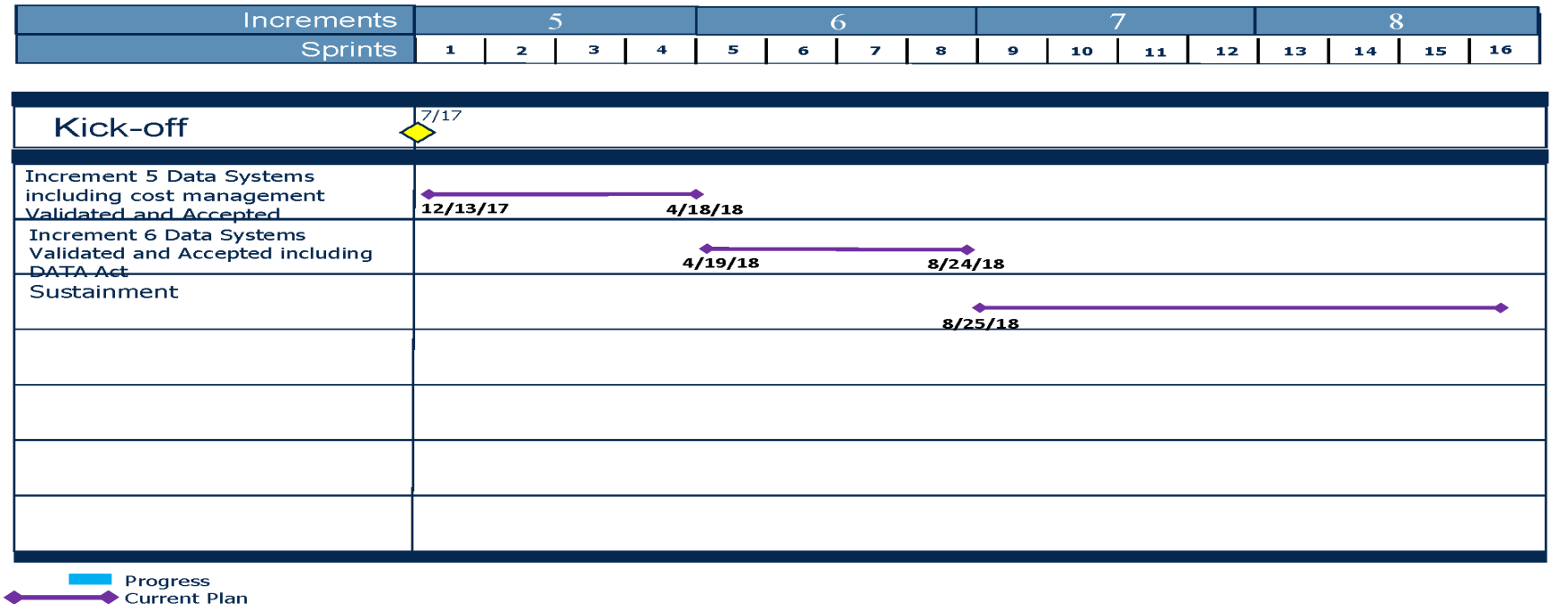

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Exhibit R-4A, RDT&E Schedule Details: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605027D8Z / *OUSD(C) IT Development Initiative*	**Project (Number/Name)** 930 / *Universe of Transactions*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Acquisition Milestone				
Pilot to Production Decision	3	2017	3	2017
Begin Full Acquisiition Prep	4	2017	4	2017

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0605075D8Z / *DCMO Policy and Integration*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	88.023	2.217	0.000	2.810	-	2.810	2.122	1.636	1.668	1.702	Continuing	Continuing
075: *DCMO Policy and Integration*	88.023	2.217	0.000	2.810	-	2.810	2.122	1.636	1.668	1.702	Continuing	Continuing

A. Mission Description and Budget Item Justification

To produce and sustain a Business Enterprise Architecture (BEA) to guide business transformation and business system investment actions for the DoD. The requirement to produce and maintain a BEA is codified in NDAA 2012, USC Title 10, Section 2222 with amplifying guidance from OMB. The proposed program provides improved capabilities to access and use the BEA information including descriptions of business processes and associated information assets; required capabilities and associated performance requirements; and governing laws, regulations and policies (LRPs).

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	2.219	0.000	2.813	0.000	2.813
Current President's Budget	2.217	0.000	2.810	0.000	2.810
Total Adjustments	-0.002	0.000	-0.003	0.000	-0.003
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.002	-			
• Other Program Adjustments	-	-	-0.003	-	-0.003

Change Summary Explanation

The FY2017 Funding was reduced by $1.979 million to account for the availability of prior year execution balances.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 5	R-1 Program Element (Number/Name) PE 0605075D8Z / *DCMO Policy and Integration*	Project (Number/Name) 075 / *DCMO Policy and Integration*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
075: *DCMO Policy and Integration*	88.023	2.217	0.000	2.810	-	2.810	2.122	1.636	1.668	1.702	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

To produce and sustain a Business Enterprise Architecture (BEA) to guide business transformation and business system investment actions for the DoD. The requirement to produce and maintain a BEA is codified in NDAA 2012, USC Title 10, Section 2222 with amplifying guidance from OMB. The proposed program provides improved capabilities to access and use the BEA information including descriptions of business processes and associated information assets; required capabilities and associated performance requirements; and governing laws, regulations and policies (LRPs).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: DCMO Policy and Integration	2.217	0.000	2.810
FY 2016 Accomplishments: • • Designed and deliver more efficient and effective applications and information resource capabilities supporting DCMO Title 10 Section 2222 responsibilities for Defense Business Enterprise Architecture. • Designed and delivered new enterprise architecture products comprising BEA content to support OSD business outcomes, performance/process improvement initiatives and Federal reporting requirements. This includes content collected during BPSRs. • Continue incorporating other mission area owner requirements and provide interoperability development to ensure Warfighter, Enterprise Information Environment, and Intelligence Mission Area architectural alignment, implementation, and information sharing (including compliance reporting) with the BMA. • Assess requirements and innovative utilization of technology to support enhanced alignment of business operations for the Department. • Continue technology innovation to support enhanced alignment of business operations for the Department. • Continue evolution of open architecture and data standards in support of DoD requirements and processes enabling and implementing enterprise level business applications. • Establish requirements for the evolving and changing emphasis in management of the OSD with continued emphasis on support to policy and business process change and technology insertion. • Design, develop and deploy tools for the evolving and changing emphasis in oversight of the BMA with continued emphasis on support to policy and process change and technology insertion. Continue to operate and deploy pilot activities and tools in the BMA.			
FY 2017 Plans:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605075D8Z / *DCMO Policy and Integration*	**Project (Number/Name)** 075 / *DCMO Policy and Integration*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Sustain this effort with previous year funding deliver more efficient and effective applications and information resource capabilities supporting DCMO Title 10 Section 2222 responsibilities for Defense Business Enterprise ArchitectureBusiness Enterprise Architecture (BEA) compliance assessments including operational activity breakout and data standards review, End-to-End functional processes and supporting systems evaluations, BEA system budget analyses, CIO and cyber compliance reporting, as well as comprehensive system sustainment and transition analytics. Additionally, BIA provides a capability to support Financial system integration and detailed transaction reporting to meet audit readiness requirements. The BIA program includes technologies for integration with other DoD authoritative data sources, business intelligence reporting capabilities/tools, and requisite DoD data hosting center support. ***FY 2018 Plans:*** Sustain this effort with previous year funding deliver more efficient and effective applications and information resource capabilities supporting DCMO Title 10 Section 2222 responsibilities for Defense Business Enterprise Architecture			
Accomplishments/Planned Programs Subtotals	2.217	0.000	2.810

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Section 2222 of Title 10, USC required that a single Business Mission Area (BMA) Investment Review Board (IRB) be established. As part of the stand-up of this single IRB, Principal Staff Assistant (PSA) and DoD Components are charged with specifying and delivering required business outcomes for the Department. These business outcomes are then incorporated into the architecture and data products making up the Department's Business Enterprise Architecture (BEA), under the oversight and direction of the Defense Business Council. These metrics measure the incorporation of the Component identified business outcomes and associated component organizational alignments into the BEA. •FY 2016 Goal: 90% of business outcomes and PRM/BRM performance data incorporated into the BEA.
•FY 2017 Goal: 100% of business outcomes and PRM/BRM performance data incorporated into the BEA.•FY 2018 Goal: 100% of business outcomes and PRM/BRM performance data incorporated into the BEA. Section 2222 of Title 10, USC further required that the defense business enterprise architecture include an information infrastructure to enable the producing of timely accurate and reliable business information. This metric measures the discoverability of BEA content that supports DoD decision making.

.• FY 2016 Goal: 90% of BEA data artifacts are discoverable via web services.
• FY 2017 Goal: 100% of BEA data artifacts are discoverable via web services.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605075D8Z / *DCMO Policy and Integration*	**Project (Number/Name)** 075 / *DCMO Policy and Integration*

• FY 2018 Goal: 100% of BEA discoverable data artifacts transitioned to a government cloud based information environment.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0605140D8Z / *Trusted Foundry*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	0.000	7.000	69.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
P837: *Trusted Mask Trust Approach*	0.000	0.000	2.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
P838: *V&V Capabilities and Standards for Trust*	0.000	3.000	19.200	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
P839: *New Trust Approach*	0.000	4.000	47.800	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

Note

Beginning in FY 2018, funds from this Program Element (PE) will be transferred to a new Budget Activity (BA) 5 PE 0605294D8Z and BA 4 0604294D8Z to allow more efficient execution of the development and prototyping activities within the body of work.

A. Mission Description and Budget Item Justification

This PE supports activities to ensure critical and sensitive integrated circuits are available to meet the DoD's needs. It refines strategies and management planning activities that will (1) provide support to acquisition programs to address trusted microelectronics supply needs; (2) improve capability to evaluate and validate trust of microelectronic parts and advance standards to incentivize the commercial marketplace to recognize trust as a competitive design standard; and (3) develop and demonstrate alternative approaches to assuring the trust of the microelectronics supply chain in order to enable broader DoD access to commercial state-of-the-art (SOTA) microelectronics technology.

This activity will be coordinated by the Office of the Assistant Secretary of Defense for Research and Engineering, and will include performers from the DoD Components, the Defense Microelectronics Activity (DMEA), the Joint Federated Assurance Center (JFAC), the Defense Advanced Research Programs Agency (DARPA), other DoD and Intelligence Community science and technology (S&T) organizations and laboratories, defense industry, and the broader commercial industrial base. It will integrate the functions of the DoD Trusted Foundry Program, the Trusted Supplier accreditation program, JFAC, and related S&T activities.

This activity implements, maintains and updates the DoD's long-term microelectronics strategy. Recognizing that trusted and assured supply of microelectronics is a Government-wide concern, this activity will interface with interagency partners to take into account interagency requirements, opportunities for collaboration, and strategic decisions that can be made to limit the overall cost of these requirements to the government.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0605140D8Z / *Trusted Foundry*

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	0.000	69.000	91.300	-	91.300
Current President's Budget	7.000	69.000	0.000	-	0.000
Total Adjustments	7.000	0.000	-91.300	-	-91.300
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	7.000	-			
• SBIR/STTR Transfer	-	-			
• Funds transfer to BA4 PE 0604294D8Z	-	-	-84.200	-	-84.200
• Funds transfer to BA5 PE 0605294D8Z	-	-	-5.251	-	-5.251
• Other	-	-	-1.235	-	-1.235
• DTIC Offset	-	-	-0.614	-	-0.614

Change Summary Explanation

FY 16 add is to support the initiation of Trusted Foundry activities. FY 2018 funds transferred to PE 0604294D8Z in BA 4 for development and prototyping activities and PE 0605294D8Z in BA 5 for demonstration activities.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 5	R-1 Program Element (Number/Name) PE 0605140D8Z / *Trusted Foundry*	Project (Number/Name) P837 / *Trusted Mask Trust Approach*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P837: *Trusted Mask Trust Approach*	0.000	0.000	2.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project staffs and supports operation of a new secure (SECRET-level) photomask manufacturing capability down to 14 nanometers (nm) at an existing SOTA commercial photomask manufacturing supplier to secure the masks and design intellectual property (IP) of acquisition programs when using commercial microelectronic fabrication facilities other than the Trusted Foundry. This capability can be used in conjunction with one or more leading-edge commercial foundries. This capability will address trusted masks at technology node sizes < 130nm.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Trusted Mask Trust Approach	-	2.000	-
FY 2017 Plans: Starting in FY 2017, DMEA will conduct management and technical support, as required, to procure secure mask data parsing services for the Department, as well as other Federal entities, by upgrading an existing SOTA commercial photomask manufacturing supplier with a Trusted photomask capability to ensure the integrity of the tape-in/mask release, mask manufacturing, and authentication process for photomasks. Over the FYDP, a SOTA commercial photomask manufacturing supplier will be equipped with a new secure (SECRET-level) photomask manufacturing capability ($7.2M is planned as a FY 2017 Defense Production Act (DPA) Title III project) and staffed to provide the required critical Trusted photomask capabilities.			
Accomplishments/Planned Programs Subtotals	-	2.000	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance for this project is monitored in the following ways:

- Number of photomasks created using the secure photomask manufacturing capability.
- Number of acquisition programs using the secure photomask manufacturing capability.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605140D8Z / *Trusted Foundry*	**Project (Number/Name)** P837 / *Trusted Mask Trust Approach*

- Number of technology node sizes supported by the secure photomask manufacturing capability.
- Number of foundries supported by the secure photomask manufacturing capability.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 5	R-1 Program Element (Number/Name) PE 0605140D8Z / *Trusted Foundry*	Project (Number/Name) P838 / *V&V Capabilities and Standards for Trust*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P838: *V&V Capabilities and Standards for Trust*	0.000	3.000	19.200	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project improves microelectronics test and verification methodologies in support of assuring commercial parts and develops standards/practices to foster commercial development of secure, trusted, and assured parts. Verification and test technologies are required to provide direct program support for microelectronics assurance verification when DoD Trusted Foundry Program options are not available. Core technical laboratories have recently been chartered as a Joint Federated Assurance Center (JFAC) to provide this support. Out-year demands will require an increase in capacity, which will take the form of additional personnel and/or equipment to permit scaling of microelectronics assessment capabilities. Challenges have been identified, to include the ability to analyze leading-edge technologies, throughput/time required for analysis, ability to analyze third-party IP contained in microelectronic components, and analysis of non-application-specific integrated circuit (ASIC) components that are increasingly being used for agility, e.g., Field-Programmable Gate Arrays (FPGAs). This project addresses these gaps in current technical capabilities in a collaborative nature amongst the core technical laboratories, driven by projected and realized out-year demand. Three capability areas core to microelectronics analysis and verification will be improved:

- Physical verification, i.e., destructive analysis of integrated circuits and printed circuit boards
- Functional analysis, i.e., non-destructive screening/verification of select, critical parts
- Design verification, i.e., verification/assurance of designs, IP, netlists, bitstreams, firmware, etc.

These improvements will address two primary attributes: (1) technical capability including laboratory equipment, analysis tools, such as imaging software, and highly skilled tradecraft, and (2) the capacity to perform microelectronics assessments.

This project also develops standards and practices in support of trustworthy designs and supply chains and formal relationships with industry to foster commercial development of secure, trusted, and assured parts and for acquisition of government access to proprietary designs, software, development, and quality assurance processes and test procedures to develop practices that minimize security flaws in designs and facilitate verification. Two capability areas that are core to improved commercial designs will be improved, i.e., trustworthy designs and supply chains.

Beginning in FY 2018, funding for this project has been transferred to BA 4 PE 0604294D8Z to accurately reflect execution of funds in support of the mission.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Verification and Validation (V&V) Capabilities and Standards for Trust	3.000	19.200	-
FY 2016 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605140D8Z / *Trusted Foundry*	**Project (Number/Name)** P838 / *V&V Capabilities and Standards for Trust*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Planned for funding of a dedicated technical government subject matter experts (SME) at JFAC laboratories within the Air Force, Army, Navy, and National Security Agency, starting in FY 2017 and provided support for identified JFAC acquisition program pilots and non-program-related assessments, e.g., suspicious parts acquired by law enforcement or that failed in the field. In addition, utilizing the 2015 JFAC hardware assurance capability survey, developed a plan of action based on incremental technical improvement and capacity across participating JFAC laboratories in the following areas: • Equipment re-capitalization and new equipment • Data and imaging processing • Enhanced automation • Technology and IP licensing • Training and SME development • Maintenance support • Feasibility studies • Reimbursable (test fixtures, boards, parts, and supplies) • Direct program support in related areas beyond the acquisition programs' technical capability or capacity to address			
FY 2017 Plans: The JFAC is: (1) improving its microelectronics test and verification methodologies in support of verifying trust and assurance of parts and (2) developing standards/practices to foster commercial development of secure, trusted and assured parts. Verification and test technologies. Initiating: • Improvements to the core JFAC's (1) technical capability, i.e., laboratory equipment, IP, analysis tools, such as imaging software, and highly skilled tradecraft, and (2) the capacity to perform microelectronics assessments. Out-year demands will continue to require an increase in capacity, which will take the form of additional personnel and/or equipment to permit scaling of assessment capabilities. • Enhancement of automation needed to increase the throughput of information produced by individual JFAC laboratory tools as well as to facilitate information sharing across the families of tools used for analysis and testing. • Development of common SME training and protocols based on the existing tool base, to include both commercial and government-developed tools. • Funding for additional SMEs per core JFAC laboratory in support of the microelectronics trust verification and other JFAC-related work. • Cost sharing of direct program support prioritized for FY 2017 focused on addressing technical gaps and trust-related findings. • Investment in the above technical areas based on priority and monitor and report increased technical capability from the baseline 2016 level.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605140D8Z / *Trusted Foundry*	**Project (Number/Name)** P838 / *V&V Capabilities and Standards for Trust*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Standards and Practices. Initiating the: • Development of standards and best practices, and relationships with industry, to foster commercial development of secure and trusted parts. • Establishment of formal relationships with FPGA vendors and other key commercial suppliers to improve device and IP security. • Acquisition of government access to proprietary designs, software, development, and quality assurance processes and test procedures to develop design practices that minimize security flaws and facilitate verification. • Establishment of government and industry working groups to develop test procedures to validate the trust of designs. • Documentation and promulgation of security-enhancing design practices across government, industry, and academia. • Development of industry-wide standards and practices to establish a common understanding of what constitutes verified and trusted hardware/software/firmware at both the component and systems level. • Development of a common lexicon for secure hardware/software/firmware in collaboration with the Committee for National Security Systems, National Institute of Standards and Technology, and the broader United States Government, industry, and academia. • Definition of supply chain controls for assured chain of custody for critical and other microelectronics devices and IP. • Development of security training and educate government and industry system security engineers and material managers on supply chain and life-cycle management best practices using agreed-upon language, standards, and practices. • Alignment of DoD Instruction 5200.44 (Protection of Mission Critical Functions to Achieve Trusted Systems and Networks (TSN)), related policies, and NIST 800-161 (Supply Chain Risk Management Practices for Federal Information Systems and Organizations) with industry standards identifying and addressing gaps in definition and criteria and establishing accepted levels of supplier and part trustworthiness.			
Accomplishments/Planned Programs Subtotals	3.000	19.200	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance for this project is monitored in the following ways:

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605140D8Z / *Trusted Foundry*	**Project (Number/Name)** P838 / *V&V Capabilities and Standards for Trust*

- Increases in throughput in current JFAC laboratories, and stands-up of additional capability/capacity as required, so that at least two laboratories will have capability in physical verification, functional analysis, and design verification to increase the DoD's overall microelectronics trust verification and test capacity for analysis of state-of-the practice parts.
- Increased Probability of Detection of malicious insertion and/or counterfeit parts.
- Cost to evaluate components.
- Time to evaluate components.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 5	R-1 Program Element (Number/Name) PE 0605140D8Z / *Trusted Foundry*	Project (Number/Name) P839 / *New Trust Approach*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P839: *New Trust Approach*	0.000	4.000	47.800	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project funds a program of research to develop, and demonstrate the next generation, technology-driven approach to microelectronics trust and assurance, to include SOTA microelectronics, to ensure continued access to leading-edge microelectronic technologies while maintaining the required level of trust in all environments. DoD's ability to access commercial technology for its custom trusted and assured needs is diminishing as leading-edge suppliers become fewer and more focused on serving the global commercial market. DoD's technology needs are broad, and relying on a single source supplier is not feasible. Alternative, advanced manufacturing methods, technologies, and design tools are needed to produce trusted and assured SOTA parts from untrusted sources and to preserve access to these advanced nodes while protecting DoD and Defense Industrial Base IP from exploitation. It also is intended to dramatically improve the capabilities of the JFAC with regard to verification and validation of microelectronics trust and assurance.

This program of research will demonstrate innovative design, manufacturing, imaging, tagging, and control and assessment approaches for protecting DoD's microelectronics supply chain and intellectual property (IP), including alternatives for trusted, strategic radiation-hardened electronics in advanced technology nodes for next-generation strategic systems, obfuscation and disaggregation technology development, and other assurance mitigations. It develops advanced imaging technologies and forensics, Design for Trust techniques, active hardware trust control, electronic component markers, and a data and analysis capability to enable auditing and independent verification and validation of commercial designs. It also demonstrates, and implements concepts for the cost-effective production of custom microelectronics in low volumes and protection of sensitive IP from exploitation.

Technologies that provide trust and assurance in a broad range of trusted and un-trusted environments can mitigate the risks associated with sole-source suppliers, and increase the Government's ability to leverage commercial capabilities. The suite of demonstrated technologies, e.g., alternative manufacturing methods and design tools, would enable DoD to obfuscate the purpose of sensitive devices, verify their origin and function, and protect sensitive IP from exploitation even while using the global supply chain for most hardware. In cases where the risk involved precludes that level of commercial collaboration, low-volume manufacturing technologies demonstrated under this project would permit DoD to more cheaply produce low volumes of sensitive microelectronics in trusted environments. The project would also support using a repository of third-party IP to expedite circuit design and transition promising technologies to use.

Beginning in FY 2018, funding for this project has been transferred to BA 4 PE 0604294D8Z and BA 5 PE 0605294D8Z.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: New Trust Approach	4.000	47.800	-
FY 2016 Accomplishments: Conducted a study and coordinated with DARPA for a Broad Agency Announcement (BAA) to fully develop and initiate the program of research. IDA was contracted and coordinated NDIA and industry engagement around new trust approaches and			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605140D8Z / *Trusted Foundry*	**Project (Number/Name)** P839 / *New Trust Approach*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
FPGA Assurance resulting in two workshops and summary reports. In addition, FY 2017 acquisition program pilots and/or technology demonstrations of mature trust technologies and techniques were identified and planned for with DARPA and other programs. ***FY 2017 Plans:*** Initiate the conduct of identified acquisition program pilots and technology demonstrations in accordance with the FY 2016 and FY2017 plans and coordinate research programs across sponsored BAAs, government R&D organizations, academia and industry. FY17 and FY18 primary activities include demonstration of these technologies being developed in PE 0604294D8Z, followed by transition of these capabilities to new programs in the following fiscal years. Assess and report technical progress against the FY 2016 and FY 2017 plan. Engage early on with potential stakeholders to identify potential transition issues and aid in transition through joint collaboration between research teams and stakeholders with a focus on evaluations of prototypes, test articles and beta versions of tools, IP, techniques, methods, etc. and their use in operationally-realistic scenarios.			
Accomplishments/Planned Programs Subtotals	4.000	47.800	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance for this project is monitored in the following ways:
- Effectiveness of developed technologies, as measured by:
o The speed and reliability of new validation and verification techniques in identifying known microelectronics issues (e.g. tampering) in laboratory and non-laboratory situations;
o Successful testing of advanced, alternative manufacturing techniques such as disaggregated manufacturing; and
o Resilience of microelectronics protected by new trust approach technologies in red teaming exercises.
- Adoption of next-generation trust technologies, as measured by:
o The number of DoD and other Government programs employing these trust technologies, design approaches, or best practices, possibly as facilitated by the provision of use models;

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605140D8Z / *Trusted Foundry*	**Project (Number/Name)** P839 / *New Trust Approach*

o The volume and criticality of components employing these technologies, design approaches, or best practices; and
o Promulgation in DoD guidance and program protection plans.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0605210D8Z / *Defense-Wide Electronic Procurement Capabilities*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	51.227	7.961	9.881	11.870	-	11.870	10.338	9.838	10.021	10.221	Continuing	Continuing
P*021: *Defense-Wide Electronic Procurement Capabilities-Contingency*	51.227	7.961	9.881	11.870	-	11.870	10.338	9.838	10.021	10.221	Continuing	Continuing

A. Mission Description and Budget Item Justification

Defense-wide Electronic Procurement Capabilities is designed to provide an avenue for the development of increased e-business capabilities critical to meet the enterprise-wide needs of the procurement community. The requirement for increased e-business capabilities may result from statute, regulation or internal control requirements. This program provides opportunities for the introduction of innovative, time-saving, and cost-saving technologies into procurement processes across the Department. This RDT&E PE provides resources to conduct software development and testing on new or modified e-business applications to ensure mature system development, integration and demonstration of production representative systems and capabilities.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	7.209	9.881	11.961	-	11.961
Current President's Budget	7.961	9.881	11.870	-	11.870
Total Adjustments	0.752	0.000	-0.091	-	-0.091
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	1.000	-			
• SBIR/STTR Transfer	-0.248	-			
• DTIC Offset	-	-	-0.091	-	-0.091

Change Summary Explanation

FY 2018 program decreased due DTIC offset costs.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 5	R-1 Program Element (Number/Name) PE 0605210D8Z / *Defense-Wide Electronic Procurement Capabilities*	Project (Number/Name) P*021 / *Defense-Wide Electronic Procurement Capabilities- Contingency*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P*021: *Defense-Wide Electronic Procurement Capabilities-Contingency*	51.227	7.961	9.881	11.870	-	11.870	10.338	9.838	10.021	10.221	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Defense-wide Electronic Procurement Capabilities is designed to provide an avenue for the development of increased e-business capabilities critical to meet the enterprise-wide needs of the procurement community. The requirement for increased ebusiness capabilities may result from statute, regulation or internal control requirements. This program provides opportunities for the introduction of innovative, time-saving, and cost-saving technologies into procurement processes across the Department. This RDT&E PE provides resources to conduct software development and testing on new or modified e-business applications to ensure mature system development, integration and demonstration of production representative systems and capabilities.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Defense-Wide Electronic Procurement Capabilities- Contingency	7.961	9.881	11.870
FY 2016 Accomplishments: To achieve efficiencies and support audit readiness funding will support the following procurement capabilities development: 1) an end to end paperless reconciliation process for Government Furnished Property (GFP) 2) complete implementation of a fraud and misuse data mining detection capability for purchase cards in DoD, 3) strengthening existing vendor identification systems in DoD to combat counterfeiting and cyber intrusion, 4) implementating contingency contracting end to end business tools for the warfighter, 5) developing enterprise mapping capabilities to streamline procure to pay exchanges in partnership with the Comptroller. Low risk adjustments were taken in shifting focus to automating simple contract closeout, and business intelligence capabilities and to mitigate fiscal reductions. Efficiency Reductions for PB16 were taken along with additional PB16 adjustments to a total of 2.205M from the original President's Budget.			
FY 2017 Plans: To achieve efficiencies and support audit readiness funding will support the following procurement capabilities development: 1) an end to end paperless reconciliation process for Government Furnished Property (GFP) 2) continue implementation of a fraud and misuse data mining detection capability for purchase cards in DoD, 3) strengthening existing vendor identification systems in DoD to combat counterfeiting and cyber intrusion, 4) implementing contingency contracting end to end business tools for the warfighter, 5) developing enterprise mapping capabilities to streamline procure to pay exchanges in partnership with the Comptroller.			
FY 2018 Plans:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605210D8Z / *Defense-Wide Electronic Procurement Capabilities*	**Project (Number/Name)** P*021 / *Defense-Wide Electronic Procurement Capabilities- Contingency*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
To achieve efficiencies and support audit readiness funding will support the following procurement capabilities development: 1) an end to end paperless reconciliation process for Government Furnished Property (GFP) 2) continue implementation of a fraud and misuse data mining detection capability for purchase cards in DoD, 3) strengthening existing vendor identification systems in DoD to combat counterfeiting and cyber intrusion, 4) implementing contingency contracting end to end business tools for the warfighter, 5) developing enterprise mapping capabilities to streamline procure to pay exchanges in partnership with the Comptroller (with an emphasis on contract closeout)			
Accomplishments/Planned Programs Subtotals	7.961	9.881	11.870

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

NA

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 5	R-1 Program Element (Number/Name) PE 0605210D8Z / *Defense-Wide Electronic Procurement Capabilities*	Project (Number/Name) P*021 / *Defense-Wide Electronic Procurement Capabilities- Contingency*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contract Business Systems Development	Various	DLA, JTIC, WPAFB : FORT BELVOIR, SCOTT AFB	49.597	7.455		9.260		10.964		-		10.964	-	-	-
		Subtotal	49.597	7.455		9.260		10.964		-		10.964	-	-	-

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Interoperability Testing	Various	DLA, JTIC, WPAFB : FORT BELVOIR, SCOTT AFB	1.630	0.506		0.621		0.906		-		0.906	-	-	-
		Subtotal	1.630	0.506		0.621		0.906		-		0.906	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	51.227	7.961		9.881		11.870		-		11.870	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605210D8Z / *Defense-Wide Electronic Procurement Capabilities*	**Project (Number/Name)** P*021 / *Defense-Wide Electronic Procurement Capabilities- Contingency*

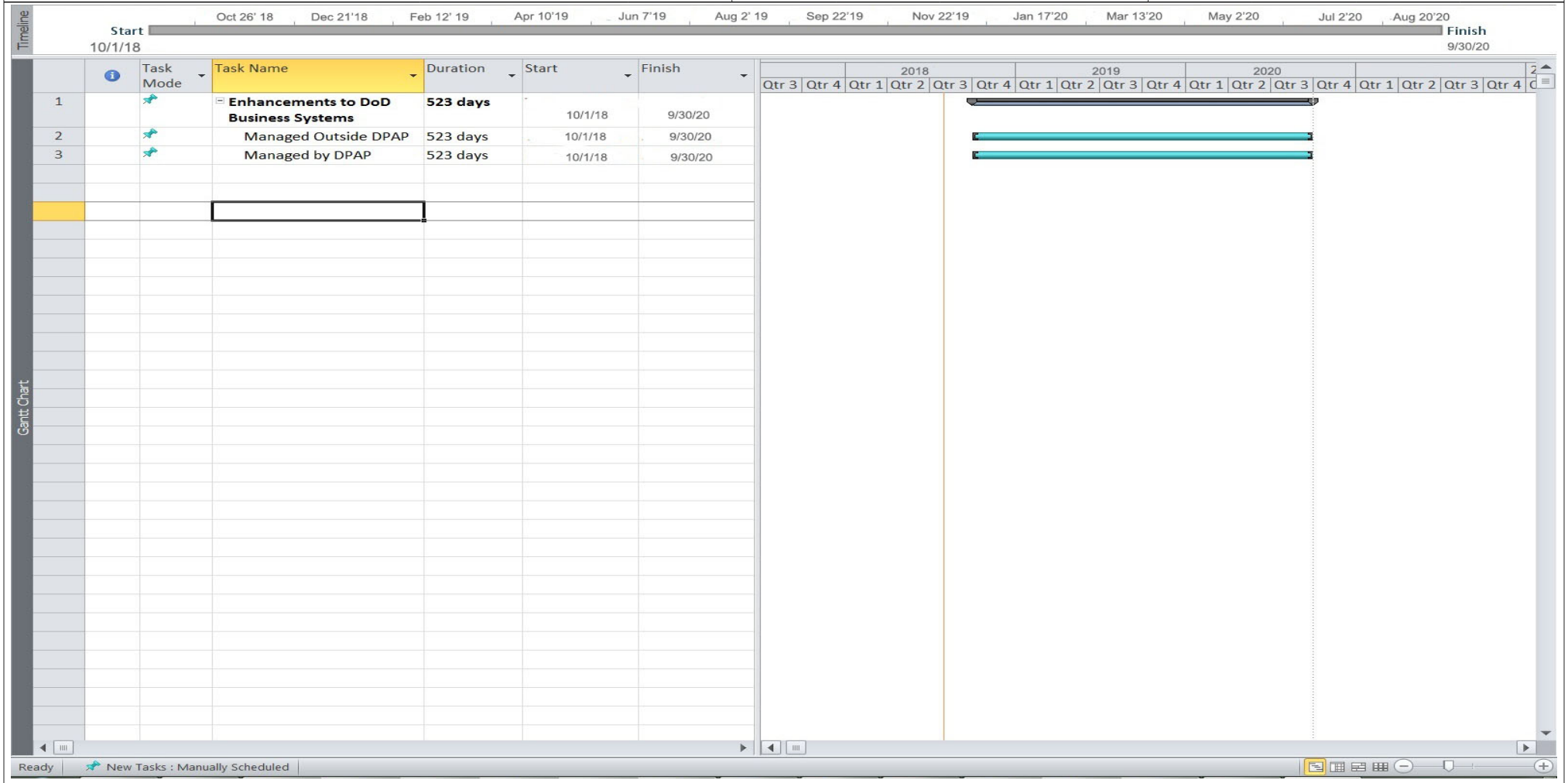

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605210D8Z / *Defense-Wide Electronic Procurement Capabilities*	**Project (Number/Name)** P*021 / *Defense-Wide Electronic Procurement Capabilities- Contingency*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
N/A				
Enhancements Managed outside of DPAP	1	2018	4	2020
Not Applicable				
Enhancements Managed by DPAP	1	2018	4	2020

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0605294D8Z / *Trusted and Assured Microelectronics*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	61.084	-	61.084	15.481	15.943	25.911	25.910	Continuing	Continuing
P812: *Trusted Mask Trust Approach*	-	0.000	0.000	2.000	-	2.000	2.000	2.000	2.000	2.000	Continuing	Continuing
P809: *New Trust Approach Demonstration*	-	0.000	0.000	59.084	-	59.084	13.481	13.943	23.911	23.910	Continuing	Continuing

A. Mission Description and Budget Item Justification

Baseline efforts for this Program Element (PE) were previously funded in PE 0605140D8Z BA 5 and have been transferred to this BA 5 PE to: (1) change the title from "Trusted Foundry" to "Trusted and Assured Microelectronics"; and (2) correctly align funding in support of the mission. Additional funds were added in FY 2018 to enable secure design environments with intellectual property (IP) for access to advanced node processes and field programmable gate array (FPGA) Assurance engagement and co-development with commercial vendors.

This PE supports activities to ensure critical and sensitive integrated circuits are available to meet the DoD's needs. It refines strategies and management planning activities that will (1) provide support to acquisition programs to address trusted microelectronics supply needs; (2) improve capability to evaluate and validate trust of microelectronic parts and advance standards to incentivize the commercial marketplace to recognize trust as a competitive design standard; and (3) develop and demonstrate alternative approaches to assuring the trust of the microelectronics supply chain in order to enable broader DoD access to commercial state-of-the-art (SOTA) microelectronics technology.

This activity will be coordinated by the Office of the Assistant Secretary of Defense for Research and Engineering, and will include performers from the DoD Components, the Defense Microelectronics Activity (DMEA), the Joint Federated Assurance Center (JFAC), the Defense Advanced Research Programs Agency (DARPA), other DoD and Intelligence Community science and technology (S&T) organizations and laboratories, defense industry, and the broader commercial industrial base. It will integrate the functions of the DoD Trusted Foundry Program, the Trusted Supplier accreditation program, JFAC, and related S&T activities.

This activity implements, maintains and updates the DoD's long-term microelectronics strategy. Recognizing that trusted and assured supply of microelectronics is a Government-wide concern, this activity will interface with interagency partners to take into account interagency requirements, opportunities for collaboration, and strategic decisions that can be made to limit the overall cost of these requirements to the government.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0605294D8Z / *Trusted and Assured Microelectronics*

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	61.084	-	61.084
Total Adjustments	0.000	0.000	61.084	-	61.084
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Funds transfer from PE 0605140D8Z	-	-	6.084	-	6.084
• Other	-	-	55.000	-	55.000

Change Summary Explanation

Beginning in FY 2018, funds transferred from Trusted Foundry BA 5 PE 0605140D8Z to allow more efficient execution of development and prototyping activities. An additional $55.000 million was added to support secure design environments with IP for access to advanced node processes and FPGA Assurance engagement and co-development with commercial vendors.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 5	R-1 Program Element (Number/Name) PE 0605294D8Z / *Trusted and Assured Microelectronics*	Project (Number/Name) P812 / *Trusted Mask Trust Approach*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P812: *Trusted Mask Trust Approach*	-	0.000	0.000	2.000	-	2.000	2.000	2.000	2.000	2.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project staffs and supports operation of a new secure (SECRET-level) photomask manufacturing capability down to 14 nanometers (nm) at an existing SOTA commercial photomask manufacturing supplier to secure the masks and design intellectual property (IP) of acquisition programs when using commercial microelectronic fabrication facilities other than the Trusted Foundry. This capability can be used in conjunction with one or more leading-edge commercial foundries. This capability will address trusted masks at technology node sizes < 130nm.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Trusted Mask Trust Approach	-	-	2.000
FY 2018 Plans: DMEA will continue management and technical support, as required, to procure secure mask data parsing services for the Department, as well as other Federal entities, by upgrading an existing SOTA commercial photomask manufacturing supplier with a Trusted photomask capability to ensure the integrity of the tape-in/mask release, mask manufacturing, and authentication process for photomasks. Over the FYDP, a SOTA commercial photomask manufacturing supplier will be equipped with a new secure (SECRET-level) photomask manufacturing capability ($7.200 million is planned as a FY 2017 Defense Production Act (DPA) Title III project) and staffed to provide the required critical Trusted photomask capabilities.			
Accomplishments/Planned Programs Subtotals	-	-	2.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance for this project is monitored in the following ways:

- Number of photomasks created using the secure photomask manufacturing capability.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** P812 / *Trusted Mask Trust Approach*

- Number of acquisition programs using the secure photomask manufacturing capability.
- Number of technology node sizes supported by the secure photomask manufacturing capability.
- Number of foundries supported by the secure photomask manufacturing capability.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 5	R-1 Program Element (Number/Name) PE 0605294D8Z / *Trusted and Assured Microelectronics*	Project (Number/Name) P809 / *New Trust Approach Demonstration*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P809: *New Trust Approach Demonstration*	-	0.000	0.000	59.084	-	59.084	13.481	13.943	23.911	23.910	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project funds a program of research to develop, and demonstrate the next generation, technology-driven approach to microelectronics trust and assurance, to include SOTA microelectronics, to ensure continued access to SOTA microelectronic technologies, while maintaining the required level of trust in all environments. DoD's ability to access commercial technology for its custom secure, trusted and assured needs is diminishing as SOTA suppliers become fewer and more focused on serving the global commercial market. DoD's technology needs are broad, and relying on a single source supplier is not feasible. Alternative, advanced manufacturing methods, technologies, and design tools are needed to produce secure, trusted and assured SOTA parts from commercial sources and to preserve access to these advanced nodes while protecting DoD and Defense Industrial Base IP from exploitation. It also is intended to dramatically improve the capabilities of the JFAC with regard to verification and validation of microelectronics trust and assurance.

This program of research will demonstrate innovative design, manufacturing, imaging, tagging, and control and assessment approaches for protecting DoD's microelectronics supply chain and intellectual property (IP), including alternatives for trusted, strategic radiation-hardened electronics in advanced technology nodes for next-generation strategic systems, obfuscation and disaggregation technologies, and other assurance mitigations. It will develop advanced imaging technologies and forensics, Design for Trust techniques, active hardware trust control, electronic component markers, and a data and analysis capability to enable auditing and independent verification and validation of commercial designs. It also demonstrates, and implements concepts for the cost-effective production of custom microelectronics in low volumes and protection of sensitive IP from exploitation.

Technologies that provide trust and assurance in a broad range of trusted and commercial environments can mitigate the risks associated with sole-source suppliers, and increase the Government's ability to leverage commercial capabilities. The suite of demonstrated technologies, e.g., alternative manufacturing methods and design tools, would enable DoD to obfuscate the purpose of sensitive devices, verify their origin and function, and protect sensitive IP from exploitation even while using the global supply chain for most hardware. In cases where the risk involved precludes that level of commercial collaboration, low-volume manufacturing technologies demonstrated under this project would permit DoD to more cheaply produce low volumes of sensitive microelectronics in trusted environments. The project would also support using a repository of third-party IP to expedite circuit design and transition promising technologies to use.

This project will also support the following: 1) secure design environments, including high-performance computation environments, for collaboration across the U.S. Government and with private innovators to jointly conduct research on areas such as secure verification of hardware; 2) electronic design automation (EDA) tools and cell libraries; 3) persistent expertise to engage with innovation teams and sponsors to develop business models, IP articles and licensing agreements, architectures, and standards that align with U.S. Government interests in assurance and security strategy; and 4) assured field programmable gate array (FPGA) development and product demonstration for commercial FPGAs.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** P809 / *New Trust Approach Demonstration*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: New Trust Approach Demonstration	-	-	59.084
FY 2018 Plans: FY 2018 primary activities will include demonstration of acquisition program pilots and technology demonstrations, followed by transition of these capabilities to new programs in the following fiscal years. FY18 activities will mature and evaluate trust technologies and techniques through efforts that may include the conduct of studies and Broad Agency Announcements (BAAs) and other efforts to coordinate research programs across government research and development (R&D) organizations, academia and industry. Assess and report technical progress. Will engage early on with potential stakeholders to identify potential transition issues and aid in transition through joint collaboration between research teams and stakeholders with a focus on evaluations of prototypes, test articles and beta versions of tools, intellectual property (IP), techniques, methods, etc. and their use in operationally-realistic scenarios.			
Accomplishments/Planned Programs Subtotals	-	-	59.084

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance for this project is monitored in the following ways:
- Effectiveness of developed technologies, as measured by:
o The speed and reliability of new validation and verification techniques in identifying known microelectronics issues (e.g. tampering) in laboratory and non-laboratory situations;
o Successful testing of advanced, alternative manufacturing techniques such as disaggregated manufacturing; and
o Resilience of microelectronics protected by new trust approach technologies in red teaming exercises.
- Adoption of next-generation trust technologies, as measured by:
o The number of DoD and other Government programs employing these trust technologies, design approaches, or best practices, possibly as facilitated by the provision of use models;
o The volume and criticality of components employing these technologies, design approaches, or best practices; and

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** P809 / *New Trust Approach Demonstration*

o Promulgation in DoD guidance and program protection plans.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** P809 / *New Trust Approach Demonstration*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
New Trust Approach Demonstration Program Support	MIPR	Various (DARPA, Air Force, Army, Navy, NSA) : Various	-	-		-		59.084	Mar 2018	-		59.084	Continuing	Continuing	-
		Subtotal	-	-		-		59.084		-		59.084	-	-	-

Remarks

NA

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		0.000		59.084		-		59.084	-	-	-

Remarks

N/A

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** P809 / *New Trust Approach Demonstration*

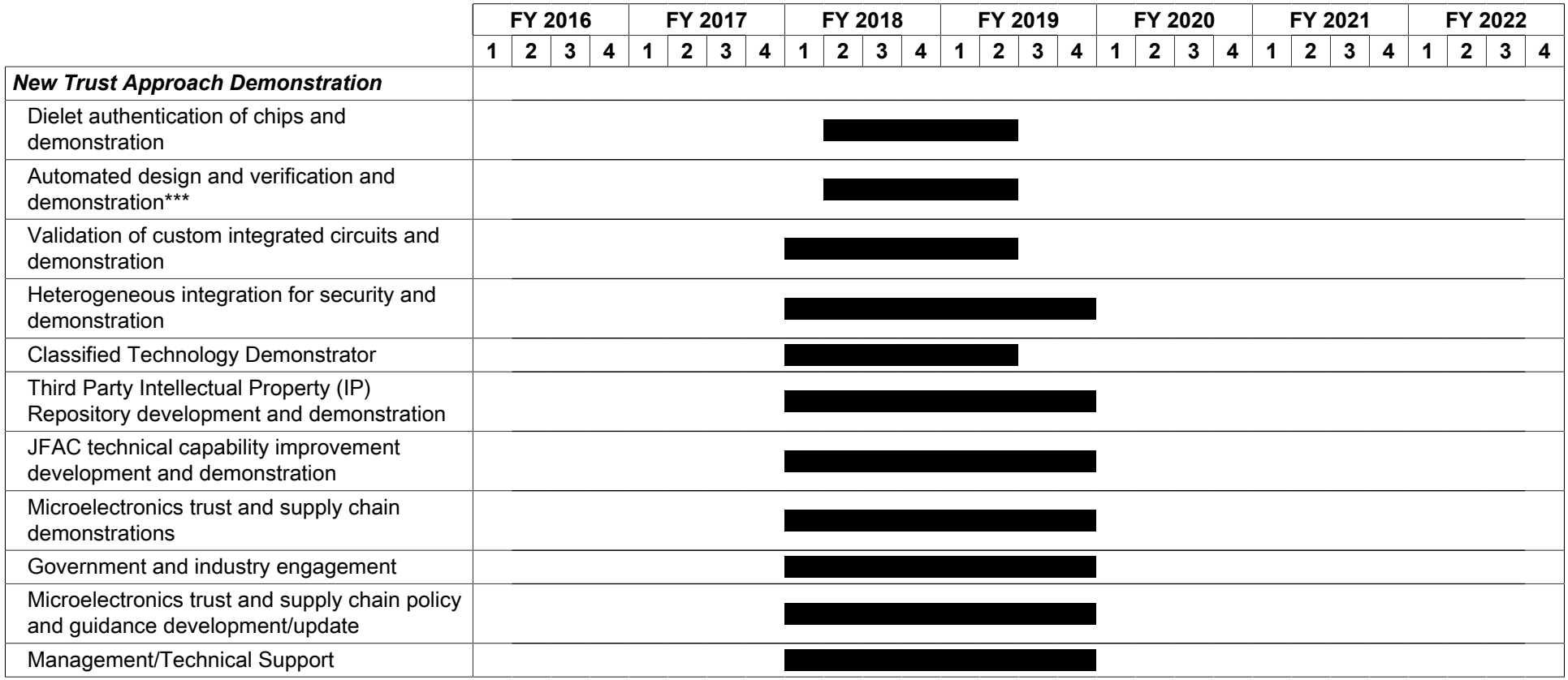

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** P809 / *New Trust Approach Demonstration*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
New Trust Approach Demonstration				
Dielet authentication of chips and demonstration	2	2018	2	2019
Automated design and verification and demonstration***	2	2018	2	2019
Validation of custom integrated circuits and demonstration	1	2018	2	2019
Heterogeneous integration for security and demonstration	1	2018	4	2019
Classified Technology Demonstrator	1	2018	2	2019
Third Party Intellectual Property (IP) Repository development and demonstration	1	2018	4	2019
JFAC technical capability improvement development and demonstration	1	2018	4	2019
Microelectronics trust and supply chain demonstrations	1	2018	4	2019
Government and industry engagement	1	2018	4	2019
Microelectronics trust and supply chain policy and guidance development/update	1	2018	4	2019
Management/Technical Support	1	2018	4	2019

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0305304D8Z / *DoD Enterprise Energy Information Management (EEIM)*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	10.196	4.289	2.703	3.669	-	3.669	3.584	3.372	3.443	3.516	Continuing	Continuing
304: *Enterprise Energy Information Management*	4.329	0.779	0.553	0.500	-	0.500	0.400	0.372	0.370	0.371	Continuing	Continuing
305: *Real Property Accountability*	5.867	2.570	1.404	2.192	0.000	2.192	2.210	2.030	2.108	2.175	Continuing	Continuing
306: *Cyber Security*	0.000	0.940	0.746	0.977	-	0.977	0.974	0.970	0.965	0.970	Continuing	Continuing

A. Mission Description and Budget Item Justification

PE 0305304D8Z was established in FY2013 and plays a pivotal role in the Department's ability to achieve audit readiness, enhance the Department's goal of energy efficiency, gain a full accountability of Real Property assets, as well as improve data quality and integration across the full spectrum of EI&E business functions. The PE helped conduct a full Business Process Re-engineering of the processes used to collect energy information, and publishing an EEIM data standard and a additional effort to build out data stores and portal requirements for Energy Conservation Investment Program (ECIP) management. Funding is also used to support ASD EI&E Senior Real Property Officer accountability requirements by supporting management and oversight of reconciliation efforts and auditability by determining requirements for the department's Real Property inventory records and asset management processes, business rules and associated data standards. A major component of this capability is an enterprise EI&E Data Analytics & Integration Support (DAIS) platform coupled with a independent verification & validation capability. With access to real time data through services WSDLS, reports generated through business intelligence provide immediate indicators driving improved and quicker decisions.

In 2015, it was determined that the current state of cyber security of energy-related (and other real property-related) control systems (such as the electronic/computer controls on heating, ventilation & air conditioning equipment) is deficient, and a $1,000,000 increase in FY2016 funding was allocated above the EEIM baseline to support a multi-year real property-related control systems cyber security initiative.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0305304D8Z / *DoD Enterprise Energy Information Management (EEIM)*

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	4.406	2.703	4.536	-	4.536
Current President's Budget	4.289	2.703	3.669	-	3.669
Total Adjustments	-0.117	0.000	-0.867	-	-0.867
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.117	-			
• Service Requirement Review Board (SRRB)	-	-	-0.025	-	-0.025
• Management Realignment	-	-	-0.817	-	-0.817
• DTIC Offset	-	-	-0.025	-	-0.025

Change Summary Explanation

SRRB - As part of the Department of Defense reform agenda, the incremental reduction accounts for consolidation and reduction of service contracts.

Management Realignment - Funding was realigned to O&M for critical statutory requirements.

Other adjustments are the results of departmental efficiencies reduction.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 5	R-1 Program Element (Number/Name) PE 0305304D8Z / *DoD Enterprise Energy Information Management (EEIM)*	Project (Number/Name) 304 / *Enterprise Energy Information Management*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
304: *Enterprise Energy Information Management*	4.329	0.779	0.553	0.500	-	0.500	0.400	0.372	0.370	0.371	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

A key part of DoD's strategy to meet its energy goals is to develop an energy information management environment that will enable the Services and OSD to track energy production and usage across the real property portfolio. Information on energy usage is critical for day-to-day management and accountability, troubleshooting building systems, and planning for capital investments. Integration with accurate Real property asset, Utilization, Military Construction, Environmental, and installation Geospatial data is equally key to ensuring these decisions for planning and reporting are possible. It also supports development of The geospatial portal for visualizing energy layers with other EI&E data on installation or area maps for improved spatial analysis. This portal is the DOD aggregated repository for DoD Common Installation Picture layers. Additionally, the map viewer is customized and easier for OSD senior staff to manipulate and includes an online catalog of maps, documents and data; and a secure, robust data exchange module. This development supports a range of Joint Staff and OSD customers.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Enterprise Energy Information Management	0.779	0.553	0.500
Description: Supports development of an enterprise energy data store and associated standard that will be integrated with other existing and future data stores and visualization capability for a fully integrated and spatially analytical perspective of EI&E mission area information. ***FY 2016 Accomplishments:*** Continued development and procurement of an enterprise-wide energy data warehouse that will be integrated with existing and future real property systems. Fielded a new web-user interface for Defense Installation Spatial Data Infrastructure (DISDI) Portal, including a catalog/library of available policy & guidance documents as well as finished maps suitable for trip books, Congressional interactions, OSD-level planning, etc. ***FY 2017 Plans:*** Continue work on Energy Conservation Investment Program Data Store and related business intelligence. Field new map viewer tailored for OSD staff users with a simpler, modern interface and customized map data packages and pre-configured queries of real property asset location data. Begin development of automated data discovery catalog (Voyager). ***FY 2018 Plans:*** Support Business Process Re-Engineering effort to update Enterprise Energy Information Model and related Business Enterprise Architecture. Include updates in energy data store integrated into EI&E Data Analytics & Integration Support warehouse. Complete initial development of automated data discovery catalog in Defense Installation Spatial Data Infrastructure (DISDI)			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0305304D8Z / *DoD Enterprise Energy Information Management (EEIM)*	**Project (Number/Name)** 304 / *Enterprise Energy Information Management*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Portal. This is including data tagging and curation of the current DISDI Portal database and contents. Begin customization of the data catalog based on initial user feedback and complete initial development of data exchange module to connect DISDI Portal to the DoD Components live databases for IGI&S.			
Accomplishments/Planned Programs Subtotals	0.779	0.553	0.500

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 5	R-1 Program Element (Number/Name) PE 0305304D8Z / *DoD Enterprise Energy Information Management (EEIM)*	Project (Number/Name) 305 / *Real Property Accountability*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
305: *Real Property Accountability*	5.867	2.570	1.404	2.192	0.000	2.192	2.210	2.030	2.108	2.175	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Real Property Inventory fulfills requirements of Executive Order for DoD to achieve and maintain real property accountability. This is critical both from audit readiness and program management perspectives. This funding provides the department independent verification and validation needed to reconcile errors to gain the data quality and interoperability needed for decisionable data and processes throughout the lifecycle of real property assets. Oversight and configuration management of business rules and standards are used to determine requirements for the departments Real Property inventory records and proper end to end process steps throughout the lifecycle of an asset from purchase to disposal. This includes development and procurement of the enterprise data warehouse for integrating existing and future EI&E systems and database needs. The Real Property Unique Identifier (RPUID) process has also been included in this EI&E enterprise system.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Real Property Accountability	2.570	1.404	2.192
Description: The ASD EI&E is the Senior Real Property Officer for the DoD. In this role they are responsible for the accountability and utilization of all DoD Real Property Assets. This funding provides the department a enterprise data warehouse coupled with a independent verification & validation capability. The DoD Real Property Accountability efforts are mandated by Executive Order and Public Law for improved reporting and utilization of federal real property and verifiable decisionable data is needed for future BRAC deliberations.			
FY 2016 Accomplishments: Real Property Information Model 8.1 was published and implemented across DoD. The EI&E enterprise Data Analytics & Integration Support continued (DAIS) platform development with Military Construction and Energy Conservation Investment Program (ECIP) data Stores.			
FY 2017 Plans: Continued reconciliation efforts and determining requirements for the department's Real Property inventory records and asset mgt processes & data requirements. Auditability support focused on existence and completeness of required documents throughout the lifecycle. Continued development of DAIS and additional EI&E data stores. Gained accesses to real time data through services WSDLS.			
FY 2018 Plans: Continue reconciliation and auditability efforts by determining requirements for the department's Real Property inventory records and asset			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0305304D8Z / *DoD Enterprise Energy Information Management (EEIM)*	**Project (Number/Name)** 305 / *Real Property Accountability*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
accountability and management processes, business rules and associated data. Continue DAIS implementation with WSDL maturity and improved data quality and integration in preparation for BRAC and other upcoming analysis and decisions.			
Accomplishments/Planned Programs Subtotals	2.570	1.404	2.192

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 5	R-1 Program Element (Number/Name) PE 0305304D8Z / *DoD Enterprise Energy Information Management (EEIM)*	Project (Number/Name) 306 / *Cyber Security*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
306: *Cyber Security*	0.000	0.940	0.746	0.977	-	0.977	0.974	0.970	0.965	0.970	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The current state of cyber security of energy-related (and other real property-related) control systems (such as the electronic/computer controls on heating, ventilation & air conditioning equipment) is deficient, and the adjusted EEIM baseline supports a multi-year real property-related control systems cyber security initiative to address these issues.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Cyber Security	0.940	0.746	0.977
Description: The current state of cyber security of energy-related (and other real property-related) control systems (such as the electronic/computer controls on heating, ventilation & air conditioning equipment) is deficient. This effort supports a multi-year real property-related control systems cyber security initiative to address these issues. So far it has generated an updated DoD CIO RMF Knowledge Service Portal with controls systems cyber security implementation guidance for practitioners (templates, key references, step-by-step instructions, look-up tables, etc.) Controls systems cyber security Tactics, Techniques and Procedures (TTPS) has transitioned from Joint Base Architecture for Secure Industrial Control Systems (J-BASICS). The department has begun to implement Platform Resilience Mission Assurance (PRMA) assessments across 10 installations.			
FY 2016 Accomplishments: Initiated real property-related controls cyber security systems risk assessment through MIT labs. Included development of procedural guides for future training and use by installation staff for conducting their own assessments.			
FY 2017 Plans: Began to implement Platform Resilience Mission Assurance (PRMA) assessments across 10 installations. Also supported specific risk assessments at selected port facilities.			
FY 2018 Plans: Continue to support multiyear real property-related controls systems cyber security risk assessments and development of guidelines and training manuals for future in house procedures. Also supports joint initiative with DOE this year.			
Accomplishments/Planned Programs Subtotals	0.940	0.746	0.977

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0305304D8Z / *DoD Enterprise Energy Information Management (EEIM)*	**Project (Number/Name)** 306 / *Cyber Security*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0305310D8Z / *Countering Weapons of Mass Destruction (CWMD) Systems: System Development and Demonstration (SDD)*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	8.230	-	8.230	15.566	9.468	0.000	0.000	Continuing	Continuing
1: *P*813 / System Development and Demonstration (SDD)*	-	0.000	0.000	8.230	-	8.230	15.566	9.468	0.000	0.000	Continuing	Continuing

Note

FY2018 increase reallocated from PE 0303310D8Z to support transition of technologies from Advanced Technology Development to System Development and Demonstration phase in support of acquisition programs of record and/or fielded systems.

A. Mission Description and Budget Item Justification

The Countering Weapons of Mass Destruction (CWMD) Systems program provides funding for research, development, integration, and deployment of CWMD capabilities. Funding is allocated to a portfolio of projects and activities in response to Combatant Command needs and research initiatives.

A focal point of this program is development of CWMD situational awareness capabilities. The Joint Requirements Oversight Council approved the Information Systems Initial Capabilities Document for CWMD Situational Awareness on 23 December 2015, which identifies the need for a family of systems to mitigate capability gaps identified by the Combatant Commands. U.S. Special Operations Command, which assumed CWMD mission responsibilities in January 2017 per the Unified Command Plan, is providing focus and direction for development of CWMD situational awareness capabilities. Gaining situational awareness of weapons of mass destruction (WMD) threats and risks, as well as U.S. and international efforts to counter WMD proliferation, requires expertise and information access. Relevant information is spread across disconnected systems, on multiple networks, and in the open source domain, making it difficult to discover and use information to support mission needs. WMD-related situations in recent years, including the removal of chemical weapons from Syria and the response to the West African Ebola outbreak, have demonstrated the need for Combatant Commands to access and share CWMD information, collaborate on planning and operations, and have a common understanding of the operational environment with mission partners. CWMD Systems is addressing existing gaps and deficiencies through a portfolio of investments.

The CWMD Systems program provides funding for two technology-enabled fusion cells at the Defense Threat Reduction Agency (DTRA) and the Defense Intelligence Agency (DIA), which utilize information systems and applications to enable CWMD situational awareness. Existing DoD information systems, networks, and applications are utilized and/or modified using CWMD Systems funding. Development of new applications reuses software to the extent possible. The DTRA and DIA cells curate, synthesize, and contextualize CWMD information for end-users. This hybrid approach facilitates cross-organizational information sharing and collaboration, necessary for addressing the transregional character of WMD proliferation.

The CWMD Systems program utilizes four Research, Development, Test & Evaluation (RDT&E) program elements (BA-3 / PE#0303310D8Z, BA-5 / PE#0305310D8Z, BA-6 / PE#0306310D8Z, and BA-7 / PE#0607310D8Z), as well as an Operations and Maintenance (O&M) "CWMD Sustainment" line (ORC-2531).

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0305310D8Z *I Countering Weapons of Mass Destruction (CWMD) Systems: System Development and Demonstration (SDD)*

This Program Element (PE) funds engineering and manufacturing development of CWMD situational awareness information systems and software applications, including system development and demonstration, and initial operational test and evaluation. The purpose is to develop, build, and test systems, verify that all operational and derived requirements have been met, and support product development decisions.

This appropriation funds travel to support the requirements of this program, and work (including manpower) performed by a government agency or by private individuals or organizations under a contractual or grant arrangement with the government who conduct research, development and test and evaluation efforts.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	8.230	-	8.230
Total Adjustments	0.000	0.000	8.230	-	8.230
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Funding Realigned from PE 0303310D8Z	-	-	8.287	-	8.287
• DTIC Offset	-	-	-0.057	-	-0.057

Change Summary Explanation

FY2018 increase reallocated from PE 0303310D8Z to support transition of technologies to acquisition programs of record and/or fielded systems.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0305310D8Z / *Countering Weapons of Mass Destruction (CWMD) Systems: System Development and Demonstration (SDD)*	**Project (Number/Name)** 1 / *P*813 / System Development and Demonstration (SDD)*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
1: *P*813 / System Development and Demonstration (SDD)*	-	0.000	0.000	8.230	-	8.230	15.566	9.468	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

FY2018 increase reallocated from PE 0303310D8Z to support transition of technologies from Advanced Technology Development to System Development and Demonstration phase in support of acquisition programs of record and/or fielded systems.

A. Mission Description and Budget Item Justification

The Countering Weapons of Mass Destruction (CWMD) Systems program provides funding for research, development, integration, and deployment of CWMD capabilities. Funding is allocated to a portfolio of projects and activities in response to Combatant Command needs and research initiatives.

A focal point of this program is development of CWMD situational awareness capabilities. The Joint Requirements Oversight Council approved the Information Systems Initial Capabilities Document for CWMD Situational Awareness on 23 December 2015, which identifies the need for a family of systems to mitigate capability gaps identified by the Combatant Commands. U.S. Special Operations Command, which assumed CWMD mission responsibilities in January 2017 per the Unified Command Plan, is providing focus and direction for development of CWMD situational awareness capabilities. Gaining situational awareness of weapons of mass destruction (WMD) threats and risks, as well as U.S. and international efforts to counter WMD proliferation, requires expertise and information access. Relevant information is spread across disconnected systems, on multiple networks, and in the open source domain, making it difficult to discover and use information to support mission needs. WMD-related situations in recent years, including the removal of chemical weapons from Syria and the response to the West African Ebola outbreak, have demonstrated the need for Combatant Commands to access and share CWMD information, collaborate on planning and operations, and have a common understanding of the operational environment with mission partners. CWMD Systems is addressing existing gaps and deficiencies through a portfolio of investments.

The CWMD Systems program provides funding for two technology-enabled fusion cells at the Defense Threat Reduction Agency (DTRA) and the Defense Intelligence Agency (DIA), which utilize information systems and applications to enable CWMD situational awareness. Existing DoD information systems, networks, and applications are utilized and/or modified using CWMD Systems funding. Development of new applications reuses software to the extent possible. The DTRA and DIA cells curate, synthesize, and contextualize CWMD information for end-users. This hybrid approach facilitates cross-organizational information sharing and collaboration, necessary for addressing the transregional character of WMD proliferation.

The CWMD Systems program utilizes four Research, Development, Test & Evaluation (RDT&E) program elements (BA-3 / PE#0303310D8Z, BA-5 / PE#0305310D8Z, BA-6 / PE#0306310D8Z, and BA-7 / PE#0607310D8Z), as well as an Operations and Maintenance (O&M) "CWMD Sustainment" line (ORC-2531).

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0305310D8Z / *Countering Weapons of Mass Destruction (CWMD) Systems: System Development and Demonstration (SDD)*	**Project (Number/Name)** 1 / *P*813 / System Development and Demonstration (SDD)*

This Program Element (PE) funds engineering and manufacturing development of CWMD situational awareness information systems and software applications, including system development and demonstration, and initial operational test and evaluation. The purpose is to develop, build, and test systems, verify that all operational and derived requirements have been met, and support product development decisions.

This project funds travel to support the requirements of this program, and work (including manpower) performed by a government agency or by private individuals or organizations under a contractual or grant arrangement with the government who conduct research, development and test and evaluation efforts.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: P*001 / System Development and Demonstration (SDD)	0.000	0.000	8.230
Description: • Perform engineering and manufacturing development of CWMD Situational Awareness information systems and components • Perform system development and demonstration, and initial operational test and evaluation • Provide support to program management office on product development decisions ***FY 2016 Accomplishments:*** None ***FY 2017 Plans:*** None ***FY 2018 Plans:*** • Perform engineering and manufacturing development of CWMD Situational Awareness information systems and components • Perform system development and demonstration, and initial operational test and evaluation • Provide support to program management office on product development decisions			
Accomplishments/Planned Programs Subtotals	0.000	0.000	8.230

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Utilize or reuse information technologies to field initial capabilities to end-users. As technologies mature and user needs are refined, systems or applications may transition to acquisition program(s) or be sustained separately. Integration of or interoperability among systems is also an acquisition pathway.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0305310D8Z / *Countering Weapons of Mass Destruction (CWMD) Systems: System Development and Demonstration (SDD)*	**Project (Number/Name)** 1 / *P*813 / System Development and Demonstration (SDD)*

E. Performance Metrics

Success in this area is measured by compliance with various statutes and DoD directives that govern the conduct of the affairs within the Office of the Assistant Secretary of Defense for Nuclear, Chemical and Biological Defense Programs (OASD/NCB). Maintain cost, schedule, and performance reporting, review, and adjudication. Maintain requirements traceability matrix.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0604774D8Z / *Defense Readiness Reporting System (DRRS)*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	24.371	5.571	4.678	6.941	-	6.941	6.708	6.264	6.385	6.425	Continuing	Continuing
774: *Defense Readiness Reporting System (DRRS)*	24.371	5.571	4.678	6.941	-	6.941	6.708	6.264	6.385	6.425	Continuing	Continuing

A. Mission Description and Budget Item Justification

This funding supports the Defense Readiness Reporting System, (DRRS,) the comprehensive readiness reporting system for the Department of Defense mandated under Title 10 U.S. Code. The system measures in an objective, accurate, and timely manner the capability of the armed forces to carry out the National Security Strategy prescribed by the President, as well as the defense planning guidance provided by the Secretary of Defense and the National Military Strategy prescribed by the Chairman of the Joint Chiefs of Staff. DRRS hosts information and applications used to support the Geographic and Functional Combatant Commanders, the Services, Combat Support Agencies, the Joint Staff and the Office of the Secretary of Defense.

The transformation of readiness reporting into a new, more comprehensive system under DRRS, presents a number of significant challenges. Included in these challenges is the expansion in scope of the entities who can, and do report readiness, as well as what they report. Shifting from solely resource centric readiness reporting to a mission/capabilities based reporting system oriented towards the National Military Strategy (NMS) makes substantially more complex demands on readiness reporting, but portrays a far more relevant and holistic picture of readiness. DRRS allows the Department to assess readiness globally based on our integrated ability to project and sustain a mix of constructed forces in simultaneous engagements. Additionally, the challenges associated with sourcing and evaluating the readiness of our forces engaged in on-going real operations mean that force managers need applications that will query the entire Department for suitable, available organizations to meet current needs. The need for these applications and the underlying data are a top priority for the DRRS project.

The realization of DRRS requires integrating a host of key technologies in order to achieve an information system that supports distributed, collaborative, and dynamic readiness reporting in addition to continuous tool-based assessment. The holistic perspective of the application necessitates its need to operate in multiple domains. Additionally, the highly complex data structures and visualization tools needed to support the Global Force Management - Data Initiative and critical down-stream consumers of readiness information, must now be implemented within DRRS.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0604774D8Z / *Defense Readiness Reporting System (DRRS)*

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	5.571	4.678	7.135	-	7.135
Current President's Budget	5.571	4.678	6.941	-	6.941
Total Adjustments	0.000	0.000	-0.194	-	-0.194
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Other Adjustments	-	-	-0.194	-	-0.194

Change Summary Explanation

Service Requirement Review Board - As part of the Department of Defense reform agenda, the incremental reduction accounts for consolidation and reduction of service contracts.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0604774D8Z / *Defense Readiness Reporting System (DRRS)*	Project (Number/Name) 774 / *Defense Readiness Reporting System (DRRS)*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
774: *Defense Readiness Reporting System (DRRS)*	24.371	5.571	4.678	6.941	-	6.941	6.708	6.264	6.385	6.425	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This funding supports Defense Planning Guidance (DPG) directing the Department of Defense (DoD) components to develop guidelines and procedures for a comprehensive readiness reporting system that evaluates readiness on the basis of the actual missions and capabilities assigned to the forces. The Defense Readiness Reporting System (DRRS) establishes a capabilities-based, adaptive, near real-time readiness information system for the DoD. This system is being designed to measure the readiness of military forces and supporting infrastructure to meet missions and goals assigned by the Secretary of Defense. DRRS hosts information and applications used to support the Geographic and Functional Combatant Commanders, the Services, Combat Support Agencies, the Joint Staff and the Office of the Secretary of Defense.

DRRS expands the scope of readiness reporting within the Department to create a more comprehensive assessment of the total force and its capability to perform the tasks and missions required of it to support the National Military Strategy. DRRS allows the Department to assess readiness globally based on our integrated ability to project and sustain a mix of constructed forces in simultaneous engagements. The program is the keystone for the readiness enterprise and architected to embrace the implementation of the Global Force Management - Data Imitative (GFM-DI), allowing for the Department's efforts in the realm of Adaptive Planning and Execution to be fully supported.

The realization of DRRS requires integrating a host of key technologies in order to achieve an information system that supports distributed, collaborative, and dynamic readiness reporting in addition to continuous tool-based assessment. The primary technical goal is the creation of a highly reliable and securely integrated readiness data environment to leverage and extend current readiness information systems. This system is based on intelligent agents, dynamic databases, semantic middleware, and publish/subscribe concepts; providing a logically uniform view into the multiple databases and information sources that feed DRRS. Through this type of advanced information environment, the DRRS dramatically expands the range of readiness information available to manage the force. This environment supports a suite of analysis tools that allow users to explore the consequences of readiness deficiencies in terms of the ability to generate forces and assess transportation feasibility as it pertains to specific scenarios. These tools and tool suites harness the power of the information environment to make possible the kind of quick-turnaround, excursion-driven readiness assessment that is at the heart of DRRS.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: 774 Defense Readiness Reporting System	5.571	4.678	6.941
Description: DRRS is the primary means by which Defense components (Combatant Commands, Services, Agencies and their subordinate elements and units) report their readiness. The system measures readiness of the Department's components to execute the full range of missions assigned by the Secretary of Defense.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0604774D8Z / *Defense Readiness Reporting System (DRRS)*	**Project (Number/Name)** 774 / *Defense Readiness Reporting System (DRRS)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018

The Defense Readiness Reporting System (DRRS) establishes a capabilities-based, adaptive, near real-time readiness information system for DoD. DRRS measures the readiness of military forces and supporting infrastructure to meet missions and goals assigned by the Secretary of Defense. The realization of DRRS required integrating a host of key technologies to achieve an information system that supports distributed, collaborative, and dynamic readiness reporting in addition to continuous tool-based assessment. The primary technical goal was the creation of a highly reliable and securely integrated readiness data environment to leverage and extend current readiness information systems. DRRS contains readiness metrics and supporting data for forces and support organizations.

FY 2016 Accomplishments:

• Continued Software lifecycle support and assistance to assist the Services, CCDRs and Combat Support Agencies fully integrating DRRS
• Continued refinement of data architecture
• Continued full integration of GFM DI within DRRS
• Supported the integration of JPES and integration with APEX
• Continued data quality improvement
• Continued data latency improvement with the use of Dashboards and continued the development and integration with Interagency readiness and preparedness systems outside DoD.
• Completed Joint Interoperability testing through the Joint Interoperability Test Command (JITC)
• Completed work required to support the readiness enterprise transition to DRRS as the source for SORTS data and retire legacy readiness system (GSORTS)

FY 2017 Plans:

• Continue refinement of data architecture
• Continue development and refinement of the Air Force Input Tool
• Continue full integration of GFM DI within DRRS
• Support the integration of JPES and integration with APEX
• Data quality improvement and latency improvement
• Commence replacement of vulnerable & legacy software components for required cyber security
• Continue development and integration with Interagency readiness and preparedness systems outside DoD.

FY 2018 Plans:

• Optimize system implementation within the Defense Enterprise Computation Center environment to include development of functionality need to replace Enterprise Messaging
• Continue full integration of GFM DI within DRRS

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0604774D8Z / *Defense Readiness Reporting System (DRRS)*	**Project (Number/Name)** 774 / *Defense Readiness Reporting System (DRRS)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Continue replacement of vulnerable & legacy software components • Implement functionality to support the needs of the Adaptive Planning and Execution initiatives.			
Accomplishments/Planned Programs Subtotals	5.571	4.678	6.941

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

• Readiness Transformation - Accurate and timely Mission Readiness Assessment and Reporting
• Capability Readiness Reporting and Assessment - Operational commonality of mission based capability readiness reporting and assessment
• DRRS Operational Performance - Single integrated Readiness system capability for the Department
• Achieving Reliable Data Architecture and Interoperability - Seamless integration with the departments readiness architecture and compatible with emerging adaptive planning systems
• Transition to one readiness reporting system for DoD.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0604875D8Z / *Joint Systems Architecture Development*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	13.147	3.007	4.499	4.851	-	4.851	5.213	5.270	5.372	5.484	Continuing	Continuing
P875: *Portfolio Systems Acquisition (PSA)*	13.147	2.809	3.166	3.451	-	3.451	3.813	3.870	3.972	4.084	Continuing	Continuing
P220: *Electronic Warfare Executive Committee*	0.000	0.198	1.333	1.400	-	1.400	1.400	1.400	1.400	1.400	Continuing	Continuing

A. Mission Description and Budget Item Justification

Department and acquisition reform initiatives call for top down, national security strategy-driven capabilities-based planning. Department of Defense (DoD) Instruction 5000.02 and Chairman of the Joint Chiefs of Staff Instruction 3170.01 promulgate capabilities-based requirements and acquisition processes. The JSAD program enables collaborative efforts to achieve these goals with a focus on Major Defense Acquisition Programs (MDAPs). These efforts include warfighting capability-based analyses; assessments of joint capability areas and joint integrating concepts; development of system-related data; integrated roadmaps to support acquisition investment decisions; and assessments of MDAPs in a capability area context. Activities in the JSAD project are divided into three areas: (1) capability-based analysis; (2) roadmaps; and (3) support tools and guidance. Capability-based analysis provides analysis of the different technology, functionality, and integration impacts of systems on warfighting capability. Acquisition roadmaps guide systems development and associated investment plans. JSAD support tools and guidance initiatives develop systems data, and tools, exploit modeling and simulation and architecture efforts to improve DoD's overall assessment capability. These efforts guide the development and improve the testing and fielding of integrated systems of systems in order to achieve Joint mission capabilities. The Department has also undergone an institutional reorientation or shift in emphasis from organization-specific to enterprise-wide approaches. This means: (1) horizontal integration within the Department and unity of effort through greater interagency collaboration; (2) engaging in a coordinated and portfolio-based approach to planning, programming, budgeting and execution; and (3) significant reforms at the governance, management and execution levels. To accomplish this direction, there needs to be a focused goal and concerted emphasis on shifting from systems acquisition to capabilities-based portfolio management (or portfolio systems acquisition). This program enables collaborative efforts to implement the QDR direction outlined above in order to achieve portfolio systems acquisition goals. The program is broken up into two focus areas (Portfolio Management and Reform Initiatives).

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0604875D8Z *I Joint Systems Architecture Development*

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	3.076	4.499	5.080	-	5.080
Current President's Budget	3.007	4.499	4.851	-	4.851
Total Adjustments	-0.069	0.000	-0.229	-	-0.229
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.069	-			
• SRRB Reductions/Management Realignment	-	-	-0.196	-	-0.196
• DTIC Offset Bill	-	-	-0.033	-	-0.033

Change Summary Explanation

Service Requirement Review Board - As part of the Department of Defense reform agenda, the incremental reduction accounts for consolidation and reduction of service contracts.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0604875D8Z / *Joint Systems Architecture Development*	Project (Number/Name) P875 / *Portfolio Systems Acquisition (PSA)*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P875: *Portfolio Systems Acquisition (PSA)*	13.147	2.809	3.166	3.451	-	3.451	3.813	3.870	3.972	4.084	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Departments 2005 Quadrennial Defense Review (QDR) laid out the need for an institutional reorientation or shift in emphasis from organization-specific to enterprise-wide approaches. This meant: (1) horizontal integration within the Department and unity of effort through greater interagency collaboration; (2) engaging in a coordinated and portfolio-based approach to planning, programming, budgeting and execution; and (3) significant reforms at the governance, management and execution levels. The Department's 2010 QDR report further addressed reforming how we buy, noting that the conventional acquisition process is too long and too cumbersome to fit the needs of the many systems that require continuous changes and upgrades - a challenge that will become only more pressing over time. Better Buying Power (BBP) is the implementation of best practices to strengthen the Defense Department's buying power, improve industry productivity, and provide an affordable, value-added military capability to the Warfighter. Launched in 2010, BBP encompasses a set of fundamental acquisition principles to achieve greater efficiencies through affordability, cost control, elimination of unproductive processes and bureaucracy, and promotion of competition. BBP initiatives also incentivize productivity and innovation in industry and Government, and improve tradecraft in the acquisition of services. The Department will improve how it matches requirements with mature technologies, maintains disciplined systems engineering approaches. To accomplish this direction, there needed to be a focused goal and concerted emphasis on shifting from acquisition of individual systems to portfolio management (or portfolio systems acquisition). This program enables collaborative efforts to implement the QDR direction outlined above and advance BBP initiatives to achieve portfolio systems acquisition goals and to develop and implement acquisition reform initiatives.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Portfolio Systems Acquisition (PSA)	2.809	3.166	3.451
Description: The program is broken up into two focus areas (Portfolio Management and Reform Initiatives) and consolidates work previously performed under various other Program Elements.			
FY 2016 Accomplishments: -Continued and expanded support Mission Area Portfolio Assessments and warfare areas to identify portfolio and program synergies, reduce duplication, and identify opportunities for cost savings. -Conducted additional analyses and supported implementation of updated Better Buying Power (BBP) initiatives. -Provided technical expertise in support of warfare area portfolios including Tactical Air (TACAIR), unmanned systems, electronic warfare, and land warfare and munitions. -Assessed progress of program management initiatives and continued support to a variety of certification and qualification standards activities.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0604875D8Z / *Joint Systems Architecture Development*	**Project (Number/Name)** P875 / *Portfolio Systems Acquisition (PSA)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
-Continued "reliability by design" analyses and support to programs. --Continued radar systems study of G/ATOR and 3DELRR reliability to reduce O&S cost. --Studied requirements generation process to develop criteria to help ensure requirements are based on sound physics and to understand correct entry points for OSD; goal is reduced test costs and better milestone readiness. --Continued support to programs/initiate new analyses. -Updated roadmaps and where appropriate generated new roadmaps to guide investments in critical areas (e.g., future vertical lift and Integrated Air and Missile Defense (IAMD). -Continued analytical support for the IAMD portfolio. -Provided analysis and support to the Homeland Defense Coordinator and DoD-DHS Capability Development Working Group (CDWG) Executive Secretary functions within OUSD(AT&L). ***FY 2017 Plans:*** -Continue and expand support Mission Area Portfolio Assessments and warfare areas to identify portfolio and program synergies, reduce duplication, and identify opportunities for cost savings. -Conduct additional analyses and support implementation of updated Better Buying Power (BBP) initiatives. -Provide technical expertise in support of warfare area portfolios. -Assess progress of program management initiatives and continue support to a variety of certification and qualification standards activities. -Continue "reliability by design" analyses and support to programs. -Develop DoD courses of action and views on homeland defense implementation and compliance issues in multiple bilateral and multilateral fora. -Provide analytical support to the Homeland Defense Coordinator function within OUSD(AT&L). -Update roadmaps and where appropriate generate new roadmaps to guide investments in critical areas (e.g., future vertical lift, weapons and Integrated Air and Missile Defense (IAMD). -Continue analytical support for the IAMD portfolio. -Provide analysis and support to the Homeland Defense Coordinator and DoD-DHS Capability Development Working Group (CDWG) Executive Secretary functions within OUSD(AT&L). ***FY 2018 Plans:*** -Continue and expand support Mission Area Portfolio Assessments and warfare areas to identify portfolio and program synergies, reduce duplication, and identify opportunities for cost savings. -Conduct additional analyses and support implementation of updated Better Buying Power (BBP) initiatives. -Provide technical expertise in support of warfare area portfolios. -Assess progress of program management initiatives and continue support to a variety of certification and qualification standards activities.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0604875D8Z / *Joint Systems Architecture Development*	**Project (Number/Name)** P875 / *Portfolio Systems Acquisition (PSA)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
-Continue "reliability by design" analyses and support to programs. -Develop DoD courses of action and views on homeland defense implementation and compliance issues in multiple bilateral and multilateral fora. -Provide analytical support to the Homeland Defense Coordinator function within OUSD(AT&L). -Update roadmaps and where appropriate generate new roadmaps to guide investments in critical areas (e.g., future vertical lift, weapons and Integrated Air and Missile Defense (IAMD). -Continue analytical support for the IAMD portfolio. -Provide analysis and support to the Homeland Defense Coordinator and DoD-DHS Capability Development Working Group (CDWG) Executive Secretary functions within OUSD(AT&L).			
Accomplishments/Planned Programs Subtotals	2.809	3.166	3.451

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Not Applicable

E. Performance Metrics

Not Applicable

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0604875D8Z / *Joint Systems Architecture Development*	Project (Number/Name) P220 / *Electronic Warfare Executive Committee*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P220: *Electronic Warfare Executive Committee*	0.000	0.198	1.333	1.400	-	1.400	1.400	1.400	1.400	1.400	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Electronic Warfare (EW) Executive Committee (EXCOM) - co-chaired by the Under Secretary of Defense for Acquisition, Technology and Logistics and the Vice Chairman of the Joint Chiefs of Staff - is tasked to provide senior oversight, coordination, budget/capability harmonization, and advice on EW matters to the Secretary of Defense, Deputy Secretary of Defense, and the Deputy's Management Action Group. This program develops, maintains, and implements the overarching DoD EW Strategy and Implementation Plan to achieve Electromagnetic Spectrum (EMS) superiority. This program provides technical analyses, technology assessments, capability and capability gap identification, intelligence and threat evaluations to inform DoD EW requirements, acquisition programs, and investment decisions. This program also advances EW needs in modeling, simulation, test, exercises, experimentation, and training.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Electronic Warfare Executive Committee	0.198	1.333	1.400
Description: Funds are to conduct analytic assessments, threat-projective red-teaming, and physics-based modeling of electronic warfare capabilities to support the Deputy Secretary of Defense-directed Electronic Warfare (EW) Executive Committee (EXCOM).			
FY 2016 Accomplishments: - Developed overarching DoD EW Strategy. Analyzed existing DoD EMS management capabilities and identified promising technologies and coordinated solutions to improve EMS management capabilities. - Analyzed adversary kill-chains to support the development of non-kinetic attack options.			
FY 2017 Plans: - Continue underpinning analysis for EW Strategy and implementation plans. Provide analysis to improve Airborne Electronic Attack System of Systems, advanced electronic protection techniques, passive targeting, and perform assessments of US systems to detect, intercept, and attack advanced threat signals. - Examine options for aircraft survivability equipment (ASE), including Infrared Countermeasures and missile warning programs and develop roadmap to synchronize investment in DoD ASE programs. - Continue EMS management and adversary kill chain analysis. - Examine options for improved capabilities to detect complex threat emitters.			
FY 2018 Plans:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0604875D8Z / *Joint Systems Architecture Development*	**Project (Number/Name)** P220 / *Electronic Warfare Executive Committee*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Perform analytic underpinning for EW Strategy implementation, for synchronization of Services' EW investments, and for advancing DoD EW capabilities, training, exercises, modeling and simulation.			
Accomplishments/Planned Programs Subtotals	0.198	1.333	1.400

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Not Applicable

E. Performance Metrics

Not Applicable

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0604940D8Z / *Central Test and Evaluation Investment Program (CTEIP)*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	743.688	209.014	219.199	211.325	-	211.325	248.116	250.187	281.064	286.833	Continuing	Continuing
940: *Central Test and Evaluation Investment Program (CTEIP)*	743.688	209.014	219.199	211.325	-	211.325	248.116	250.187	281.064	286.833	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Since its inception in FY 1990, this program element has been used to fund the development of critically needed, high priority Test and Evaluation (T&E) capabilities for joint/multi-Service requirements. The Central Test and Evaluation Investment Program (CTEIP) uses a corporate investment approach to combine Service, Defense, and other government agencies T&E needs, maximize opportunities for joint efforts, and avoid unwarranted duplication of test capabilities. CTEIP focuses investments on projects that will have high productivity returns on investment. Projects under the CTEIP Program Element (PE) support two basic tasks: investments to improve the test capabilities base (Joint Improvement and Modernization (JIM) projects) and development of near-term solutions to test capability shortfalls in support of ongoing operational test programs (Resource Enhancement Project (REP)).

The JIM funds critically needed T&E investments in the major functional areas of: air combat; armament and munitions; Command, Control Communication, Computer and Intelligence (C4I) and networks; common range instrumentation; electronic combat; cyber warfare; land combat; sea combat; space combat; target systems; and test environments. Examples of project subject matter include: highly accurate time-space-position information, network enhanced telemetry, electronic warfare test capability developments to address critical testing shortfalls against advanced threats, information assurance and cyber testing and analysis capabilities, ground testing for hypersonic systems, end-to-end testing of infrared countermeasures systems, net-centric weapons and unmanned systems. CTEIP continues as the focal point for fostering common architectures throughout the test and training communities to enhance the sharing of resources and linkages between test and training ranges.

CTEIP has provided special focus to institutionalize the use of modeling and simulation (M&S) as a practical test tool; to link ranges through internetting to enhance inter-range and inter-Service cooperation and resource sharing; and, to ensure development and acquisition of common instrumentation necessary for a more efficient test infrastructure.

Analyses of alternative solutions are conducted for each investment project to validate T&E requirements, to define integrated support systems, and to determine overall cost effectiveness of the proposed test investments. The use of Department of Defense (DoD)-wide criteria for requirement validation, prioritization, and risk assessment ensures an effective test resource investment program.

The REP funds development of near-term solutions for critical ongoing operational tests supporting decisions on major, high priority defense acquisition programs. These unanticipated operational test (OT) capability requirements arise from several sources such as a new threat system identified during OT planning, acquisition of foreign military assets that are critical in determining weapon system operational effectiveness, short timelines between system design maturity and scheduled OT, and emerging technologies and test requirements resulting from operational concept changes mandated by Congress or Director, Operational Test & Evaluation (DOT&E),

or system-of-systems testing. Funding these activities under the CTEIP provides the opportunity to coordinate and integrate these near-term test requirements with the total DoD test and evaluation investment planning, and ensures their availability and legacy for other programs that may have similar testing requirements.

This Budget Activity 6 PE includes special studies, analyses, and strategic planning related to test capabilities and infrastructure, and supports the development and application of proven technologies to provide major test and evaluation capabilities required to meet DoD component weapon system test requirements.

The FY2018 Central Test and Evaluation Program budget is described in detail below. As part of the DoD reform agenda, the CTEIP budget was reduced for consolidation and reduction of service contracts.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	213.668	219.199	220.566	-	220.566
Current President's Budget	209.014	219.199	211.325	-	211.325
Total Adjustments	-4.654	0.000	-9.241	-	-9.241
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-4.654	-			
• SRRB Reduction	-	-	-9.241	-	-9.241

Change Summary Explanation

• FY2018 strategic efficiency reductions in management headquarters funding and staffing for better alignment and to provide support to a smaller military force.
• SRRB - Service Requirement Review Board - As part of the Department of Defense reform agenda, the incremental reduction accounts for consolidation and reduction of service contracts.

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Central Test and Evaluation Investment Program	209.014	219.199	211.325
FY 2016 Accomplishments: JIM Projects: - Completed requirements development and planning, and awarded contract for system design for the Advanced Range Tracking and Imaging System project to provide an integrated next generation suite of optical tracking mounts needed to increase performance, reduce costs, and effectively deliver secure reliable optical throughput.			

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0604940D8Z / *Central Test and Evaluation Investment Program (CTEIP)*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Completed system development and initiated production and sustainment for the Common Range Integrated Instrumentation System project to develop a common range instrumentation system to address next generation range data requirements. - Completed the Next Generation Range Control and Data Distribution project to enhance and modernize range control and data distribution systems at the Pacific Missile Range Facility (PMRF). - Completed the B-2 Defense Management System project to upgrade test capabilities at the Benefield Anechoic Facility (BAF) to support B-2 testing in a modern radio frequency (RF) signal threat environment. - Completed a requirements review for a Common Development Environment to combine the specifications, models, tools, policy, and best practices needed to enhance interoperability among live, virtual, and constructive T&E capabilities throughout the acquisition lifecycle. - Initiated requirements development and planning multiple projects improving hypersonic ground test capabilities to address critical shortfalls in developmental and operational testing of cruise missile and boost glide vehicles. - Continued system development for the Multi-Level Secure (MLS) Joint/Coalition Network Environment project to develop a standardized, DoD multi-level secure and cross-domain data management T&E network architecture. - Continued system development of the Integrated Network Enhanced Telemetry project Block I capability to develop a network-enhanced aeronautical telemetry capability for T&E ranges and facilities. - Continued system development for the Next Generation Electronic Warfare Environment Generator Build B project to provide electronic warfare simulation capabilities for testing future Electronic Attack and Electronic Support Measures systems. - Continued threat system simulator development efforts to improve integration, reduce potential duplication, and ensure that accurate, cost-effective representations of threat systems are available to support testing. - Fielded the initial operational capability for the Synthetic Battlefield Emitter Systems project to provide a controlled, high density open air environment for testing of C4ISR systems. Continued development of the Full Operation Capability. - Completed system design and continued development for the Vertical Electromagnetic Pulse (EMP) and High Power Microwave (HPM) Test Sources project to provide vertical high-altitude EMP and HPM external electromagnetic environments for testing in accordance with applicable Military Standards. - Completed system design and continued development for the Network Centric Weapon (NCW) T&E Environment project to provide an enhanced capability to test and evaluate NCW in a distributed end-to-end simulation environment. - Completed system design and continued development for the Cyber Test Analysis and Simulation Environment project to enhance current Information Assurance / Cyber testing and analysis capabilities and modeling and simulations tools for testing against increasingly robust Cyber threats. - Completed system design and development, and initiated acceptance testing for the Radar Signal Emulator project to provide open-loop, transmit-only systems that will accurately emit waveforms of threat radar systems operating in the C and S radio frequency (RF) bands.			

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0604940D8Z / *Central Test and Evaluation Investment Program (CTEIP)*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Completed preliminary design and continued system development for the Advanced Dynamic Transmitter Array project to develop a complex, dynamic radio frequency (RF) threat environment that will accurately represent signal characteristics, increase signal densities while reducing test system set up and calibration times at the Benefield Anechoic Facility (BAF). - Continued system development of the Closed Loop PESA Simulator project to develop a closed-loop radar system that will closely replicate the performance of a widely fielded Western Pacific (WESTPAC) long-range surface-to-air missile (SAM) system. - Continued system development of Integrated Air Defense System (IADS) Enhancements that will add comprehensive threat-representative IADS capabilities based on the development and integration of several high-priority, threat-representative Command Post (CP) models to open-air test ranges, test laboratories and modeling and simulation (M&S) facilities. - Continued Integrated Technical Evaluation and Analysis of Multiple Sources (ITEAMS) activities to provide detailed analysis and validation of threat system designs and operational techniques. - Continued concept development and preliminary design for the Commercial Derivative Aircraft Based Instrumentation Telemetry System project to provide expanded capability and capacity telemetry support for aircraft and missile defense testing in inter-range and broad ocean area test scenarios. - Fielded an initial operational capability and continued system development for Full Operational Capability for the Joint Distributed Infrared Countermeasures (IRCM) Ground Test System project to provide end-to-end ground testing of IRCM systems. - Continued the Common Operational Data Analytics for Continuous T&E project that provides big-data analytics capability at the Army Test Center, Aberdeen Proving Grounds. - Continued the Joint Strike Fighter Knowledge Management (KM) project to establish a next-generation KM capability that utilizes the latest in virtualization technologies, methodologies, and best practices for efficient and effective use of T&E data. - Completed requirements development and planning, and initiated concept development and preliminary design for the Advanced Weapons Effects Test Capability project to develop a capability to more accurately measure fragment characteristics of explosive weapons and more accurately estimate collateral damage distances. - Completed requirements development and planning, and initiated concept development and preliminary design for the Mid-Pressure Arc Heater project to expand the H2 Hypersonic Test Facility at Arnold Engineering Development Center, TN to provide higher enthalpy at the mid-pressure altitudes to enable ground materials testing of components of hypersonic systems. - Continued requirements development and planning for the Pulsed Neutron Environment project to provide a Low Enriched Uranium (LEU) facility to replace the current HEU reactor, providing higher fluence over a larger test area. It will also develop a Dense Plasma Focus (DPF) system to meet short pulse requirements necessary for both weapons certification and testing new circuit designs. - Completed requirements development and planning, and initiated concept development and preliminary design for the Radar Cross Section Range Relevance Project to upgrade radar cross section measurement capabilities to measure and evaluate advanced low observable technologies at the Atlantic Test Range, Patuxent River NAS and the National RCS Test Facility, Holloman AFB, NM.			

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0604940D8Z / *Central Test and Evaluation Investment Program (CTEIP)*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Completed requirements development and planning, and initiated concept development and preliminary design for the Swarm Autonomy and Scoring project to upgrade existing High Speed Maneuverable Surface Target (HSMST) with semi-autonomous control, develop a Real Time Casualty Assessment capability, and UAS scoring capabilities for testing against representative surface swarming threats. - Initiated risk reduction activities under the Enhanced Solutions Process for potential FY18 multi-service T&E developments, as recommended by Service Test and Evaluation Executives. Resource Enhancement Project: - Completed the Automated Test Case Generator Web Service (ATC-GEN WS) to provide Joint Interoperability Test Command (JITC) with the capability to develop BMDS and Mode 5 IFF MIL-STD-6016E compliance test cases and an automated test tool on a test network. - Completed development of DIADS Weapons Control (DWC) to develop operationally representative weapons control algorithms for mixed brigade SAM players within DIADS. - Completed development of MSALTS Ultraviolet Emitter Enhancement (MUVEE) to upgrade Multi Spectral Sea and Land Target Simulator (MSALTS) with LED-based UV source for short shot hostile fire IRCM end-to-end threat engagements. - Completed the Wideband Configurable Control Jammer (WCCJ) Enhancement to develop and integrate an Electronic Support Measures (ESM) direction finding subsystem into WCCJ, thus improving its ability to monitor and prioritize signals during operational test events such as Network Integrated Exercise. - Continued development of Airborne Early Warning Interoperability Simulator (AEIS) to develop the hardware and software necessary to generate a properly spaced, dense target and ECM environment for injection-mode Installed Systems Test Facility testing of the E-2D Hawkeye mission system. - Continued development of Advanced Mine Simulation System (AMISS) Upgrade, which provides the existing AMISS asset with five new mine triggering emulations, as well as sensor and improved compartmentalization enhancements. - Continued development of Boosted Zombie Target (BZT) to develop multi-stage, economical targets for PAC-3 by integrating a GFE booster onto a blue "Zombie" maneuvering target. - Continued development of C2 and Urban Background Environment Simulator (CUBES) to incorporate modern urban communication background signals and selected closed-loop communications for Installed System Test Facility communications jamming purposes. - Continued the Digital Integrated Air Defense System (DIADS) Sensor Reactivity Upgrade (SRU) to upgrade DIADS radars with enhanced ECM response features in support of F-35 and F-22 operational testing. - Continued development of Joint Standard Instrumentation Suite (JSIS) to measure and collect signature, TSPI, and related data of threat missile and hostile fire munitions (e.g., small arms and RPG) firings to support evaluation of the missile/hostile fire warning systems such as the Advance Threat Warning (ATW) system.			

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0604940D8Z / *Central Test and Evaluation Investment Program (CTEIP)*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Continued development of Submarine Launched Modular 3-inch Device (SLAM-3D), which provides a Cluster Duncan countermeasure emulator that will help resolve the Anti-Submarine Warfare COI for the Mk 54 Mod 1 Torpedo. - Continued development of Torpedo Operational Testing Using Modeling and Simulation (TOTUMS) to enhance torpedo OT&E by upgrading an HITL simulator and environment simulator for high-fidelity, OT-ready realism. - Initiated development of the Medium Range Target Engagement Radar (MR-TER) Radar System Emulator (RSE) to develop and integrate TER waveform replication capability into C-Band RSEs. - Initiated development of Tactical Datalink (TDL) and Full Motion Video (FMV) Accuracy Assessment Tool (T-FAAT) to interface COTS tool suites to create a net-enabled weapon situational awareness during live testing.			
FY 2017 Plans: JIM Projects: - Complete system development and field the Synthetic Battlefield Emitter Systems project to provide a controlled density open air environment for testing of C4ISR systems. - Complete system development for the Joint Distributed Infrared Countermeasures (IRCM) Ground Test System project to provide an end-to-end ground test system enabling complete testing of IRCM systems. - Complete system development for Block 1 and continue Block 2 concept development and preliminary design for the Multi-Level Secure (MLS) Joint/Coalition Network Environment project to develop a standardized, DoD multi-level secure and cross-domain data management T&E network architecture. - Compete initial operational capability (IOC) and continue system development for the Network Centric Weapon (NCW) T&E Environment project to provide an enhanced capability to test and evaluate NCW in a distributed end-to-end simulation environment. - Complete early operational capability (EOC) and continue development for the Cyber Test Analysis and Simulation Environment project to enhance current Information Assurance / Cyber testing and analysis capabilities and modeling and simulations tools for testing against increasingly robust Cyber threats. - Complete system development and transition to production and sustainment of the Radar Signal Emulator project to provide open-loop, transmit-only systems that will accurately emit waveforms of threat radar systems operating in the C and S radio frequency (RF) bands. - Continue system development for the Advanced Range Tracking and Imaging System project to provide an integrated next generation suite of optical tracking mounts needed to increase performance, reduce costs, and effectively deliver secure reliable optical throughput. - Continue the Commercial Derivative Aircraft Based Instrumentation Telemetry System project with contract award for design and system development to provide expanded capability and capacity telemetry support for aircraft and missile defense testing in inter-range and broad ocean area test scenarios.			

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0604940D8Z / *Central Test and Evaluation Investment Program (CTEIP)*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Continue production and sustainment for the Common Range Integrated Instrumentation System project to develop a common range instrumentation system to address next generation range data requirements. - Continue system development for the Next Generation Electronic Warfare Environment Generator Build B project to provide electronic warfare simulation capabilities for testing future Electronic Attack and Electronic Support Measures systems. - Continue system development for the Advanced Dynamic Transmitter Array project to develop a dense, complex, dynamic radio frequency (RF) signal threat environment that will accurately represent signal characteristics, increase signal densities, while reducing test system set up and calibration times at the Benefield Anechoic Facility (BAF). - Continue system development of the Closed Loop PESA Simulator project to develop a closed-loop radar system that will closely replicate the performance of a widely fielded Western Pacific (WESTPAC) long-range surface-to-air missile (SAM) system. - Continue system development of Integrated Air Defense System (IADS) Enhancements that will add comprehensive threat-representative IADS capabilities based on the development and integration of several high-priority, threat-representative Command Post (CP) models to open-air test ranges, test laboratories and modeling and simulation (M&S) facilities. - Continue Integrated Technical Evaluation and Analysis of Multiple Sources (ITEAMS) activities to provide detailed analysis and validation of threat system designs and operational techniques. - Complete concept development and preliminary design and initiate system development for the Advanced Weapons Effects Test Capability project to develop a capability to more accurately measure fragment characteristics of explosive weapons and more accurately estimate collateral damage distances. - Complete concept development and preliminary design and initiate system development for the Mid-Pressure Arc Heater project to expand the H2 Hypersonic Test Facility at the Arnold Engineering Development Center, TN to provide higher enthalpy at the mid-pressure altitudes to enable ground materials testing of components of hypersonic systems. - Complete requirements development and planning and enter concept development and preliminary design for the Pulsed Neutron Environment project to provide a Low Enriched Uranium (LEU) facility to replace the current HEU reactor, providing higher fluence over a larger test area. It will also develop a Dense Plasma Focus (DPF) system to meet short pulse requirements necessary for both weapons certification and testing new circuit designs. - Complete concept development and preliminary design and initiate system development for the Radar Cross Section Range Relevance Project to upgrade radar cross section measurement capabilities to measure and evaluate advanced low observable technologies at the Atlantic Test Range, Patuxent River NAS and the National RCS Test Facility, Holloman AFB, NM. - Complete concept development and preliminary design and initiate system development for the Swarm Autonomy and Scoring project to upgrade existing High Speed Maneuverable Surface Target (HSMST) with semi-autonomous control, develop a Real Time Casualty Assessment capability, and improved scoring capabilities for testing against representative surface swarming threats. - Continue system development of the Integrated Network Enhanced Telemetry project capability to develop a network-enhanced aeronautical telemetry capability for T&E ranges and facilities.			

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0604940D8Z / *Central Test and Evaluation Investment Program (CTEIP)*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Continue risk reduction activities under the Enhanced Solutions Process for potential multi-service T&E developments, as recommended by Service Test and Evaluation Executives. - Continue threat system simulator development efforts to improve integration, reduce potential duplication, and ensure that accurate, cost-effective representations of threat systems are available to support testing. - Complete concept development and initiate design for Hypersonic Test Capability Improvement project that will test models of hypersonic systems in a realistic clean air environment up to Mach 7.5 at Arnold Engineering and Development Center, TN. - Continue requirements development and planning for improved hypersonics ground test capabilities to address critical shortfalls in developmental and operational testing of cruise missile and boost glide vehicles. - Initiate requirements development and planning for the upgrade of the Arnold Engineering Center Hypervelocity Wind Tunnel 9, Maryland to a Mach 18 capability to conduct testing in support of hypersonic system development and hypersonic vehicle technologies. - Initiate requirements development and planning for the upgrade of the Arnold Engineering Center, TN G-Range Weather Erosion Facility to conduct erosion testing of hypersonic materials and vehicle technologies in weather and particulate environments (rain, ice and dust). - Initiate requirements development and planning for the upgrade of the Holloman AFB, NM Sled Track to conduct erosion testing of hypersonic materials and vehicle technologies. - Initiate requirements development and planning to develop a Light Detecting and Ranging (LiDAR) atmospheric measurement system for enhanced ground-based atmospheric measurements to support open-air range flight testing of hypersonic vehicles. -Initiate a study of open-air ranges for hypersonic testing. Resource Enhancement Project: - Complete development of Advanced Mine Simulation System (AMISS) Upgrade, which provides the existing AMISS asset with five new mine triggering emulations, as well as sensor and improved compartmentalization enhancements. - Complete development of C2 and Urban Background Environment Simulator (CUBES) to incorporate modern urban communication background signals and selected closed-loop communications for Installed System Test Facility communications jamming purposes. - Complete the Digital Integrated Air Defense System (DIADS) Sensor Reactivity Upgrade (SRU) to upgrade DIADS radars with enhanced ECM response features in support of F-35 and F-22 operational testing. - Complete development of Joint Standard Instrumentation Suite (JSIS) to measure and collect signature, TSPI, and related data of threat missile and hostile fire munitions (e.g., small arms and RPG) firings to support evaluation of the missile/hostile fire warning systems such as the Advance Threat Warning (ATW) system. - Complete development of Submarine Launched Modular 3-inch Device (SLAM-3D), which provides a Cluster Donut countermeasure emulator that will help resolve the Anti-Submarine Warfare COI for the Mk 54 Mod 1 Torpedo.			

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0604940D8Z / *Central Test and Evaluation Investment Program (CTEIP)*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Complete development of Tactical Datalink (TDL) and Full Motion Video (FMV) Accuracy Assessment Tool (T-FAAT) to interface COTS tool suites to create a net-enabled weapon situational awareness during live testing. - Complete development of Torpedo Operational Testing Using Modeling and Simulation (TOTUMS) to enhance torpedo OT&E by upgrading an HITL simulator and environment simulator for high-fidelity, OT-ready realism. - Continue development of Airborne Early Warning Interoperability Simulator (AEIS) to develop the hardware and software necessary to generate a properly spaced, dense target and ECM environment for injection-mode Installed Systems Test Facility testing of the E-2D Hawkeye mission system. - Continue development of Boosted Zombie Target (BZT) to develop multi-stage, economical targets for PAC-3 by integrating a GFE booster onto a blue "Zombie" maneuvering target. - Continue development of the Medium Range Target Engagement Radar (MR-TER) Radar System Emulator (RSE) to develop and integrate TER waveform replication capability into C-Band RSEs. - Initiate development of additional enhancements to Air Warfare Battle Shaping (AWBS) investments to improve air-to-air range infrastructure for NAWC-WD. - Initiate development of Cognitive Electronic Warfare (Cognitive EW) Flight Test to evaluate an advanced EW system against emerging threat representations. - Initiate development of General Threat Torpedo (GTT) to develop a threat torpedo surrogate with upgradable interchangeable segments as an upgrade replacement for the current threat surrogate torpedo. -Initiate development of the Pulsed Doppler Emitter Capability Payload for Aerial Targets (PDEC-163) to develop kinematic threat representations and threat representative emissions to provide the DDG-1000 OT SUT with the ability to collect data necessary for COTF to accredit the DDG-1000's fire control loop weapons system response to threat targets. - Initiate development of Space Fence Evaluation of Radar Effectiveness (SFERES) to fabricate a 3-axis stabilized CubeSat which will launch two spheres to support accurate evaluation of the Space Fence radar.			
FY 2018 Plans: JIM Projects: - Initiate CTEIP FY2018 New Start test environment and test instrumentation test capability development projects based results of the completed FY16-17 Enhanced Solutions Process and nominations by Service Test and Evaluation Executives. - Complete critical design and continue system development for the Advanced Range Tracking and Imaging System project to provide an integrated next generation suite of optical tracking mounts needed to increase performance, reduce costs, and effectively deliver secure reliable optical throughput. - Complete critical design and continue development for the Advanced Weapons Effects Test Capability project to develop a capability to more accurately measure fragment characteristics of explosive weapons and more accurately estimate collateral damage distances.			

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0604940D8Z / *Central Test and Evaluation Investment Program (CTEIP)*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Complete preliminary design and continue system development for the Commercial Derivative Aircraft Based Instrumentation Telemetry System project to provide expanded capability and capacity telemetry support for aircraft and missile defense testing in inter-range and broad ocean area test scenarios. - Continue production and interim contractor logistics support for the Common Range Integrated Instrumentation System project to develop a common range instrumentation system to address next generation range data requirements. - Complete Initial Operational Capability (IOC) and continue development for the Cyber Test Analysis and Simulation Environment project to enhance current Information Assurance / Cyber testing and analysis capabilities and modeling and simulations tools for testing against increasingly robust Cyber threats. - Continue system development of the Integrated Network Enhanced Telemetry project capability to develop a network-enhanced aeronautical telemetry capability for T&E ranges and facilities. - Complete Full Operational Capability (FOC)for Block 1 and Initial Operational Capability (IOC) for Block 2 for the Multi-Level Secure (MLS) Joint/Coalition Network Environment project to develop a standardized, DoD multi-level secure and cross-domain data management T&E network architecture. - Continue system development for the Network Centric Weapon (NCW) T&E Environment project to provide an enhanced capability to test and evaluate NCW in a distributed end-to-end simulation environment. - Continue concept development and preliminary design for the Pulsed Neutron Environment project to provide a Low Enriched Uranium (LEU) facility to replace the current HEU reactor, providing higher fluence over a larger test area. It will also develop a Dense Plasma Focus (DPF) system to meet short pulse requirements necessary for both weapons certification and testing new circuit designs. - Complete critical design and continue system development for the Radar Cross Section Range Relevance Project to upgrade radar cross section measurement capabilities to measure and evaluate advanced low observable technologies at the Atlantic Test Range, Patuxent River NAS and the National RCS Test Facility, Holloman AFB, NM. - Complete critical design and continue system development for the Swarm Autonomy and Scoring project to upgrade existing High Speed Maneuverable Surface Target (HSMST) with semi-autonomous control, develop a Real Time Casualty Assessment capability, and improved scoring capabilities for testing against representative surface swarming threats. - Continue threat system simulator development efforts to improve integration, reduce potential duplication, and ensure that accurate, cost-effective representations of threat systems are available to support testing. - Continue system development for the Advanced Dynamic Transmitter Array project to develop a dense, complex, dynamic radio frequency (RF) signal threat environment that will accurately represent signal characteristics, increase signal densities, while reducing test system set up and calibration times at the Benefield Anechoic Facility (BAF). - Complete Initial Operational Capability (IOC) and continue system development of the Closed Loop PESA Simulator project to develop a closed-loop radar system that will closely replicate the performance of a widely fielded Western Pacific (WESTPAC) long-range surface-to-air missile (SAM) system.			

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0604940D8Z / *Central Test and Evaluation Investment Program (CTEIP)*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Complete Full Operational Capability (FOC) for the Integrated Air Defense System (IADS) Enhancements that will add comprehensive threat-representative IADS capabilities based on the development and integration of several high-priority, threat-representative Command Post (CP) models to open-air test ranges, test laboratories and modeling and simulation (M&S) facilities. - Continue Integrated Technical Evaluation and Analysis of Multiple Sources (ITEAMS) activities to provide detailed analysis and validation of threat system designs and operational techniques. - Complete Initial Operational Capability and continue system development for the Next Generation Electronic Warfare Environment Generator Build B project to provide electronic warfare simulation capabilities for testing future Electronic Attack and Electronic Support Measures systems. - Complete system integration and Full Operational Capability (FOC) for the Radar Signal Emulator project to provide open-loop, transmit-only systems that will accurately emit waveforms of threat radar systems operating in the C and S radio frequency (RF) bands. - Complete critical design and continue system development for the Mid-Pressure Arc Heater project to expand the H2 Hypersonic Test Facility at the Arnold Engineering Development Center, TN to provide higher enthalpy at the mid-pressure altitudes to enable ground materials testing of components of hypersonic systems. - Complete design and continue system development for Hypersonic Test Capability Improvement project that will test models of hypersonic systems in a realistic clean air environment up to Mach 7.5 at Arnold Engineering and Development Center, TN. - Continue development and fabrication for the upgrade of the Arnold Engineering Center Hypervelocity Wind Tunnel 9, Maryland to a Mach 18 capability to conduct testing in support of hypersonic system development and hypersonic vehicle technologies. - Continue development for the upgrade of the Arnold Engineering Center, TN G-Range Weather Erosion Facility to conduct erosion testing of hypersonic materials and vehicle technologies in weather and particulate environments (rain, ice and dust). - Continue development for the upgrade of the Holloman AFB, NM Sled Track to conduct erosion testing of hypersonic materials and vehicle technologies. - Continue development of a Light Detecting and Ranging (LiDAR) atmospheric measurement system for enhanced ground-based atmospheric measurements to support open-air range flight testing of hypersonic vehicles. -Continue the study of open-air ranges for hypersonic testing. - Continue development of the Transient Thermal Analysis Software to predict aerothermal responses to high speed, high temperature air flow. - Continue activities to improve capabilities of the hypersonics workforce with industry and academia. - Start requirements development of a new high-fidelity automated airborne reconfigurable tracking system for hypersonic systems. - Start planning for a set of integrated UAV telemetry, optical, and LIDAR flight demonstrations. - Start requirements development of a new non-intrusive aerothermal test techniques for hypersonic systems. Resource Enhancement Project:			

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0604940D8Z / *Central Test and Evaluation Investment Program (CTEIP)*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Complete development of Airborne Early Warning Interoperability Simulator (AEIS) to develop the hardware and software necessary to generate a properly spaced, dense target and ECM environment for injection-mode Installed Systems Test Facility testing of the E-2D Hawkeye mission system. - Complete development of Boosted Zombie Target (BZT) to develop multi-stage, economical targets for PAC-3 by integrating a GFE booster onto a blue "Zombie" maneuvering target. - Complete development of the Medium Range Target Engagement Radar (MR-TER) Radar System Emulator (RSE) to develop and integrate TER waveform replication capability into C-Band RSEs. - Complete development of additional enhancements to Air Warfare Battle Shaping (AWBS) investments to improve air-to-air range infrastructure for NAWC-WD. - Complete development of Space Fence Evaluation of Radar Effectiveness (SFERES) to fabricate a 3-axis stabilized CubeSat which will launch two spheres to support accurate evaluation of the Space Fence radar. - Continue development of General Threat Torpedo (GTT) to develop a threat torpedo surrogate with upgradable interchangeable segments as an upgrade replacement for the current threat surrogate torpedo. - Continue development of the Pulsed Doppler Emitter Capability Payload for Aerial Targets (PDEC-163) to develop kinematic threat representations and threat representative emissions to provide the DDG-1000 OT SUT with the ability to collect data necessary for COTF to accredit the DDG-1000's fire control loop weapons system response to threat targets. - Initiate development of instrumented facilities to evaluate our next generation of sensors, weapons, platforms, and C4ISR systems in a realistic urban environment in response to near-term documented OT shortfalls. - Initiate development of hardware simulators to test missile warning systems of new generation electronic warfare (EW) suites in a dynamic environment in response to near-term documented OT shortfalls. - Initiate the development of non-intrusive instrumentation to address near term OT capability shortfalls to evaluate advanced sensor system performance in harsh environments in response to near-term documented OT shortfalls.			
Accomplishments/Planned Programs Subtotals	209.014	219.199	211.325

D. Other Program Funding Summary ($ in Millions)

N/A

Remarks

E. Acquisition Strategy

N/A

F. Performance Metrics

A portion of CTEIP projects that were developed and delivered to the DoD test community over the past five years.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0604942D8Z / *Assessments & Evaluations*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	21.990	127.827	132.106	30.144	-	30.144	31.612	31.856	32.451	33.101	Continuing	Continuing
P805: *Assessments & Evaluations*	21.990	127.827	28.706	30.144	-	30.144	31.612	31.856	32.451	33.101	Continuing	Continuing
P807: *Cyber Vulnerabilities*	-	0.000	100.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
P810: *Continuity Enterprise Capability Based Assessment (CBA)*	-	0.000	3.400	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program is reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress. For further information, please contact the Director of Special Programs, OUSD(AT&L)/DSP at (703) 697-1282.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	27.827	28.706	30.160	-	30.160
Current President's Budget	127.827	132.106	30.144	-	30.144
Total Adjustments	100.000	103.400	-0.016	-	-0.016
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	100.000	-			
• SBIR/STTR Transfer	-	-			
• SRRB	-	-	0.000	-	0.000
• DTIC Offset	-	-	-0.016	-	-0.016
• FY 2017 Request for Additional Appropriations	-	103.400	-	-	-

Change Summary Explanation

FY 2016: increase to classified program. Detailed information is classified.

FY 2017: $103.400 million requested to address emergency warfighting readiness requirements.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0604942D8Z / *Assessments & Evaluations*	Project (Number/Name) P805 / *Assessments & Evaluations*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P805: *Assessments & Evaluations*	21.990	127.827	28.706	30.144	-	30.144	31.612	31.856	32.451	33.101	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This program is reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress. For further information, please contact the Director of Special Programs, OUSD(AT&L)/DSP at (703) 697-1282.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Assessments & Evaluations	127.827	28.706	30.144
Description: Classified Program			
FY 2016 Accomplishments: Program change from fee-for-service to fully organically funding drives the increase in funding requested. Detailed information is Classified.			
FY 2017 Plans: Detailed information is Classified.			
FY 2018 Plans: Detailed information is Classified.			
Accomplishments/Planned Programs Subtotals	127.827	28.706	30.144

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

This is a RDT&E Management and Support effort and does not acquire any products.

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0604942D8Z / *Assessments & Evaluations*	Project (Number/Name) P807 / *Cyber Vulnerabilities*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P807: *Cyber Vulnerabilities*	-	0.000	100.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Cyber Vulnerability effort. The National Defense Authorization Act (NDAA) 2016 Section 1647, directed and authorized up to $200M for this effort. The Department was directed to prioritize a list of Major Weapon Systems, assess those systems for cyber vulnerabilities and develop mitigation strategies to improve mission assurance. The Department estimated the total effort outlined would require approximately $200M. In CY 2016 OSD(AT&L) allocated $100 million of Congressional funds to the Services to complete assessments of Quadrennial Defense Review (QDR) mission area 1 and 2 Weapon Systems. The Department is on track to complete those assessments by CY 2018; with QDR 3-12 in progress and expected to be completed by CY 2019. Additional details are classified. For further information at a higher classification, please contact the Director of OUSD (AT&L)/DASD C3CB at (703) 697-6673.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Cyber Vulnerabilities ***Description:*** Classified. ***FY 2017 Plans:*** Classified.	-	100.000	-
Accomplishments/Planned Programs Subtotals	-	100.000	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Details are classified.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0604942D8Z / *Assessments & Evaluations*	Project (Number/Name) P810 / *Continuity Enterprise Capability Based Assessment (CBA)*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P810: *Continuity Enterprise Capability Based Assessment (CBA)*	-	0.000	3.400	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Continuity Enterprise Capability Based Assessment (CBA) (Project P810): $3.4 million is required to support a Department of Defense (DoD) Continuity Enterprise Capability Based Assessment (CBA), which will assess gaps and recommend material/non-material solutions in three interconnected analytical phases. The strategic context is to systematically understand all elements of the defense continuity enterprise in order to sustain an agile and flexible continuity posture that ensures the Department's ability to execute its essential functions in times of national crisis. Phase 1 focuses on enterprise communications, Phase 2 focuses on system level communications, continuity operations (facilities, devolution, logistics, transportation, and essential functions) and phase 3 on reconstitution (what is required for return to normal operations) after a catastrophic event. Each phase will identify and define requirements, gaps, risk, and offer recommendations to reduce operational risk. Additional details are classified. For further information at a higher classification, please contact the Director of Special Programs, OUSD (AT&L)/DSP at (703) 697-1282.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Continuity Enterprise Capability Based Assessment (CBA)	-	3.400	-
FY 2017 Plans: Classified			
Accomplishments/Planned Programs Subtotals	-	3.400	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Classified

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0605100D8Z / *Joint Mission Environment Test Capability (JMETC)*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	85.497	39.549	87.080	91.057	-	91.057	86.077	82.942	79.201	80.826	Continuing	Continuing
100: *Joint Mission Environment Test Capability Distributed Test*	65.216	19.897	66.267	15.000	-	15.000	15.000	15.000	19.000	25.000	Continuing	Continuing
200: *Joint Mission Environment Test Capability National Cyber Range (NCR) Sustainment*	20.281	19.652	20.813	20.000	-	20.000	20.000	20.000	30.000	35.000	Continuing	Continuing
300: *Joint Mission Environment Test Capability: Increasing Cyber T&E Capacity and Capability*	-	0.000	0.000	56.057	-	56.057	51.077	47.942	30.201	20.826	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Joint Mission Environment Test Capability (JMETC) program was established for the purpose of implementing the Department's strategy to move to an enterprise-centric, distributed test capability that results in acquisition systems fielded with enhanced joint capabilities, reduced program costs, and improved acquisition timelines. The JMETC program implements the infrastructure capabilities defined in the Department of Defense's "Testing in a Joint Environment Roadmap" to provide acquisition program managers a robust nation-wide capability to "test like we fight." JMETC provides a persistent, distributed test and evaluation (T&E) capability that supports system development, interoperability testing, and cyber testing which otherwise would not be readily available to Service/Component acquisition programs. The JMETC program is funded within the Research, Development, Test and Evaluation (RDT&E) Management Support Budget Activity because it is intended to provide test capability in support of RDT&E programs. By linking distributed facilities, as well as providing the necessary tools, services and subject matter expertise, JMETC allows acquisition programs to efficiently evaluate their warfighting capability in a realistic joint mission environment. This enables a customer-defined joint mission test environment for systems engineering and testing, extensible to training and experimentation, in a timely and cost effective manner.

On October 1, 2012, the Under Secretary Defense for Acquisition, Technology and Logistics (USD(AT&L)) directed Test Resource Management Center (TRMC) to take responsibility for operations and resources of the National Cyber Range (NCR). TRMC undertook management oversight of the NCR, including all operational activities and sustainment of resources, transitioning it from a Defense Advanced Research Projects Agency (DARPA) Science & Technology project to an operational capability supporting cyber test, experimentation, and training events. The NCR mission is to provide secure facilities, technology, processes, and workforce to rapidly create hi-fidelity, mission representative cyberspace environments and facilitate integration/federation of cyberspace T&E infrastructure in support of the TRMC Mission. The NCR supports diverse set of customers performing Developmental and Operational Testing, Cyber Mission Force Training and Certification, and support for operational contingencies.

The Test Resource Management Center (TRMC) is the Department's lead for the JMETC program, the National Cyber Range, and oversees both their development and operations. In order to meet the significant growth in requirements, TRMC will use the increased funding for FY 2018 to substantially increase cyber test and training capacity by 1) refurbishing the current NCR hardware that is nearing end-of-life and increasing computing capacity to support additional customers; 2) procuring and

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0605100D8Z *I Joint Mission Environment Test Capability (JMETC)*

fielding additional enterprise computational and storage resources for JMETC's Regional Service Delivery Points (RSDPs) capability; and 3) begin construction of a new high capacity cyber range similar to the NCR.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	40.146	87.080	94.868	-	94.868
Current President's Budget	39.549	87.080	91.057	-	91.057
Total Adjustments	-0.597	0.000	-3.811	-	-3.811
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.597	-			
• SRRB Reductions	-	-	-3.811	-	-3.811

Change Summary Explanation

- Internal strategic efficiency reductions in management headquarters funding and staffing for better alignment and to provide support to a smaller military force.
- SRRB - Service Requirement Review Board - As part of the Department of Defense reform agenda, the incremental reduction accounts for consolidation and reduction of service contracts.
- National Cyber Range (NCR) expansion to address increases in cyber test requirements.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0605100D8Z / *Joint Mission Environment Test Capability (JMETC)*	Project (Number/Name) 100 / *Joint Mission Environment Test Capability Distributed Test*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
100: *Joint Mission Environment Test Capability Distributed Test*	65.216	19.897	66.267	15.000	-	15.000	15.000	15.000	19.000	25.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The JMETC mission is to provide an enterprise-level, persistent capability for linking distributed facilities, enabling Department of Defense (DoD) customers to develop and test warfighting capabilities in a Joint Context. JMETC provides a test infrastructure consisting of the components necessary to conduct Joint distributed test events by cost-effectively integrating live, virtual, and constructive (LVC) test resources that are configured to support the users' needs. The JMETC program provides its customers a support team to assist with JMETC products and the conduct of distributed testing. JMETC's institutional funding builds, maintains, and operates the JMETC infrastructure and pays for persistent availability of national connectivity for testing; data communications middleware; identification and development of interface standards; common software tools and components; and a reuse repository. JMETC Program funding also provides JMETC program management, facilities, equipment, operating costs, and special studies and analysis related to distributed test capabilities and infrastructure. Key attributes of the JMETC include: persistency; interoperability; reuse; various combinations of distributed capabilities (reconfigurable infrastructure to meet customer requirements); modeling and simulation (M&S) linkage; Live-Virtual-Constructive (LVC) test resource integration; and distributed test support to satisfy both Service and Joint needs. System engineering, training, and experimentation all benefit from a corporate JMETC developed for T&E. JMETC has grown from four sites in 2007 to well over 100 functional sites by the end of FY16 with several more planned for FY17. JMETC will reduce the cost and time to plan and prepare for distributed joint testing by providing a readily-available, persistent connectivity with network security accreditation support, common integration software for linking sites, and accredited test tools for distributed testing. To support its customers, JMETC also provides extensive expertise in planning, preparing for, and executing the infrastructure for distributed test events. Additionally in FY 2013, the JMETC PE was funded to develop and field the Regional Service Deliver Points (RSDP). The RSDPs are a set of distributed computing and storage platforms designed to efficiently meet DoD capacity and capability demands for distributed and cyber test and evaluation (T&E) requirements as part of the Test Resource Management Center (TRMC). They provide services (i.e. traffic generation, simulation, instrumentation, visualization, and integrated event management), a scalable architecture to increase capacity and capabilities as needed by the user community, a flexible and adaptable infrastructure to support users requirements which are prone to frequent change, and to deliver cost and performance efficiencies (virtualization, rapid reconstitution). At a high-level architecture view, the RSDP adds enterprise compute and storage resources as well as a platform for distributed and cyber T&E tools and services at multiple classifications necessary to create high fidelity, operationally representative virtual environments, previously unavailable.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Joint Mission Environment Test Capability Distributed Test	19.897	66.267	15.000
FY 2016 Accomplishments: - Continued to expand the JMETC Secret Network (JSN) infrastructure to 74 functional sites with 8 more planned and the JMETC Multiple Independent Levels of Security Network (JMN) infrastructure to 43 functional sites with 8 more planned.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605100D8Z / *Joint Mission Environment Test Capability (JMETC)*	**Project (Number/Name)** 100 / *Joint Mission Environment Test Capability Distributed Test*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Successfully underwent reaccreditation of JSN Systems Control (SYSCON). - Fielded two additional Regional Service Deliver Points (RSDPs), thus increasing cyber test and training capacity. Improved RSDP performance through enhanced automation as well as upgraded computational and storage components - Supported 70 distinct customer distributed test and training events to include the following: MQ-4C Triton, Small Diameter Bomb II Live Fly Tests, F-35 Record and Playback, Aegis Integrated Air & Missile Defense (IAMD) Baseline 9C1D Training Test, Joint Unmanned Air System – Mission Environment(JUAS-ME), Joint Integrated Air & Missile Defense Office (JIAMDO) Correlation / Decorrelation Interoperability Test (C/DIT), Interoperability Development and Certification Testing (IDCT), STRATCOM Simulation Exercise (SIMEX), NAVAIR Captive Carry Testing, Distributed Integration & Interoperability Assessment Capability (DIIAC) Certification Events, Common Connectivity Device (CCD) Cooperative Engagement Capability (CEC) Multi-Site Interoperability Testing, Air Ground Integrated Layer Exploration (AGILE) Fire IX, Joint Distributed IRCM Ground-test System (JDIGS), Kodiak Cyber Operations Team (KCOT) Capabilities Test, DoD Enterprise Cyber Range Environment (DECRE) Event, Command Post Computing Environment (CPCE) Event, Cyber Range Technology Proving Grounds (CRTPG), Cyber School (CF-17) Training, Cyber Security Test Bed (CSTB), USS SECURE, Thunderstruck, Missile Defense Agency (MDA), Talon Hate Distro, Automated Cyberspace Threat Representation (ACTR) Demonstration, Massachusetts Institute of Technology/ Lincoln Laboratories (MIT/ LL) Persistent Range, Army Integrated Air and Missile Defense (AIAMD) Live Virtual Constructive (LVC) Distributed Environment, Cyber Guard 16, Cyber Flag 16, Red Flag 16-3, and 61st National Mission Team Event. - Provided planning support to the following users and organizations: US Army Cyber Command (ARCYBER); Program Executive Office, Intelligence, Surveillance, and Sensor Systems (PEO IEW&S); Small Diameter Bomb (SDB) II; MQ-4C Triton;P-8A Increment 3; Director, Operational Test and Evaluation(DOT&E); DIIAC, Unmanned Carrier Launched Airborne Surveillance & Strike (UCLASS); Common Aviation Command and Control System (CAC2S); Tactical Mobile (TacMobile), Army Product Manager Information Warfare (PM IW); U.S. Army Intelligence and Security Command (INSCOM); Naval Criminal Investigative Service (NCIS), 46th Test Squadron DET 2, JUPITER, Command Post of the Future (CPoF), PACOM J81, National Guard Bureau, NAVSEA Dahlgren Division, Long Range Bomber, Air Force Northern Command, Distributed Common Ground System (DCGS); Littoral Combat Ship (LCS); Integrated Personnel and Pay System (IPPS-A); CH-47; AIAMD; Ground/Air Task Oriented Radar (G/ATOR); Joint Surveillance and Target Attack Radar System (JSTARS); Combat Rescue Helicopter (CRH) , AH-64 and several others. - Continued strategic planning efforts to engage new acquisition programs that must demonstrate compliance with Net-Ready Key Performance Parameter (NR-KPP) and Cyber security requirements.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605100D8Z / *Joint Mission Environment Test Capability (JMETC)*	**Project (Number/Name)** 100 / *Joint Mission Environment Test Capability Distributed Test*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Assisted customers with the use of distributed test tools and troubleshooting of the end-to-end network infrastructures. Continue providing remote and on-site support for the planning and execution of distributed events. - Continued to develop and refine the RSDP capabilities to provide users with enhanced large scale, high-fidelity virtualized representations of cyber contested environments and do so as rapidly as possible to minimize event timelines and associated costs. ***FY 2017 Plans:*** - Increase cyber test and training capacity by fielding a 5th RSDP. Acquire additional storage capacity for existing RSDPs and implement a central library for reusable Red, Blue and Gray environments. Initiate development of a NSA approved Type-1 encryption capability to secure data at rest in a Multiple Independent Levels of Security (MILS) architecture. Complete full automated sanitization capability to allow for unconstrained cyber activities to be conducted on the RSDPs. - Continue to provide distributed interoperability and cyber test and training support for major customer events such as the F-35 Joint Strike Fighter, Small Diameter Bomb II tests, MQ-4C Triton testing, JIAMDO project testing, MDA cybersecurity tests, Joint Interoperability Test Command JITS, Air Force AGILE Fire, NAVAIR Integrated Warfare Capability (IWC) test events, NAVSEA DIIAC, Marine Corps Virtual Rapid Prototyping Laboratory (VRPL) experiments, PM IW Development and Operations (DevOps), Air Force AFSIT, DIIAC certification tests, Cyber Flag, Cyber Guard, Red Flag, and numerous other test and training activities. - Continue planning support to new and on-going acquisition programs including: F-35, SDB II, JUPITER, Advanced Anti-Radiation Guided Missile (AARGM), MQ-4C Triton, P-8A Poseidon, UCLASS, CAC2S, TacMobile, IPPS-A, CRH, CH-47, LCS, G/ATOR, AH-64, DCGS and several others. - Continue strategic planning efforts to engage new acquisition programs that must demonstrate compliance with Net-Ready Key Performance Parameter (NR-KPP) and Cyber security as part of their Survivability KPP requirements. - Continue to assist customers with the use of distributed test tools and troubleshooting of the end-to-end network infrastructures. Continue providing remote and on-site support for the planning and execution of distributed events. ***FY 2018 Plans:*** - Increase support to as many as a 100 major customer events and numerous smaller test and training activities, as well as maintaining robust, persistent network infrastructures to support distributed collaboration and data dissemination. - Continue planning support to new and on-going acquisition programs.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605100D8Z / *Joint Mission Environment Test Capability (JMETC)*	**Project (Number/Name)** 100 / *Joint Mission Environment Test Capability Distributed Test*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Provide connectivity to new capabilities and services based on user requirements via both the JMETC Secret Network (JSN) and the JMETC MILS Network (JMN). - Continue collaboration with the Training community by providing distributed infrastructure and planning support to the Joint Staff, USCYBERCOMMAND and to other customers for their distributed training events. - Continue strategic planning efforts to engage new acquisition programs that must demonstrate compliance with Net-Ready Key Performance Parameter (NR-KPP) and Cybersecurity requirements. - Continue coordination efforts to migrate DoD, Service, Industry, and Academia distributed test and evaluation infrastructures to JMETC's enterprise infrastructures. - Continue to enhance the web-based JMETC Reuse Repository to store distributed test tools, utilities, lessons learned, and test metadata making all available to the DoD test community. - Continue to assist customers with the use of distributed test tools and troubleshooting of the end-to-end network infrastructures. Continue providing remote and on-site support for the planning and execution of distributed events. - Continue to refine, expand, and sustain the RSDP capabilities and processes to support increased customer demand. Implement NSA approved Type-1 encryption capability to secure data at rest in a Multiple Independent Levels of Security (MILS) architecture. - Continue to identify, assess, and develop cyber specific test tools as enterprise solutions to capability gaps.			
Accomplishments/Planned Programs Subtotals	19.897	66.267	15.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

- Number of Distributed test sites

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605100D8Z / *Joint Mission Environment Test Capability (JMETC)*	**Project (Number/Name)** 100 / *Joint Mission Environment Test Capability Distributed Test*

- Number of events conducted
- Number of acquisition programs supported

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605100D8Z / *Joint Mission Environment Test Capability (JMETC)*	**Project (Number/Name)** 200 / *Joint Mission Environment Test Capability National Cyber Range (NCR) Sustainment*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
200: *Joint Mission Environment Test Capability National Cyber Range (NCR) Sustainment*	20.281	19.652	20.813	20.000	-	20.000	20.000	20.000	30.000	35.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

In FY 2013, responsibility for National Cyber Range (NCR) Operations was transferred to the Test Resource Management Center (TRMC) and subsequently aligned under the Joint Mission Environment Test Capability (JMETC) Program Element. Since then, the NCR has executed 140 events for DOD Customers. The NCR provides secure facilities, technology, processes, and workforce to rapidly create hi-fidelity, mission representative cyberspace environments and facilitate integration/federation of cyberspace test and evaluation (T&E) infrastructure in support of the TRMC Mission. The NCR is accredited to operate at TS//SI-G/TK/HCS-P//SAR. As a result of recent recapitalization and capacity enhancement efforts, the NCR now has the capability to support up to 8 concurrent events and scale up to ~250K virtual nodes. The NCR concurrently emulates complex (Red/Blue/Gray) operationally representative network environments at different classification levels using Multiple Independent Levels of Security (MILS) architecture. The NCR Test Automation Tool Suite minimizes human error, enables verification of test environment, ensures repeatable results and reduces event timelines from weeks/months to hours/days. NCR computing assets can be sanitized after exposure to malicious attacks/malware and restored to a known, clean state. The NCR conducts distributed events with other Cyberspace Ranges via the JMETC MILS Network (JMN) and Joint Information Operations Range (JIOR).

The NCR conducts Cyberspace Testing, Training and Operational Events for the full spectrum of DoD Customers including Research, Development, Acquisition, Testing, Training and Operational Cyber Mission Forces. The NCR executes wide variety of event types including Science and Technology (S&T) Demonstrations, Developmental Test & Evaluation (DT&E), Operational Test & Evaluation (OT&E), Security Controls Assessments (SCA), Cyberspace Operations Training, Cyberspace Tactics, Techniques Procedures (TTP) Development, Forensics/Malware Analysis) and Cyberspace Operations Mission Rehearsal. The NCR enables acquisition programs to conduct Cybersecurity Test and Evaluation (T&E) in a representative Cyberspace Environment to identify and close exposed vulnerabilities, evaluate resiliency and positively impact program cost, schedule and performance. The NCR also supports Training and Certification of Cyber Mission Forces in support of US Cyber Command by enabling operational forces to efficiently evaluate cyber warfighting capability in a realistic joint mission environment. Finally, the NCR is supporting in real time Overseas Contingency Operations as directed by National Authority.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Joint Mission Environment Test Capability NCR Sustainment	19.652	20.813	20.000
FY 2016 Accomplishments: - Since commencing operations, between FY-13 and the end of FY-16, the NCR executed more than 140 events. In FY-16 the NCR demonstrated robust operational capability supporting 58 different events for a diverse set of customers and is operating			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605100D8Z / *Joint Mission Environment Test Capability (JMETC)*	**Project (Number/Name)** 200 / *Joint Mission Environment Test Capability National Cyber Range (NCR) Sustainment*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
at 125% of the originally provisioned capacity. The NCR provided Cybersecurity Test and Evaluation “As a Service” for Major Defense Acquisition Programs (MDAP) and Major Automated Information Systems (MAIS) Acquisition Programs that is simply not available in other venues. - Acquisition Programs supported include Command Post Computing Environment (CP CE), Joint Space Operations Center (JSpOC) Mission System (JMS), P-8A Poseidon, Triton MQ-4C, FireScout, Tactical Mobile (TacMobile), CVN-78 Components (USS Secure, LHA-6, Enterprise GPS, 3DExtended Long Range Radar, Distributed Common Ground Station Family of Systems, Carrier Based Air Refueling System, Aviation Data Management and Control System. - The NCR Team helped DOD Customers manage Cybersecurity Testing by conducting Cyber Table Top (CTT) exercises. DOD programs supported include Command Post Computing Environment, Carrier Based Air Refueling System, P—8A Poseidon, MQ-4C Triton, TacMobile and Small Diameter Bomb. The NCR also supported CTTs for MRTFB Customers to help improve the Cybersecurity Posture of the Ranges. - The NCR supported customers from the Services and Joint Community. Customers include US Cyber Command, Joint Staff J-7, Director, Operational Test & Evaluation (DOT&E), Army PEO Command Control Communications Tactical, US Naval Air Systems Command (NAVAIR), Air Force Space and Missile Command, Army Intelligence and Information Warfare Directorate; Office of Naval Intelligence and the Army Communications and Electronics Research, Development and Engineering Command (CERDEC). - In FY-16, 53% of available NCR capacity was used by the Training Community including USCC Training and Certification Events, Cyber Flag 16 and multiple Cyber Knight and Cyber Guard Events. NCR will continue to support to the JS-J6/DOT&E sponsored Enterprise Cyber Range Environment events as appropriate. - NCR supported Contingency Operations as requested by US Cyber Command. - The NCR executed an operational pause in the 4QFY-16 to recapitalize NCR computing assets, enhance computing capacity and prepare for periodic Security Assessment and Authorization. NCR can now support up to 8 concurrent events using the MILS architecture and can scale up to ~250K virtual nodes.			
FY 2017 Plans:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605100D8Z / *Joint Mission Environment Test Capability (JMETC)*	**Project (Number/Name)** 200 / *Joint Mission Environment Test Capability National Cyber Range (NCR) Sustainment*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Increased funding will be used to execute events at a steadily increasing OPTEMPO to support 8 concurrent events. NCR will conduct engineering activities to plan for technical refresh of emerging end of life and end of service computing assets. The NCR will modify the NCR Test Specification Tool Suite to streamline operations and make them interoperable with other cyber ranges. - Increased Funding will be used to conduct pathfinder events to evaluate Industrial Control Systems and Avionics Systems. - The NCR will execute formal runs for the record to complete periodic Security Assessment and Authorization in the 2QFY-17. - The NCR will implement improvements needed to increase capacity and support increased demand at the existing NCR location. - NCR will begin to build out additional dedicated Persistent Testing and Training Environments to support testing and training customers - The NCR will continue to operate in support of the growing Acquisition Program Cybersecurity Test and Evaluation requirements. The NCR will support test planning and execution for MDAP and MAIS acquisition programs. - The NCR will continue to provide Cyber Table Top support for acquisition programs to help programs address cyber security as early as possible in development. - The NCR will continue to provide support for USCC Training and Certification Events by developing blue, red and gray environments for including Cyber Flag and multiple Cyber Knight and Cyber Guard Events. NCR will support to the JS-J6/DOT&E sponsored Enterprise Cyber Range Environment events as appropriate. - NCR will support DOT&E Assessments of Major Combatant Commands beginning with an event for TRANSCOM in 2QFY-17. - NCR will continue to support Contingency Operations as requested by US Cyber Command. ***FY 2018 Plans:*** - Increased Funding will be used to create increasingly robust Industrial Control Systems and Avionics Systems Test Beds. - The NCR will continue to implement improvements needed to increase capacity and support increased demand at the existing NCR location.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605100D8Z / *Joint Mission Environment Test Capability (JMETC)*	**Project (Number/Name)** 200 / *Joint Mission Environment Test Capability National Cyber Range (NCR) Sustainment*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- NCR will continue to build out additional dedicated Persistent Testing and Training Environments to support testing and training customers - The NCR will continue to operate in support of the growing Acquisition Program Cybersecurity Test and Evaluation requirements. The NCR will support test planning and execution for MDAP and MAIS acquisition programs. - The NCR will continue to provide Cyber Table Top support for acquisition programs to help programs address cyber security as early as possible in development. - The NCR will continue to provide support for USCC Training and Certification Events by developing blue, red and gray environments for including Cyber Flag and multiple Cyber Knight and Cyber Guard Events. NCR will support to the JS-J6/DOT&E sponsored Enterprise Cyber Range Environment events as appropriate. - NCR will continue to support DOT&E Assessments of Major Combatant Commands. - NCR will continue to support Contingency Operations as requested by US Cyber Command.			
Accomplishments/Planned Programs Subtotals	19.652	20.813	20.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

- Amount of increase in computing power
- Number of events capable of supporting
- Number of NCR-like facilities available

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0605100D8Z / *Joint Mission Environment Test Capability (JMETC)*	Project (Number/Name) 300 / *Joint Mission Environment Test Capability: Increasing Cyber T&E Capacity and Capability*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
300: *Joint Mission Environment Test Capability: Increasing Cyber T&E Capacity and Capability*	-	0.000	0.000	56.057	-	56.057	51.077	47.942	30.201	20.826	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

In FY 2016, the Department, as a result of a study conducted by DASD(C3&CB), realized the magnitude of need for increased cyber test and training capacity and capability. Based on this and other inputs, the Department made the decision to increase funding in the Test Resource Management Center (TRMC) in FY 17 to build out additional cyber T&E capacity based on the National Cyber Range (NCR) architecture. This increased capacity will also be available to conduct training for the Cyber Mission Force. The TRMC worked with the Services to identify facilities where this buildout could be accomplished most efficiently. They also considered additional criteria such as accessibility by acquisition programs, availability of qualified work force, utilities and network availability, timing, and expected cost.

To date, TRMC and the Services have identified five sites that are potential candidates. We have begun design and cost estimation in FY16 so that we can begin detailed design and begin build-out in FY 17. Once complete, the Department will have well over four times the cyber test and training capacity offered by the current NCR.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Joint Mission Environment Test Capability: Increasing Cyber T&E Capacity and Capability	-	-	56.057
FY 2018 Plans: - Operationalize the additional NCR locations to support cyber Test and Training requirements. TRMC will install computing equipment, install remote access capabilities, attain accreditation from Defense Intelligence Agency, put contracts in place, and hire work force. - Begin build out of infrastructure supporting the Avionics Cyber Range Project for the Air Force. - Conduct engineering activities to plan for technical refresh of emerging end of life and end of service computing assets - Continue to assess cyber range requirements in close cooperation with the DoD Cyber Test and Training Executive Agents to build priority cyber range capability and capacity to meet identified RDT&E community and CMF needs.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605100D8Z / *Joint Mission Environment Test Capability (JMETC)*	**Project (Number/Name)** 300 / *Joint Mission Environment Test Capability: Increasing Cyber T&E Capacity and Capability*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Continue analyses of capability to determine requirements and standards needed to join these cyber test facilities with existing acquisition system hardware-in-the-loop, software-in-the-loop, and systems integration laboratories to test systems in a realistic cyber contested environment. - Continue analyses of capability to determine requirements and standards needed to meet the need for exceptionally large cyber test and training environments, such as those required for Cyber Flag.			
Accomplishments/Planned Programs Subtotals	-	-	56.057

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

- Number of events conducted
- Utilization rate
- Number of acquisition programs supported
- Number of events supported for other DoD communities

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0605104D8Z / *Technical Studies Support and Analysis*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	108.887	24.121	23.069	22.386	-	22.386	22.760	23.345	23.605	24.287	Continuing	Continuing
P421: *Technical Studies*	108.887	24.121	23.069	22.386	-	22.386	22.760	23.345	23.605	24.287	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program is a key source of funding for the Office of the Secretary of Defense and the Joint Staff to manage studies, analyses, strategic planning, and technical support efforts to improve and support policy development, decision making, management and administration of DoD programs and activities. Studies and analyses will examine current and alternative policies, plans, operations, strategies and budgets, providing essential means for managing and responding to the shifting and complex international, political, technological, economic, military, and acquisition environments in which national security planning decisions are made. Independent analyses from subject matter experts are instrumental for senior defense planners in making informed choices regarding requirements for force planning and strategic deployment of assets taking into account technological challenges and resource constraints, and there is a strong need to incorporate the findings of operational analysis in force planning requirements and projections. With the complexities of emerging security threats in the current geopolitical environment, the need for objective analysis and forward looking planning for the mid and long-term is vital.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	24.887	23.069	23.040	-	23.040
Current President's Budget	24.121	23.069	22.386	-	22.386
Total Adjustments	-0.766	0.000	-0.654	-	-0.654
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	0.000	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.766	-			
• General Program Services Reductions	-	-	-0.499	-	-0.499
• DTIC Offset	-	-	-0.155	-	-0.155

Change Summary Explanation

Reductions are reflected for implementation of efficiencies initiatives and Service Requirements Review Board Guidance.

As part of the Department of Defense reform agenda, the budget estimate reflects a stable trend in the number and cost of reports and studies in the near-term.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0605104D8Z / *Technical Studies Support and Analysis*	Project (Number/Name) P421 / *Technical Studies*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P421: *Technical Studies*	108.887	24.121	23.069	22.386	-	22.386	22.760	23.345	23.605	24.287	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This program is a key source of funding for the Office of the Secretary of Defense and the Joint Staff to manage studies, analyses, strategic planning, and technical support efforts to improve and support policy development, decision making, management and administration of DoD programs and activities. Studies and analyses will examine current and alternative policies, plans, operations, strategies and budgets, providing essential means for managing and responding to the shifting and complex international, political, technological, economic, military, and acquisition environments in which national security planning decisions are made. Independent analyses from subject matter experts are instrumental for senior defense planners in making informed choices regarding requirements for force planning and strategic deployment of assets taking into account technological challenges and resource constraints, and there is a strong need to incorporate the findings of operational analysis in force planning requirements and projections. With the complexities of emerging security threats in the current geopolitical environment, the need for objective analysis and forward looking planning for the mid and long-term is vital.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Technical Studies and Analyses Support for the Office of the Secretary of Defense	24.121	23.069	22.386
FY 2016 Accomplishments: Technical Support for the USD(Acquisition, Technology & Logistics): Studies and analyses of: Electronic warfare capabilities, munitions planning, strategic and conventional system technologies, weapons platform software sustainment, cyber risk assessments, strategic force modernization requirements, weapons of mass destruction force protection capabilities, foreign military systems and technologies proliferation, industrial supply chain resilience, strategic deterrence capabilities, industrial base capabilities assessments, defense manufacturing technology, global defense industry trends, technologies for evolving mission requirements, allied defense capabilities, logistics sustainability, NATO policy planning, munitions safety, identifying acquisition program risk, defense acquisition workforce requirements, small business defense suppliers, and support to new and ongoing Defense Science Board task forces (Constrained Military Operations, Logistics, Cyber Deterrence, Military Satellite Communications, Weapons of Mass Destruction, and Space Resilience). Technical Support for the Director, Cost Assessment and Program Evaluation: Studies and analyses regarding the following areas:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605104D8Z / *Technical Studies Support and Analysis*	**Project (Number/Name)** P421 / *Technical Studies*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Requirements regarding investment and resource planning such as strategic tradeoffs and risk management, strategic strike capabilities, air-land tactical mobile communications, air strike chain capabilities, unconventional defense options for allied states, imagery capabilities, hard and deeply buried targets, close air support and interdiction capabilities, maintaining medical readiness, strategic communications, personnel force models, technical studies and analyses to support independent cost estimates and economic research, comparative analyses of alternative strategic and conventional weapons systems configurations and force levels, and continuation of development of critical management instruments for measuring the long-term trends, strength and affordability of the defense program. Technical Support for the USD(Policy): Studies, analyses, and activities in the following areas: Requirements regarding geopolitical posture and policy such as regional and strategic defense policy planning, space strategy, deterrence and counterproliferation requirements, scenario-based escalation dynamics analyses, strengthening security assistance mechanisms, international defense trade and industrial relationships, technological and cyber effects policy, information operations capabilities, escalation control, nuclear strategy, and strategic-level simulations of areas of interest for legislative and executive branch decision-makers. Technical Support for the USD(Personnel & Readiness): Studies and analyses in the following areas: Requirements for sustaining and planning for the force of the future such as active and reserve recruiting and retention issues, flag officer requirements, improving recruiting capabilities, compensation analyses, improving strategic readiness, improvements to training capabilities, reserve component readiness and sustainability, military family and educational issues, and strategies for managing the Total Force portfolio. Technical Support for the USD(Intelligence): Studies and analyses in the following areas: Targeting data collection and analyses capabilities, mobile target tracking capabilities, and operational military concepts planning. Technical Support for the Joint Staff conducting joint research with OSD:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605104D8Z / *Technical Studies Support and Analysis*	**Project (Number/Name)** P421 / *Technical Studies*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Joint studies and analyses with OSD regarding operational lessons learned, joint military requirements analytic capabilities, and cyber effects on weapons systems.			
FY 2017 Plans: Technical Support for the USD(Acquisition, Technology & Logistics): Studies and analyses of: Electronic warfare capabilities, joint warfighting command and control in contested environments, combat aircraft service life optimization, WMD defense capabilities, weapons systems architecture, laser systems, ordinance modernization strategies, cyber resilience in industrial control systems, weapons systems software assurance, foreign investment in domestic suppliers, munitions industrial requirements, leveraging additive manufacturing capabilities to strengthen supply chain resilience, technology transfer capabilities, strategic basing requirements, defense acquisition workforce planning, weapons system sustainment in contingency operations, identifying acquisition program risk, support to Defense Science Board task forces on various evolving technological and warfare issues, and leveraging small business technology innovations. Technical Support for the Director, Cost Assessment and Program Evaluation: Studies and analyses regarding the following areas: Requirements regarding investment and resource planning such as future force structure requirements and weapons system requirements, recapitalization planning of strategic forces, product support cost analysis considerations during the acquisition process, commercial aircraft pricing and market factors, contingency force structure capabilities planning, technical studies and analyses to support independent cost estimates and economic research, weapons systems capabilities projection, and continuation of development of critical management instruments for measuring the long-term trends, strength and affordability of the defense program Technical Support for the USD(Policy): Studies, analyses, and activities in the following areas: Requirements regarding national security geopolitical posture and policies such as regional and strategic defense strategy, countering extremist movements, international defense policy planning, strategic force planning, homeland defense and humanitarian response capabilities, deterrence and counterproliferation requirements, international defense trade and industrial relationships, alliance sustainment, technological and other external effects on strategic requirements, space and cyber strategic guidance planning, contingency and stability operations, and strategic-level simulations of areas of interest for legislative and executive branch decision-makers.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605104D8Z / *Technical Studies Support and Analysis*	**Project (Number/Name)** P421 / *Technical Studies*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Technical Support for the USD(Personnel & Readiness): Studies and analyses in the following areas: Requirements regarding sustainment and planning for the force of the future such as active and reserve recruiting and retention issues, health care requirements for current and retired personnel, survivor benefits, compensation analyses, identifying critical personnel requirements, reserve component readiness and sustainability, military family and educational issues, gender and equal opportunity, and strategies for managing the Total Force portfolio. Technical Support for the Joint Staff conducting joint research with OSD: Joint Studies and analyses with OSD based upon operations research, cyber capabilities and strategy, command and control, mobility capabilities, supply chain requirements, training requirements, force programming planning, and basing requirements. ***FY 2018 Plans:*** Technical Support for the USD(Acquisition, Technology & Logistics): Studies and analyses of: Technical areas such as joint warfighting capability and technology planning, strategic and conventional system requirements, technology assurance, munitions requirements, counter WMD defense capabilities, space portfolio architectures, industrial base capabilities assessments, cyber capabilities, defense manufacturing technology, acquisition policy effectiveness, global defense industry trends, technologies for evolving mission requirements, allied defense capabilities, strategic basing requirements, DoD installations planning, logistics supply chain and energy requirements, NATO policy planning, treaty compliance requirements, identifying acquisition program risk, support to Defense Science Board task forces on various evolving technological and warfare issues, and small business technology investment and acquisition strategy, Technical Support for the Director, Cost Assessment and Program Evaluation: Studies and analyses regarding the following areas: Requirements regarding investment and resource planning such as emerging strategic and tactical systems requirements, strategic mobility, maintaining force readiness, personnel force models, assessments in support of scenario analyses, special operations and force support requirements, technical studies and analyses to support independent cost estimates and economic research, comparative analyses of alternative strategic and conventional weapons systems configurations and force levels, and			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605104D8Z / *Technical Studies Support and Analysis*	**Project (Number/Name)** P421 / *Technical Studies*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
continuation of development of critical management instruments for measuring the long-term trends, strength and affordability of the defense program and supporting development of the Future Years Defense Program. Technical Support for the USD(Policy): Studies, analyses, and activities in the following areas: Requirements regarding national security geopolitical posture and policies such as regional and strategic defense strategy, international defense policy planning, strategic force requirements, homeland defense and humanitarian response capabilities, deterrence and counterproliferation requirements, international defense trade and industrial relationships, NATO requirements planning, technological and other external effects on strategic requirements, space and cyber strategic guidance planning, contingency and stability operations, countering emerging terrorist threats, and strategic-level simulations of areas of interest for legislative and executive branch decision-makers. Technical Support for the USD(Personnel & Readiness): Studies and analyses in the following areas: Requirements regarding sustainment and planning for the force of the future such as active and reserve recruiting and retention issues, medical force infrastructure, compensation analyses, identifying critical personnel requirements, reserve component readiness and sustainability, military family and educational issues, gender and equal opportunity, and strategies for managing the Total Force portfolio. Technical Support for the Joint Staff conducting joint research with OSD: Joint Studies and analyses with OSD based upon operations research, cyber force planning, command and control, mobility capabilities, supply chain requirements, joint testing and training requirements, homeland defense, force programming planning, and basing requirements.			
Accomplishments/Planned Programs Subtotals	24.121	23.069	22.386

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605104D8Z / *Technical Studies Support and Analysis*	**Project (Number/Name)** P421 / *Technical Studies*

D. Acquisition Strategy

N/A

E. Performance Metrics

FY 2018 BA: $22.386 FY 2017 BA Assoc w/Metrics: $22.386 Percent FY 2018 BA Assoc w/Metrics: 100%

This program conducts approximately seventy-five actions per fiscal year to support a wide variety of national security goals of the Department and is designed to encourage a collaborative research approach among the components of OSD and the Joint Staff. The research and study projects supported by this program are closely integrated with the strategic goals of the Department of Defense. The focus of studies varies across a wide spectrum including weapons systems cost analysis, strengthening and leveraging alliances, human resource and military personnel management, examination of innovative technologies, application of technology to operational doctrine, and many other issues of emerging importance. Most of the actions are long to intermediate-range in outlook, and the program allows organizational leaders to plan and guide their research toward meeting their highest-priority goals and other high-level guidance such as executive branch performance management objectives, the Quadrennial Defense Review, the President's National Security Strategy, and the National Military Strategy of the United States of America.

In following the program efficiencies guidance of the Secretary of Defense, the scope of studies and analyses has been limited as necessary in order to focus upon issues of the highest strategic importance to the Department of Defense while continuing to make every effort to support requirements for the Office of the Secretary of Defense developing from legislative direction.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0605128D8Z / *Classified Program*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	387.215	115.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
128: *Classified Program*	387.215	115.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

N/A

A. Mission Description and Budget Item Justification

Classified

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	115.000	0.000	0.000	-	0.000
Current President's Budget	115.000	0.000	0.000	-	0.000
Total Adjustments	0.000	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2016	FY 2017
Project: 128: *Classified Program*		
Congressional Add: *Classified*	115.000	-
Congressional Add Subtotals for Project: 128	115.000	-
Congressional Add Totals for all Projects	115.000	-

Change Summary Explanation

N/A

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0605128D8Z / *Classified Program*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017
Congressional Add: Classified	115.000	-
FY 2016 Accomplishments: Classified		
Congressional Adds Subtotals	115.000	-

D. Other Program Funding Summary ($ in Millions)

N/A

Remarks

N/A

E. Acquisition Strategy

N/A

F. Performance Metrics

None

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0605142D8Z / *Systems Engineering*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	149.112	38.321	32.429	37.622	-	37.622	37.146	36.894	37.624	38.385	Continuing	Continuing
P142: *Systems Engineering*	131.667	33.920	28.789	33.392	-	33.392	33.146	32.994	33.724	34.485	Continuing	Continuing
P143: *Program Protection*	17.445	4.401	3.640	4.230	-	4.230	4.000	3.900	3.900	3.900	Continuing	Continuing

A. Mission Description and Budget Item Justification

This Program Element (PE) establishes the dedicated funding line to carry out the duties as described in Title 10 US Code, Section 139, the Weapons Systems Acquisition Reform Act of 2009. The Deputy Assistant Secretary of Defense for Systems Engineering (DASD(SE)) is the principal advisor to the Secretary of Defense, the Under Secretary of Defense for Acquisition, Technology and Logistics (USD(AT&L)) and the Assistant Secretary of Defense for Research and Engineering (ASD(R&E)) on systems engineering, development planning, program protection and related technical fields in the Department of Defense (DoD). The DASD(SE) develops policies and guidance for (1) the use of systems engineering principles and best practices; (2) the use of systems, system security and software engineering planning and contracting approaches to enhance manufacturing, reliability, availability, maintainability, and software and hardware assurance, on major defense acquisition programs (MDAPs) and major automated information systems (MAISs); (3) the systems engineering plans (SEPs) and program protection plans (PPPs) for MDAPs and MAISs including software, and systems engineering considerations in support of lifecycle management and sustainability; and (4) the inclusion of provisions relating to systems engineering, assurance and reliability in requests for proposals. The DASD(SE) develops new methods, processes, and tools (MPTs) incorporating state of the practice into system engineering for the DoD in both weapon system design, and design tools. The DASD(SE) reviews and approves the SEP and PPP for each MDAP and MAIS, and monitors and reviews the systems engineering, program protection and development planning activities of MDAPs and other defense acquisition programs, as directed by the Secretary of Defense or the USD(AT&L). Based on the DASD(SE)'s continuous program engagement, the DASD(SE) advises and makes recommendations to the Secretary of Defense and the USD(AT&L) regarding systems engineering, development planning, program protection and the execution of these activities. As a member of the Defense Acquisition Board (DAB), the DASD(SE) provides independent assessments of defense acquisition program's systems engineering, development planning, program protection planning, technical execution, and risk. The DASD(SE) also provides input on the inclusion of systems engineering requirements as part of the Joint Requirements Oversight Council's process for joint military requirements, to include developing specific inputs relating to each capabilities development document.

The DASD(SE) issues guidance to, and consults with, the Services and Agencies with respect to systems engineering across the Department. DASD(SE) improves DoD's SE capabilities through advocacy, oversight, policy and guidance in: acquisition workforce responsible for Engineering, and Production, Quality & Manufacturing (PQM); Engineering Tools and Environments; and Specialty Engineering.

The DASD(SE) periodically reviews the organizations and capabilities of the military departments with respect to systems engineering, development planning, and lifecycle management and sustainability, and identifies needed changes or improvements to such organizations and capabilities. The DASD(SE) prepares and submits a bi-annual report to Congress on systems engineering activities and effectiveness.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0605142D8Z / *Systems Engineering*

This PE includes efforts by the office of the DASD(SE) in implementing the Department's Trusted Defense System Strategy. Specifically, the PE will develop and mature the critical sub discipline of systems engineering - system security engineering (SSE), Hardware and Software Assurance, and the Comprehensive Program Protection Planning process that implements a risk-based approach to protection of critical program information, critical components and mission functions, and information in acquisition programs. These efforts include study and maturation of policy, guidance, system security discipline fundamentals, such as engineering methods, tools, and best practices, and establishing a coalition of assurance activities across the DoD to provide analytical and technical support to acquisition programs. These activities will be promulgated in defense acquisition as a fundamental element of DASD(SE) systems engineering and technical reviews.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	39.581	32.429	38.400	-	38.400
Current President's Budget	38.321	32.429	37.622	-	37.622
Total Adjustments	-1.260	0.000	-0.778	-	-0.778
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.260	-			
• DTIC Offset	-	-	-0.258	-	-0.258
• Other	-	-	-0.520	-	-0.520

Change Summary Explanation

SRRB - Service Requirement Review Board - As part of the Department of Defense reform agenda, the incremental reduction accounts for consolidation and reduction of service contracts.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0605142D8Z / *Systems Engineering*	Project (Number/Name) P142 / *Systems Engineering*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P142: *Systems Engineering*	131.667	33.920	28.789	33.392	-	33.392	33.146	32.994	33.724	34.485	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project P142 supports the execution of the missions of the Deputy Assistant Secretary of Defense for Systems Engineering (DASD(SE)) to: (1) provide flexible engineering policy, guidance, and workforce development requirements for the DoD acquisition workforce; (2) foster an acquisition environment of collaboration, teamwork, and joint ownership of program success through a proactive program oversight process, ensuring appropriate levels of systems engineering discipline are applied through all phases of the acquisition life cycle; and (3) engage all stakeholders across government, industry, and academia to collectively advance systems engineering practice and achieve acquisition excellence. The outcome of this effort is to ensure systems engineering principles and disciplines are fully accepted and assimilated into the DoD acquisition workforce positioning the DoD for acquisition excellence and leading to a stronger national defense.

Activities include the following functions:

• Work with acquisition program managers to prepare systems engineering plans (SEPs) to document the technical management approach.
• Conduct periodic program engagements in support of technical reviews to confirm programs are executed in accordance with the SEP.
• Review all aspects of the systems engineering process for major defense acquisition programs (MDAPs) to ensure they are adequate to support fielding and the achievement of cost and performance goals including producibility, reliability, sustainment, and other considerations.
• Participate in Systems Engineering Integrated Project Teams (IPTs), Systems Engineering Working Integrated Project Teams (WIPTs), and Systems Engineering technical reviews, especially Preliminary Design Reviews and Critical Design Reviews.
• Work with DoD Service program managers, their staffs, and other organizations, technical authorities, and oversight organizations to develop and implement technical management programs for MDAPs.
• Conceive plans and lead program support reviews and assessments of MDAP weapons systems and other programs (e.g., Major Automated Information Systems (MAIS)) to shape technical planning and management to ensure program success.
• Conduct other technical reviews as requested (e.g., Nunn-McCurdy certification reviews, Non-Advocate Reviews, focused technical assessments, and software readiness reviews to identify and mitigate program risk).
• Establish engineering policy, guidance, and workforce development to drive the development of fully capable and supportable weapons systems.
• Oversee Component implementation of engineering initiatives and conduct independent assessments.
• Incorporate new MPTs into the engineering practice for development of weapon systems.
• Advance the principles of modularity and open systems and incorporate them when practicable in the design, and acquisition of weapon systems.
• Develop education and training materials for instructing, maintaining, and enhancing the defense acquisition workforce. Activities include: (1) developing guidance to enhance Engineering (ENG) and Production Quality and Manufacturing (PQM) acquisition career planning and progression; and (2) monitoring, and facilitating Defense Acquisition University (DAU) updates to the systems engineering, quality and specialty engineering courses, to ensure the curriculum represents the education and training requirements necessary to be a viable team member in the acquisition process.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605142D8Z / *Systems Engineering*	**Project (Number/Name)** P142 / *Systems Engineering*

• Improving the DoD's capabilities in Specialty Engineering (e.g. reliability & maintainability, human-systems integration, weapons safety, value engineering and manufacturing) through policy, program oversight, fostering practice and technology improvements, initiating long-term strategic improvements, and collaborating with industry.
• Advance DoD engineering practices through the use of digital engineering and model-based systems engineering.
• Increase trust in computer hardware and software in warfighting systems by establishing a cadre of activities across the DoD capable of detecting and reducing or eliminating software and hardware vulnerabilities for systems in development and sustainment.
• Serve as the Defense Standardization Executive and oversee the Defense Standardization Program.
• Guide Service and other component organizations in the development planning process to ensure proposed MDAP programs are executable within acceptable levels of risk.
• Resolve long-term major systems engineering challenges such as systems of systems (SoS) systems engineering, systems engineering of complex systems, and pre-program formulation systems engineering trade off analysis.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Systems Engineering Initiatives	33.920	28.789	33.392
Description: The DASD(SE) provides objective assessments of program risk to support knowledge-based decision making by DoD leaders regarding DoD MDAPs and MAISs.			
FY 2016 Accomplishments: Strategic Thrust: Program Support • Monitored programs, providing SE oversight and support to all MDAPs, Major Automated Information Systems (MAIS), and special interest programs. • Expanded root cause analysis conducted during and after Program Support Assessments (PSAs). • Expanded use of detailed performance measurement and analysis. • Provided decision-quality information and recommendations to DABs, In Progress Reviews, Peer Reviews, and PDR/CDR assessments. Strategic Thrust: Workforce Development • Carried out Functional Lead duties for Engineering (ENG), Production, Quality, and Manufacturing(PQM), conduct Key Leader Position board for PQM • Updated and deployed courses with increased technical rigor and complex, case-based exercises. • Investigated workforce development initiatives including leadership development, specialized training, and improved instructional methods. • Assessed engineering workforce capability and capacity, and, working with Components, develop strategies to address identified gaps. • Performed outreach to services and OSD to focus the Department's attention and behavior on promoting an engineering culture.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605142D8Z / *Systems Engineering*	**Project (Number/Name)** P142 / *Systems Engineering*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Strategic Thrust: Engineering Policy and Guidance • Developed and updated core SE policy, guidance and standards; review all acquisition policy for SE implications. • Developed engineering guidance and policies for the integration of specialty engineering functions including, but not limited to, program protection/system security engineering; software; manufacturing, reliability, availability, and maintainability; modeling and simulation; configuration management; data management; and risk management. • Provided guidance to Defense acquisition programs for developing and documenting each program's technical strategy and management approach in the SEP throughout the program's lifecycle. Strategic Thrust: Systems Engineering Capabilities Assessment • Worked jointly with DT&E to develop and track measurable performance criteria. • Developed and strengthened component SE organization and capabilities. • Periodically reviewed the organizations and capabilities of the Military Departments and Defense Agencies with respect to systems engineering, development planning, and lifecycle management and sustainability, and identify needed changes or improvements to such organizations and capabilities. • Issued guidance to and consulted with the Heads of the DoD Components with respect to systems engineering and development planning in the DoD. • Stored and analyzed performance criteria in SEPs and Test and Evaluation Master Plans (TEMPs) for MDAPs; develop program metrics to aid SE assessments and program execution. Strategic Thrust: Early Systems Engineering and Development Planning • Performed early acquisition risk assessment including pre-MS A engagement with Joint Requirements Oversight Council processes. • Provided the following support: (1) Services and COCOMs in pre-MS A formulation; (2) requirements analyses and analysis of alternatives; and (3) initial capabilities document definition and development. Strategic Thrust: Engineering Tools and Environments • Established guidance and education to support digital engineering use in Systems Engineering. • Continued collaboration in digital engineering methods, processes, tools development and gap identification. • Oversaw development of, and incorporation of modularity and open system technical enablers by Services in their acquisition efforts.			
FY 2017 Plans: Strategic Thrust: Program Support Continue to:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605142D8Z / *Systems Engineering*	**Project (Number/Name)** P142 / *Systems Engineering*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Monitor programs, providing SE oversight and support to all MDAPs, Major Automated Information Systems (MAIS), and special interest programs. • Expand root cause analysis conducted during and after Program Support Assessments (PSAs). • Expand use of detailed performance measurement and analysis. • Provide decision-quality information and recommendations to DABs, In Progress Reviews, Peer Reviews, and PDR/CDR assessments. Strategic Thrust: Work Force Development • Carry out duties as Functional Lead for Engineering (ENG), Production, Quality, and Manufacturing(PQM), all Department non-construction engineering and assist software engineering. • Build an enduring high performance engineering culture across the Department in Systems Engineering. • Update and deploy courses with increased technical rigor and complex, case-based exercises. • Investigate workforce development initiatives including leadership development, specialized training, and improved instructional methods. • Assess engineering workforce capability and capacity, and, working with Components, develop strategies to address identified gaps. • Perform outreach to services and OSD to focus the Department's attention and behavior on promoting an engineering culture. Strategic Thrust: Engineering Policy and Guidance • Develop and update core SE policy, guidance and standards; review all acquisition policy for SE implications. • Develop engineering guidance and policies for the integration of specialty engineering functions as part of the SE responsibility in the acquisition process including, but not limited to, program protection/system security engineering; software; manufacturing, reliability, availability, and maintainability; modeling and simulation; configuration management; data management; and risk management. • Assess challenges and impact; develop new guidance, best practices, methods, processes and tools to more effectively implement SE for Systems of Systems. • Provide guidance to Defense acquisition programs for developing and documenting each program's technical strategy and management approach in the SEP throughout the program's lifecycle. Strategic Thrust: Systems Engineering Capabilities Assessment • Work jointly with DT&E to develop and track measurable performance criteria. • Develop and strengthen component SE organization and capabilities. • Periodically review the organizations and capabilities of the Military Departments and Defense Agencies with respect to systems engineering, development planning, and lifecycle management and sustainability, and identify needed changes or improvements to such organizations and capabilities.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605142D8Z / *Systems Engineering*	**Project (Number/Name)** P142 / *Systems Engineering*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Issue guidance to and consult with the Heads of the DoD Components with respect to systems engineering and development planning in the DoD. • Store and analyze performance criteria in SEPs and Test and Evaluation Master Plans (TEMPs) for MDAPs; develop program metrics to aid SE assessments and program execution. Strategic Thrust: Early Systems Engineering and Development Planning • Perform early acquisition risk assessment including pre-MS A engagement with Joint Requirements Oversight Council processes. • Support: (1) Services and COCOMs in pre-MS A formulation; (2) requirements analyses and analysis of alternatives; and (3) initial capabilities document definition and development. Strategic Thrust: Engineering Tools and Environments • Establish guidance and education to support digital engineering use in Systems Engineering. • Continue collaboration in digital engineering methods, processes, tools development and gap identification. • Oversee development of, and incorporation of modularity and open system technical enablers by Services in their acquisition efforts.			
FY 2018 Plans: Strategic Thrust: Program Support Continue to: • Monitor programs, providing SE oversight and support to all MDAPs, Major Automated Information Systems (MAIS), and special interest programs. • Expand root cause analysis conducted during and after Program Support Assessments (PSAs). • Expand use of detailed performance measurement and analysis. • Provide decision-quality information and recommendations to DABs, In Progress Reviews, Peer Reviews, and PDR/CDR assessments. Strategic Thrust: Work Force Development • Carry out duties as Functional Lead for Engineering (ENG), Production, Quality, and Manufacturing(PQM), all Department non-construction engineering and assist software engineering. • Build an enduring high performance engineering culture across the Department in Systems Engineering. • Update and deploy courses with increased technical rigor and complex, case-based exercises. • Investigate workforce development initiatives including leadership development, specialized training, and improved instructional methods.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605142D8Z / *Systems Engineering*	**Project (Number/Name)** P142 / *Systems Engineering*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Assess engineering workforce capability and capacity, and, working with Components, develop strategies to address identified gaps. • Perform outreach to services and OSD to focus the Department's attention and behavior on promoting an engineering culture. Strategic Thrust: Engineering Policy and Guidance • Develop and update core SE policy, guidance and standards; review all acquisition policy for SE implications. • Develop engineering guidance and policies for the integration of specialty engineering functions as part of the SE responsibility in the acquisition process including, but not limited to, program protection/system security engineering; software; manufacturing, reliability, availability, and maintainability; modeling and simulation; configuration management; data management; and risk management. • Assess challenges and impact; develop new guidance, best practices, methods, processes and tools to more effectively implement SE for Systems of Systems. • Provide guidance to Defense acquisition programs for developing and documenting each program's technical strategy and management approach in the SEP throughout the program's lifecycle. Strategic Thrust: Systems Engineering Capabilities Assessment • Work jointly with DT&E to develop and track measurable performance criteria. • Develop and strengthen component SE organization and capabilities. • Periodically review the organizations and capabilities of the Military Departments and Defense Agencies with respect to systems engineering, development planning, and lifecycle management and sustainability, and identify needed changes or improvements to such organizations and capabilities. • Issue guidance to and consult with the Heads of the DoD Components with respect to systems engineering and development planning in the DoD. • Store and analyze performance criteria in SEPs and Test and Evaluation Master Plans (TEMPs) for MDAPs; develop program metrics to aid SE assessments and program execution. Strategic Thrust: Early Systems Engineering and Development Planning • Perform early acquisition risk assessment including pre-MS A engagement with Joint Requirements Oversight Council processes. • Support: (1) Services and COCOMs in pre-MS A formulation; (2) requirements analyses and analysis of alternatives; and (3) initial capabilities document definition and development. Strategic Thrust: Engineering Tools and Environments • Establish guidance and education to support digital engineering use in Systems Engineering. • Continue collaboration in digital engineering methods, processes, tools development and gap identification.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605142D8Z / *Systems Engineering*	**Project (Number/Name)** P142 / *Systems Engineering*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Oversee development of, and incorporation of modularity and open system technical enablers by Services in their acquisition efforts.			
Accomplishments/Planned Programs Subtotals	33.920	28.789	33.392

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Improved the Systems Engineering effectiveness of the Department's acquisition enterprise and provided Department leadership with technical insights into acquisition program performance through:

• Systems engineering plans (SEPs) reviewed and approved to document each program's technical management approach.

• Program support assessments (PSAs) and periodic program engagements conducted and program technical reviews supported to confirm programs are executed in accordance with the SEP.

• Technical reviews conducted as requested (e.g., Nunn-McCurdy certification reviews, Non-Advocate Reviews, and focused technical assessments to identify and mitigate program risk).

• DABs, Overarching Integrated Product Teams (OIPTs), and other program review participation to provide technical insights to OSD stakeholders.

• Effective systems engineering policy and guidance established and promulgated throughout the Military Services and the Defense Acquisition System.

• A systems engineering workforce staffed, trained and certified with capable and experienced personnel.

• Improved reliability engineering, reliability growth management, and reliability monitoring in program development contracting, execution and sustainment.

• Service and other component organizations engaged and supported in the development planning process through effective policy, guidance, document reviews and program engagement to ensure proposed MDAP programs are executable within acceptable levels of risk.

• Increased use of digital artifacts in acquisition decision making and expansion of design options.

• Increased use of modular designs and design techniques in weapon systems, coupled with appropriate contracting language and follow through.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0605142D8Z / *Systems Engineering*	Project (Number/Name) P143 / *Program Protection*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P143: *Program Protection*	17.445	4.401	3.640	4.230	-	4.230	4.000	3.900	3.900	3.900	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Department of Defense (DoD) must address cybersecurity and supply chain risks to DoD networks, weapons systems, and information stored and processed on both DoD and Defense Industrial Base (DIB) unclassified networks that support DoD programs. Increased reliance on the internet as a vehicle for sharing information, globalization of the supply chain, and advanced persistent threats (APTs) that can evade commercially available security tools and defeat generic security best practices, drives the need for diligent program protection planning and execution. Program Protection Planning includes protection of critical program information, critical components and mission functions, and integrates high level security policies and practical expertise to specific acquisition practices, systems engineering activities, and risk reduction activities. Through this initiative the Department is maturing system security engineering methodologies to protect controlled unclassified information, to include controlled technical information on contractor networks; improve mitigation of supply chain risk management risks, improve integration of cybersecurity into the engineering processes, improve software assurance practices, mature processes to identify Critical Program Information and improve program protection planning. Activities carried out, support implementation of DoD Instruction 5200.44 Trusted Systems and Networks with the use of proven mitigation techniques and tools, the ongoing refinement of risk management processes, and creation of needed technology; implementation of DoD Instruction 5200.39 Critical Program Information (CPI) Identification and Protection Within Research, Development, Test, and Evaluation (RDT&E) to identify and protect Critical Program Information; and implementation of Safeguarding Controlled Unclassified Information on contractor owned networks.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Program Protection	4.401	3.640	4.230
Description: DASD SE provides system security engineering policy, guidance and objective assessments to reduce risks in sharing and storing Controlled Technical Information, improve mitigation of supply chain risk management risks, improve integration of cybersecurity into the engineering processes, improve software and hardware assurance practices and anti-tamper practices, mature processes to identify Critical Program Information and improve program protection planning. Activities carried out support implementation of DoD Instruction 5200.44 Trusted Systems and Networks with the use of proven mitigation techniques and tools, the ongoing refinement of risk management processes, and creation of needed technology; implementation of DoD Instruction 5200.39 Critical Program Information (CPI) Identification and Protection Within Research, Development, Test, and Evaluation (RDT&E) to identify and protect Critical Program Information; and implementation of Safeguarding Controlled Unclassified Information on contractor owned networks.			
FY 2016 Accomplishments: Provide support to Acquisition Category (ACAT) I programs to conduct broad program protection planning. - Conducted criticality analyses to determine system vulnerabilities. - Developed Program Protection Plans, and track progress to verify protection of critical program capabilities.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605142D8Z / *Systems Engineering*	**Project (Number/Name)** P143 / *Program Protection*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Reviewed ACAT I Program Protection Plans and provide recommendations for their approval to USD(AT&L). • Advance the state of the practice of systems security engineering. - Continued development of methodology to identify and mitigate system security, to include cybersecurity risk. - Continued to develop courseware, refine guidance, mentor Service teams, provide training, and outreach with government and industry. - Finalized policy for cybersecurity. - Tracked implementation of industry network security and protection of technical information. • Hardware and Software Assurance (HwA and SwA) - Supported the activities of the JFAC steering council, run the AO Working Group. - Facilitated JFAC achieving IOC and conducting a capability gap analysis. - Provided SME support to acquisition program reviews and oversight. ***FY 2017 Plans:*** Continue to: • Provide support to Acquisition Category (ACAT) I programs to conduct broad program protection planning. - Conduct criticality analyses to determine system vulnerabilities. - Develop Program Protection Plans, and track progress to verify protection of critical program capabilities. - Review ACAT I Program Protection Plans and provide recommendations for their approval to USD(AT&L). • Advance the state of the practice of systems security engineering. - Continue development of methodology to identify and mitigate system security, to include cybersecurity risk. - Continue to develop courseware, refine guidance, mentor Service teams, provide training, and outreach with government and industry. • Hardware and Software Assurance (HwA and SwA) - Conduct hardware and software technical working groups, assurance oversight steering council and support group. - Approve HwA and SwA concept of operations for collaboration activities and program support. - Approve strategic plan: establish requirements and schedule for Initial Operating Capabilities (IOC) of HwA and SwA efforts. - Conduct comprehensive survey across HwA and SwA activities to: document capability and capacity, identify gaps, propose gap mediation investments. ***FY 2018 Plans:*** Continue to:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605142D8Z / *Systems Engineering*	**Project (Number/Name)** P143 / *Program Protection*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Provide support to Acquisition Category (ACAT) I programs to conduct broad program protection planning. - Conduct criticality analyses to determine system vulnerabilities. - Develop Program Protection Plans, and track progress to verify protection of critical program capabilities. - Review ACAT I Program Protection Plans and provide recommendations for their approval to USD(AT&L). • Advance the state of the practice of systems security engineering. - Continue development of methodology to identify and mitigate system security, to include cybersecurity risk. - Continue to develop courseware, refine guidance, mentor Service teams, provide training, and outreach with government and industry. • Hardware and Software Assurance (HwA and SwA) - Conduct hardware and software technical working groups, assurance oversight steering council and support group. - Approve HwA and SwA concept of operations for collaboration activities and program support. - Approve strategic plan: establish requirements and schedule for Initial Operating Capabilities (IOC) of HwA and SwA efforts. - Conduct comprehensive survey across HwA and SwA activities to: document capability and capacity, identify gaps, propose gap mediation investments.			
Accomplishments/Planned Programs Subtotals	4.401	3.640	4.230

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

The program protection project supports activities focused on: (1) improving system security engineering to reduce risks in sharing and storing controlled unclassified information, to include controlled technical information, (2) improve mitigation to supply chain risks, (3) Program Protection Plans reviewed and recommended for USD(AT&L) approval, (4) effective system security engineering policy and guidance, (5) improve software and hardware assurance and anti-tamper practices and implementation, (6) mature processes to identify and protect critical program information, critical components and mission functions.

Impact of the program protection initiative is assessed based upon number of major acquisition programs supported with formal assessments, program protection plans reviewed and approved, and through engagement supporting acquisition policy initiatives related to program protection.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0605151D8Z / *Studies and Analysis Support - OSD*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	14.352	2.696	3.797	5.200	-	5.200	5.000	4.500	5.000	4.970	Continuing	Continuing
001: *Joint Service Training & Readiness System Development Program*	14.352	2.696	3.797	5.200	-	5.200	5.000	4.500	5.000	4.970	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Joint Service programs were established by the Secretary of Defense to improve the readiness and training of the Active and Reserve Components. This project expedites the development of technologies and systems which improve overall effectiveness and performance of the Total Force. It facilitates the sharing of information, while allowing for the transfer of emerging and innovative technologies among the Services and private sector. In addition, this project supports OSD (P&R), other OSD offices, Joint Staff, Unified Commands, and the Services in promoting more efficient and effective use of resources, increasing the effectiveness of military training, and enhancing the readiness and performance of the Total Force. Projects analyze the contributions to readiness of various programs and training techniques and use the results to expedite new concepts and procedures that increase unit effectiveness or decrease costs. Emphasis is placed on developing analytical tools and systematic methodologies to improve readiness and training resource allocations.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	2.710	3.797	5.622	-	5.622
Current President's Budget	2.696	3.797	5.200	-	5.200
Total Adjustments	-0.014	0.000	-0.422	-	-0.422
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.014	-			
• SBIR/STTR Transfer	-	-			
• SRRB Reductions and other Adjustments	-	-	-0.422	-	-0.422

Change Summary Explanation

Funding adjustment reflects SRRB reductions - Service Requirement Review Board - As part of the Department of Defense reform agenda, the incremental reduction accounts for consolidation and reduction of service contracts.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0605151D8Z / *Studies and Analysis Support - OSD*	Project (Number/Name) 001 / *Joint Service Training & Readiness System Development Program*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
001: *Joint Service Training & Readiness System Development Program*	14.352	2.696	3.797	5.200	-	5.200	5.000	4.500	5.000	4.970	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Joint Service programs were established by the Secretary of Defense to improve the readiness and training of the Active and Reserve Components. This project expedites the development of technologies and systems which improve overall effectiveness and performance of the Total Force. It facilitates the sharing of information, while allowing for the transfer of emerging and innovative technologies among the Services and private sector. In addition, this project supports OSD Personnel and Readiness (P&R), other OSD offices, Joint Staff, Unified Commands, and the Services in promoting more efficient and effective use of resources, increasing the effectiveness of military training, and enhancing the readiness and performance of the Total Force. Projects analyze the contributions to readiness of various programs and training techniques and use the results to expedite new concepts and procedures that increase unit effectiveness or decrease costs. Emphasis is placed on developing analytical tools and systematic methodologies to improve readiness and training resource allocations.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Joint Service Training & Readiness System Development	2.696	3.797	5.200

Description: The Joint Service programs were established by the Secretary of Defense to improve the readiness and training of the Active and Reserve Components. This project expedites the development of technologies and systems which improve overall effectiveness and performance of the Total Force. It facilitates the sharing of information, while allowing for the transfer of emerging and innovative technologies among the Services and private sector. In addition, this project supports OSD (P&R), other OSD offices, Joint Staff, Unified Commands, and the Services in promoting more efficient and effective use of resources, increasing the effectiveness of military training, and enhancing the readiness and performance of the Total Force. Projects analyze the contributions to readiness of various programs and training techniques and use the results to expedite new concepts and procedures that increase unit effectiveness or decrease costs. Emphasis is placed on developing analytical tools and systematic methodologies to improve readiness and training resource allocations.

FY 2016 Accomplishments:

- Initiated model development efforts for both strategic readiness and impacts of resourcing as pertains to readiness;
- Developed a strategic approach to Reserve Officer Training Corps (ROTC) sizing and investments to ensure sufficient numbers of high quality officers into the future;
- Examined current size of and future requirements for joint duty assignments as pertains to the joint duty assignment list (JDAL);

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605151D8Z / *Studies and Analysis Support - OSD*	**Project (Number/Name)** 001 / *Joint Service Training & Readiness System Development Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Assessed both the overall military manpower workforce mix and more specifically the mixes of both military technicians (MilTechs) and Active Guard/Reserve (AGR) forces; • Explored methods for mitigating risks to force training and infrastructure using allied military capabilities and facilities to save costs and assist when expansion of force is necessary; and • Continued efforts to help understand economic retruns to improved military training and credentialing; ***FY 2017 Plans:*** • Complete model development efforts for both strategic readiness and impacts of resourcing as pertains to readiness; • Test newly devised methods for building resilient, elite warriors while enhancing skills for recovery; • Investigate effects of multiple deployments on private sector mobility and financial remuneration of Reserve component members; • Continue efforts related to workforce mix, data alignment, and coding taxonomies relevancy and currency; * Evaluated readiness impacts of modifications to the Department's Total Force personnel systems; and * Respond to Congressional mandates and directives ***FY 2018 Plans:*** * Continue to assess workforce skills and analyze training requirement to support the DoD Strategy in evolving areas; * Continue to identify and analyze opportunities for early and effective incorporation of human systems interface considerations in system training for new acquisitions; * Continue to investigate modeling and simulation technologies to increase training effectiveness and lower costs; and * Respond to Congressional mandates and directives			
Accomplishments/Planned Programs Subtotals	2.696	3.797	5.200

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Each project contained within this program contains specific metrics to determine progress towards completion. Metrics for all include completed and documented analysis provided by the performer. The completion date for that analysis varies with each project. In addition, to that analysis, each effort contains a roadmap

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605151D8Z / *Studies and Analysis Support - OSD*	**Project (Number/Name)** 001 / *Joint Service Training & Readiness System Development Program*

addressing the best use of the findings throughout the department. If the results of the analysis show benefit to the Department, those findings are included in policy, doctrine, tactics and procedures.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0605161D8Z / *Nuclear Matters*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	17.215	5.094	5.302	5.232	-	5.232	5.091	5.160	5.257	5.362	Continuing	Continuing
P161: *Nuclear Matters*	17.215	5.094	5.302	5.232	-	5.232	5.091	5.160	5.257	5.362	Continuing	Continuing

A. Mission Description and Budget Item Justification

The purpose of the Nuclear Matters program is to sustain the U.S. nuclear deterrent posture, counter nuclear threats, and to develop nuclear and conventional physical security equipment. The funds for this program are used to support research, development, test and evaluation efforts as well as studies and analyses for nuclear weapons security; use control; nuclear weapons stockpile safety, survivability and performance; countering nuclear threats and office management. Funds are also used to develop and implement plans for stockpile transformation; infrastructure analyses and assessments; DoD-NNSA Nuclear Weapons Council activities, as mandated by Title 10 USC, section 179; radiological and nuclear emergency response efforts; and management of international programs of nuclear cooperation, particularly with respect to enhancing international nuclear safety and security and office management. Nuclear Matters is also responsible for policy development and implementation for personnel reliability; nuclear weapons, nuclear command and control, and special nuclear materials security; use control; nuclear weapons transportation; physical security equipment; countering nuclear threats; and nuclear and radiological incident response.

This Program Element can fund travel to support the requirements of this program.

This appropriation will finance work, including manpower, performed by a government agency or by private individuals or organizations under a contractual or grant arrangement with the government who conduct research (systematic study directed toward fuller scientific knowledge or understanding of the subject studied), development (systematic use of the knowledge and understanding gained from research, for the production of useful materials, devices, systems, or methods, including the design and development of prototypes and processes) and test and evaluation efforts.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	5.277	5.302	5.272	-	5.272
Current President's Budget	5.094	5.302	5.232	-	5.232
Total Adjustments	-0.183	0.000	-0.040	-	-0.040
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.183	-			
• Internal Directed Reduction	-	-	-0.005	-	-0.005
• DTIC Offset	-	-	-0.035	-	-0.035

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0605161D8Z / *Nuclear Matters*	Project (Number/Name) P161 / *Nuclear Matters*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P161: *Nuclear Matters*	17.215	5.094	5.302	5.232	-	5.232	5.091	5.160	5.257	5.362	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The purpose of the Nuclear Matters program is to sustain the U.S. nuclear deterrent posture, counter nuclear threats, and to develop nuclear and conventional physical security equipment. The funds for this program are used to support research, development, test and evaluation efforts as well as studies and analyses for nuclear weapons security; use control; nuclear weapons stockpile safety, survivability and performance; countering nuclear threats and office management. Funds are also used to develop and implement plans for stockpile transformation; infrastructure analyses and assessments; DoD-NNSA Nuclear Weapons Council activities, as mandated by Title 10 USC, section 179; radiological and nuclear emergency response efforts; and management of international programs of nuclear cooperation, particularly with respect to enhancing international nuclear safety and security and office management. Nuclear Matters is also responsible for policy development and implementation for personnel reliability; nuclear weapons, nuclear command and control, and special nuclear materials security; use control; nuclear weapons transportation; physical security equipment; countering nuclear threats; and nuclear and radiological incident response.

This Program Element can fund travel to support the requirements of this program.

This appropriation will finance work, including manpower, performed by a government agency or by private individuals or organizations under a contractual or grant arrangement with the government who conduct research (systematic study directed toward fuller scientific knowledge or understanding of the subject studied), development (systematic use of the knowledge and understanding gained from research, for the production of useful materials, devices, systems, or methods, including the design and development of prototypes and processes) and test and evaluation efforts.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Nuclear Weapons Council (NWC)	0.510	0.621	0.600
Description: The Nuclear Weapons Council (NWC) is a joint Department of Defense (DoD) and Department of Energy (DOE)/ National Nuclear Security Administration (NNSA) organization established by Congress to facilitate cooperation and coordination between the two Departments as they fulfill their dual agency responsibilities for U.S. nuclear weapons stockpile management.			
FY 2016 Accomplishments: - Oversaw the activities on the Congressionally mandated Joint DoD-DOE Nuclear Weapons Council and its support committees to include the Nuclear Weapons Council Standing and Safety Committee, the Compartmented Advisory Committee and the Action Officer group			
FY 2017 Plans:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605161D8Z / *Nuclear Matters*	**Project (Number/Name)** P161 / *Nuclear Matters*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Oversee the activities on the Congressionally mandated Joint DoD-DOE Nuclear Weapons Council and its support committees to include the Nuclear Weapons Council Standing and Safety Committee, the Compartmented Advisory Committee and the Action Officer group ***FY 2018 Plans:*** - Oversee the activities on the Congressionally mandated Joint DoD-DOE Nuclear Weapons Council and its support committees to include the Nuclear Weapons Council Standing and Safety Committee, the Compartmented Advisory Committee and the Action Officer group			
Title: International Programs ***Description:*** The United States also participates in several international programs of cooperation regarding nuclear weapons with foreign governments and regional defense organizations that involve unclassified and classified information exchanges. In general, these agreements are designed to promote safety and security, advance stockpile stewardship and collaborate in counter-proliferation efforts. ***FY 2016 Accomplishments:*** - Built programs of cooperation with international partners. - Sponsored international partners at national-level nuclear weapons accident/incident exercises. ***FY 2017 Plans:*** - Execute confidence building programs of cooperation with international partners. - Sponsor international partners at national-level nuclear weapons accident/incident exercises. ***FY 2018 Plans:*** - Execute confidence building programs of cooperation with international partners. - Sponsor international partners at national-level nuclear weapons accident/incident exercises.	0.319	0.199	0.197
Title: Nuclear Surety ***Description:*** Because of their political and military importance, destructive power, and the potential consequences of an accident or unauthorized act, nuclear weapons and nuclear weapon systems require special consideration and must be protected against risks and threats inherent in their peacetime and wartime environments. Oversight of the DoD nuclear surety program is provided by Deputy Assistant Secretary of Defense for Nuclear Matters (DASD(NM)). ***FY 2016 Accomplishments:*** - Conducted OSD oversight and provided direction for actions taken under DoDD 4540.5, "Transportation of Nuclear Weapons"; DoDD S-5210.81, "United States Nuclear Weapons Command and Control, Safety, and Security"; DoDD S-3150.7, "Controlling	0.773	0.748	0.822

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605161D8Z / *Nuclear Matters*	**Project (Number/Name)** P161 / *Nuclear Matters*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
the Use of Nuclear Weapons"; DoDD 5210.42 and 5210.42-R, "The DoD Personnel Reliability Program'; and DoDD 5210.41 and S-5210.41-M, "Physical Security of Nuclear Weapons." - Supported activities that support nuclear surety policy and provided OSD oversight of the Nuclear Surety program. ***FY 2017 Plans:*** - Conduct OSD oversight and provide direction for actions taken under DoDD 4540.5, "Transportation of Nuclear Weapons"; DoDD S-5210.81, "United States Nuclear Weapons Command and Control, Safety, and Security"; DoDD S-3150.7, "Controlling the Use of Nuclear Weapons"; DoDD 5210.42 and 5210.42-R, "The DoD Personnel Reliability Program'; and DoDD 5210.41 and S-5210.41-M, "Physical Security of Nuclear Weapons." - Support activities that support nuclear surety policy and provide OSD oversight of the Nuclear Surety program. ***FY 2018 Plans:*** - Conduct OSD oversight and provide direction for actions taken under DoDD 4540.5, "Transportation of Nuclear Weapons"; DoDD S-5210.81, "United States Nuclear Weapons Command and Control, Safety, and Security"; DoDD S-3150.7, "Controlling the Use of Nuclear Weapons"; DoDD 5210.42 and 5210.42-R, "The DoD Personnel Reliability Program'; and DoDD 5210.41 and S-5210.41-M, "Physical Security of Nuclear Weapons." - Support activities that support nuclear surety policy and provide OSD oversight of the Nuclear Surety program.			
Title: Stockpile Transformation ***Description:*** To meets its security needs and those of its allies, the U.S. will need a safe, secure, and reliable nuclear deterrent for the foreseeable future. There's increased risk, absent nuclear testing, in assuring long-term safety and reliability of today's aging stockpile—the legacy warheads left over from the Cold War. Today's nuclear weapons complex is not sufficiently "responsive" to technical problems in the stockpile, or to potential emerging threats. The task is to ensure the U.S. nuclear weapons stockpile and supporting infrastructure, meets long-term national security needs. ***FY 2016 Accomplishments:*** - Conducted life cycle activities in support of the nuclear weapons stockpile under DoDD 3150.1, "Nuclear Weapons Life Cycle" and DoDI 5030.55, "DoD Procedures for Joint DoD-DOE Nuclear Weapons Life Cycle Activities. - Managed DoD RDT&E activities for nuclear warheads to include B61, W76, W78, W80(0,1), B83, W87, W88 Weapons. - Supported studies for warhead replacement. ***FY 2017 Plans:*** - Conduct life cycle activities in support of the nuclear weapons stockpile under DoDD 3150.1, "Nuclear Weapons Life Cycle" and DoDI 5030.55, "DoD Procedures for Joint DoD-DOE Nuclear Weapons Life Cycle Activities. - Manage DoD RDT&E activities for nuclear warheads to include B61, W76, W78, W80(0,1), B83, W87, W88 Weapons.	1.136	1.268	1.033

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605161D8Z / *Nuclear Matters*	**Project (Number/Name)** P161 / *Nuclear Matters*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Support studies for warhead replacement. ***FY 2018 Plans:*** - Conduct life cycle activities in support of the nuclear weapons stockpile under DoDD 3150.1, "Nuclear Weapons Life Cycle" and DoDI 5030.55, "DoD Procedures for Joint DoD-DOE Nuclear Weapons Life Cycle Activities. - Manage DoD RDT&E activities for nuclear warheads to include B61, W76, W78, W80(0,1), B83, W87, W88 Weapons. - Support studies for warhead replacement.			
Title: Survivability and Weapons of Mass Destruction (WMD) ***Description:*** In the 2010 Quadrennial Defense Review (QDR), the SECDEF directed the Department to rebalance its policy, doctrine, and capabilities to better support six key missions. The fifth on the list of key missions is to prevent proliferation and counter weapons of mass destruction. This project directly supports the nation's defense strategy. ***FY 2016 Accomplishments:*** - Oversaw the Nuclear Defense Portfolio. - Planned and coordinated the activities of the National Nuclear Forensics Steering Committee and Working Group. - Developed OSD-wide approach to overseeing Global Nuclear Defense missions within DoD. ***FY 2017 Plans:*** Continue to: - Oversee the Nuclear Defense Portfolio. - Plan and coordinate the activities of the National Nuclear Forensics Steering Committee and Working Group. - Develop OSD-wide approach to overseeing Global Nuclear Defense missions within DoD. ***FY 2018 Plans:*** Continue to: - Oversee the Nuclear Defense Portfolio. - Plan and coordinate the activities of the National Nuclear Forensics Steering Committee and Working Group. - Develop OSD-wide approach to overseeing Global Nuclear Defense missions within DoD.	0.744	0.757	0.734
Title: Nuclear Matters Support Program ***Description:*** The Nuclear Matters support program conducts studies / analyses; DoD-NNSA Nuclear Weapons Council activities; and provides funding for analytical support functions. ***FY 2016 Accomplishments:*** - Submitted annual reports to the President and the Congress. - Oversaw DoD/DOE relationship regarding the survivability and surety of the national nuclear stockpile.	0.723	0.733	0.900

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605161D8Z / *Nuclear Matters*	**Project (Number/Name)** P161 / *Nuclear Matters*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Served as DoD Sigma 15 Approval Authority (Interface with DOE/NNSA). - Addressed Freedom of Information Act and Mandatory Declassification Requests. ***FY 2017 Plans:*** - Submit annual reports to the President and the Congress. - Continue to oversee DoD/DOE relationship regarding the survivability and surety of the national nuclear stockpile. - Continue as DoD Sigma 15 Approval Authority (Interface with DOE/NNSA). - Continue to address Freedom of Information Act and Mandatory Declassification Requests. ***FY 2018 Plans:*** - Submit annual reports to the President and the Congress. - Continue to oversee DoD/DOE relationship regarding the survivability and surety of the national nuclear stockpile. - Continue as DoD Sigma 15 Approval Authority (Interface with DOE/NNSA). - Continue to address Freedom of Information Act and Mandatory Declassification Requests.			
Title: Physical Security and PPBE Support ***Description:*** Provides contract support services that support the Physical Security Enterprise & Analysis Group, the Security Policy Verification Committee and all Planning, Programming, Budgeting and Execution needs for the Office of the Assistant Secretary of Defense for Nuclear, Chemical and Biological Defense Programs / Nuclear Matters. ***FY 2016 Accomplishments:*** - Supported the Physical Security Enterprise & Analysis Group - Supported the Security Policy Verification Committee - Provided all Planning, Programming, Budgeting and Execution support for the Nuclear Matters' portfolio and Countering Weapons of Mass Destruction Systems ***FY 2017 Plans:*** - Support the Physical Security Enterprise & Analysis Group - Support the Security Policy Verification Committee - Provide all Planning, Programming, budgeting and Execution support for the Nuclear Matters' portfolio ***FY 2018 Plans:*** - Support the Physical Security Enterprise & Analysis Group - Support the Security Policy Verification Committee - Provide all Planning, Programming, budgeting and Execution support for the Nuclear Matters' portfolio	0.889	0.976	0.946
Accomplishments/Planned Programs Subtotals	5.094	5.302	5.232

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605161D8Z / *Nuclear Matters*	**Project (Number/Name)** P161 / *Nuclear Matters*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Success in this area is measured by compliance with various statutes and DoD directives that govern the conduct of the affairs within the Office of DASD(Nuclear Matters). Success is also measured by the currency of information and usability of the website, timeliness and responsiveness of reports due to Congress, performance in various response exercises, and feedback from a number of senior-level government organizations that DASD(Nuclear Matters) supports.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0605170D8Z / *Support to Networks and Information Integration*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	46.767	5.113	7.246	12.583	-	12.583	13.856	14.764	14.822	14.951	Continuing	Continuing
002: *Defense Architecture Support*	3.899	0.874	0.896	0.911	-	0.911	0.958	0.968	0.986	1.008	Continuing	Continuing
003: *Integrated Planning and Management*	29.079	1.454	3.492	4.017	-	4.017	5.094	5.110	5.141	5.178	Continuing	Continuing
004: *PNT Navigation*	13.789	2.785	2.858	2.905	-	2.905	3.054	3.086	3.145	3.215	Continuing	Continuing
005: *MARMS*	0.000	0.000	0.000	4.750	-	4.750	4.750	5.600	5.550	5.550	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program element supports studies and analysis in the areas of networks, information integration, defense-wide command and control (C2), and communications. This program is funded under Budget Activity 6, RDT&E Management Support because it includes studies and analysis in support of RDT&E efforts.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	5.279	7.246	8.163	-	8.163
Current President's Budget	5.113	7.246	12.583	-	12.583
Total Adjustments	-0.166	0.000	4.420	-	4.420
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.166	-			
• SRRB Efficiency	-	-	-0.290	-	-0.290
• Program Adjustment	-	-	-0.040	-	-0.040
• Funding for MARMS	-	-	4.750	-	4.750

Change Summary Explanation

FY 2016: SBIR Adjustment -0.144 million, STTR Adjustment -0.022 million.

FY 2018: SRRB efficiency -0.290 million, Program Adjustment -0.040 million. "Service Requirement Review Board - As part of the Department of Defense reform agenda, the incremental reduction accounts for consolidation and reduction of service contracts"

FY 2018 increase of 4.750 for the MARMS program.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0605170D8Z / *Support to Networks and Information Integration*	Project (Number/Name) 002 / *Defense Architecture Support*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
002: *Defense Architecture Support*	3.899	0.874	0.896	0.911	-	0.911	0.958	0.968	0.986	1.008	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Defense Architecture Support includes development, analysis, testing and evaluation of DoD IT Enterprise Reference and solution architecture products in support of the DoD's Joint Information Environment and the closely related Mission Partner Environment. This work also includes improvements to processes that support registration and storage of the Department's enterprise architecture (formerly called DARS). The Department maintains a catalog of architecture data holdings and provides users the ability to store, search, retrieve, and use DoD architecture data through capabilities provided by the architecture portal. The portal is a central, federated hub for discovery, accessibility, understandability, and reusability of architectures. With the ability to import different architecture tool data and display disparate architecture data in a uniform, consistent method for ease of use and understanding. The portal provides a federated environment for sharing of architectures, mission threads, and other related capability integrated information between various authoritative repositories to increase effectiveness and efficiency of decision-making in a dynamic environment by our customers. Implementations are accessible on both the NIPRNET (unclassified) and SIPRNET (Collateral Classified). Key features of the Defense Architecture Support program focus on: (1) Research and Development of JIE and MPE architectures, (2) Making JIE and MPE architecture data visible, accessible, trusted, understandable, and interoperable (2) enabling reuse of validated architecture data to build "composite" integrated architectures; (3) enabling architecture analysis; and, (4) integrating architecture data into the DoD mainstream decision-making processes. The Department of the Air Force, Army, and Navy CIO's collaborate in the development of federation web services via the Enterprise Architecture and Engineering Panel under the oversight of the DoD CIOs Enterprise Architecture and Service Board to ensure DoD-wide access to and usability of all components of the composite DoD enterprise architecture model, enterprise services, data and technical standards.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Defense Architecture Support	0.874	0.896	0.911
FY 2016 Accomplishments: Continue IT Enterprise and solution architecture development, analysis, and registration processes.			
FY 2017 Plans: Continue IT Enterprise and solution architecture development, analysis, and registration processes.			
FY 2018 Plans: Continue IT Enterprise and solution architecture development, analysis, and registration processes.			
Accomplishments/Planned Programs Subtotals	0.874	0.896	0.911

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605170D8Z / *Support to Networks and Information Integration*	**Project (Number/Name)** 002 / *Defense Architecture Support*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

DARS Performance Metrics:

- Timely development and issuance of policy, guidance, processes, and technologies to build, populate, govern, operate, and protect the Network.
- Policies developed and issued for GIG design, architecture content management, implementation, and operations.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0605170D8Z / *Support to Networks and Information Integration*	Project (Number/Name) 003 / *Integrated Planning and Management*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
003: *Integrated Planning and Management*	29.079	1.454	3.492	4.017	-	4.017	5.094	5.110	5.141	5.178	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Integrated Planning and Management Project encompasses the National Leadership Command Capability (NLCC) Management Office's (NMO) responsibilities for establishing overall DoD policy and oversight with respect to the capability development, interoperability, standards, and architecture for National and Nuclear Command Capabilities for our National Leadership. The NMO serves as the single point of contact within the Department for policy, long-range plans, programs and budget, integrated mission advocacy, and management of decision-maker capabilities. NMO's objective is to ensure capabilities are in place to provide complete and timely situational awareness and decision tools for senior decision-makers. Additionally, the NMO assists the DoD CIO as the Executive Agent and primary OSD advocate for the White House Military Office with oversight of a wide range of DoD command, control, and communications (C3) assets and oversees the efforts of the Services and Agencies in the design, integration, and deployment of critical and sensitive C3 capabilities. Three overall areas of focus include: 1) National Senior Leader C3 Systems, National Security/Emergency Preparedness (NS/EP), DoD support to Civil Authorities; Continuity of Government (COG); 2) Nuclear C2, Integrated Missile Defense, Tactical Warning, Global Strike; and 3) Cyber Mission Indications and Warnings.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Integrated Planning and Management	1.454	3.492	4.017
FY 2016 Accomplishments: Continued to enhance architecture products, conducted testing analysis and systems engineering to enable national security systems and applications are validated to provide assured communications in support of senior leadership. - Continued the efforts for fielding robust, modernized and secure, mobile (smart phone and tablet) devices and services for senior leadership, for use world-wide. Plans for each FY are fully identified in the Senior Leader Secure Communications Modernization Implementation Plan (SLSCM IP). - Continued to enhance the scope of quantitative voice quality testing and associated analysis and validation activities. Each year multiple test events are planned, executed and associated analysis is conducted. - Continued risk reduction and engineering efforts within a flexible and dynamic test bed environment for senior leader solutions and infrastructure advancement validation. Efforts include a wide range of modern communications leveraging the Commercial Solutions for Classified (CSfC) approach pioneered by NSA: secure mobile phones, secure tablets, travel kits, vehicular communications, and development of common network access mechanisms. Efforts were closely worked with the broader stakeholder community and leverages efforts/funding by the broader community National Security and Emergency Preparedness (NS/EP) community (includes support to the EO 13618).			
FY 2017 Plans:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605170D8Z / *Support to Networks and Information Integration*	**Project (Number/Name)** 003 / *Integrated Planning and Management*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
$2.000 million - NC3 Modeling and Simulation and Analysis - The NC3 system is a complex architecture that utilizes a "system of systems" approach. The current NC3 model focuses on communications after a high altitude electromagnetic pulse (HEMP) event. This funding will focus on expanding the current NC3 modeling to additional survivable communications systems. The goal is to provide insight on operational impact of changes/degradation of single or multiple systems - supports planning, architecture, and investments. - Provide direction and support to the Defense Information Systems Agency / Joint Systems Engineering and Integration Office (DISA/JSEIO) in developing campaign-level modeling and simulation tools for NC3. The tools will expand on the Joint Operations Visualization Environment (JOVE), Modeling and Simulation for Strategic Communications (MASSC), NC3-N Executable Architecture Management System (NC3-N ExAMS) and NC3 Integrated Scenario Modeler (NISM). $1.492 million: - Continue to enhance architecture products, conduct testing analysis and systems engineering to enable national security systems and applications are validated to provide assured communications in support of senior leadership. - Continue the efforts for fielding robust, modernized and secure, mobile (smart phone and tablet) devices and services for senior leadership, for use world-wide. Begin investigations related to Multi-Level Security (MLS) Multiple Independent Levels of Security (MILS) on a single device. Plans for each FY are fully identified in the SLSCM IP. - Expand the scope of quantitative quality testing to include video along with voice associated analysis and validation activities. Expand this program to include Interagency assets within the context of the NS/EP as directed under EO 13618. Each year multiple test events are planned, executed and associated analysis is conducted. - Continue risk reduction and engineering efforts within a flexible and dynamic test bed environment for senior leader solutions and infrastructure advancement validation. Efforts include a wide range of modern communications leveraging the Commercial Solutions for Classified (CSfC) approach pioneered by NSA: secure mobile phones, secure tablets, travel kits, vehicular communications, and development of common network access mechanisms. Efforts are closely worked with the broader stakeholder community and leverages efforts/funding by the broader National Security and Emergency Preparedness (NS/EP) community (includes support to the EO13618). ***FY 2018 Plans:*** - $2.500 million – Continue NC3 Modeling and Simulation and Analysis – Continue to provide direction and support to the DISA/JSEIO in developing campaign-level modeling and simulation tools for NC3. The research and development of the tools will continue to increase the capabilities of MASSC (conferencing capabilities), NC3-N ExAMS (analysis of nodes, metrics and assets associated with a Navy communications system) and NISM (provide extendable, transparent multi-level simulation of scenarios). $1.517 million – Update and maintain the NLCC Capabilities Roadmap (timeline format). Develop the As-is and To-be Functional Enterprise Architectures for the NLCC as well as a high-level 2030 view of the NLCC Enterprise. Develop a set of Architecture			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605170D8Z / *Support to Networks and Information Integration*	**Project (Number/Name)** 003 / *Integrated Planning and Management*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Guiding Principles and Major Thrust Areas that will help decompose the Objective Architecture into technology areas that can be addressed by the Reference Architecture. Review existing program and service-level architectures for consistency with the overall Enterprise Architecture and drive the revamped NLCC Roadmap and Investment Strategy to move forward. – Perform financial database analysis and use the RDOCs and PDOCs to create a new structure for the NLCC Investment Strategy. Build automatic extraction tools for the RDOCs and PDOCs. Develop program lists using programmatic data in Excel. Develop a XML Parser to move data to into a single database to work on Schedule Views (GANTT) and move to roadmap format, starting as a manual process, leading to an automated process.			
Accomplishments/Planned Programs Subtotals	1.454	3.492	4.017

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Continue development of the required infrastructure to support Senior Leader Secure Mobile Communications. (measure of systems upgraded/enhanced)
- Continue development of the Overarching NLCC Initial Capabilities Document JROCM taskings. Includes both the development of measures to inform subordinate JCIDS documents as well as a roadmap and investment strategy for the sustainment and modernization of the NLCC.
- Continue policy development (DoDI) for the management of DoD Nuclear Command, Control, and Communications

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0605170D8Z / *Support to Networks and Information Integration*	Project (Number/Name) 004 / *PNT Navigation*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
004: *PNT Navigation*	13.789	2.785	2.858	2.905	-	2.905	3.054	3.086	3.145	3.215	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Funding supports Global Positioning System (GPS) User Equipment Synchronization with GPS space and operational control segments to conduct DoD CIO oversight of Global Positioning System (GPS) management and planning activities required for meeting JCIDs requirements. Funding supports policy and guidance for incorporation of alternative means of PNT delivery to augment GPS. Funding also supports the DoD's inputs into interagency activities under the National Space-Based Positioning, Navigation, and Timing Executive Committee.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: PNT Navigation	2.785	2.858	2.905

FY 2016 Accomplishments:

Global Positioning System (GPS) User Equipment Synchronization with GPS space and control segments to conduct DoD CIO oversight of Global Positioning System (GPS) management and planning activities required for meeting JCIDs requirements and supporting the National Space-Based Positioning, Navigation and Timing Executive Committee. Funding supported:

- Managed the International Supplement to GPS Security Policy as all source PNT DoDM.
- Managed the Information Assurance/COMSEC Supplement to GPS Security Policy as all source PNT DoDM.
- Managed the GPS Security Policy as all source DoDM.
- Continued implementation of the GPS Protection Profile matrix from Navigation Warfare Concept of Operations in conjunction with

Warfighting Operations Plans (OPLANS) and Contingency Plans (CONPLANS) in coordination with US STRATCOM.

- Managed PNT Navigation Warfare Instruction and Annexes to all the Operations Plans (OPLANS) and Contingency Plans (CONPLANS) in coordination with US STRATCOM.
- Managed NextGen interfaces with the GPS Wing, Joint Program Development Office (JPDO), and Air Force. Continued implementation of Red Key Sundown Policy.
- Provided staff support, performed research and conducted studies as directed by DEPSECDEF in his role as co-chair of the National Executive Committee for Space-Based PNT and for DoD CIO in his role as co-chair of the Executive Steering Group.
- Performed annual update of National Five-year Plan for Space-Based Positioning, Navigation and Timing (PNT).
- Completed drafting and coordination of FY16 FRP.
- Applied Navigation Warfare Concept of Operations via the Joint Navigation Warfare Center (JNWC) and US STRATCOM to develop Doctrine, Tactics, Techniques and Procedures, Training, Equipment Validation and Material Solutions to Navigation

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605170D8Z / *Support to Networks and Information Integration*	**Project (Number/Name)** 004 / *PNT Navigation*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Warfare challenges to the Military Services and Combatant Commanders in the scenarios defined in the CONPLANS and OPLANS. - Managed and implemented the DoD PNT investment strategy using the NetCentric Operations CPM portfolio to insure PNT material solutions are developed in a synchronized fashion in JCIDs, DAS, and PPBE. - Implemented additional Instructions (DoDIs) for public affairs and receiver certification, and DoDM for security policy. - Managed inventory of DoD GPS receivers. - Analyzed and promoted alternative PNT delivery means for inclusion in the force structure for force protection via PING. - PING included biennial tasking to Intelligence Community (IC) to assess threat vectors to GPS and other means of PNT delivery; biennial operational assessments to reveal gaps in PNT delivery against OPLANS and CONPLANS of COCOMS; maintenance of PNT equipment inventories, refreshed biennially. - Developed Directives, Instructions, and Manuals for implementation of the PNT Strategy within the Department. - Continued special task directed by DCIO to address acceleration of development and fielding of advanced GPS receivers in the Joint Force. - Maintained and updated inventory of existing GPS receiver equipage; expanded to include antennae and antennae electronics; expanded to include delivery of PNT via other-than-GPS equipment. - Addressed prioritized platforms in fielding plans and guidance to Services. - Developed MGUE “Roadmap” illustrating necessary fielding milestones for Joint Force MGUE equipage. - Administered PNT Council within DoD via Charter, supporting DoDDs and DoDIs, agendas and minutes for Council meetings, Council task disposition. ***FY 2017 Plans:*** Global Positioning System (GPS) User Equipment Synchronization with GPS space and control segments to conduct DoD CIO oversight of Global Positioning System (GPS) management and planning activities required for meeting JCIDs requirements and supporting the National Space-Based Positioning, Navigation and Timing Executive Committee. Funding will support: - Manage the International Supplement to GPS Security Policy as all sources PNT DoDM. - Manage the Information Assurance/COMSEC Supplement to GPS Security Policy as all sources PNT DoDM. - Manage the GPS Security Policy as all sources DoDM. - Continue implementation of the GPS Protection Profile matrix from Navigation Warfare Concept of Operations in conjunction with Warfighting Operations Plans (OPLANS) and Contingency Plans (CONPLANS) in coordination with US STRATCOM. - Manage PNT Navigation Warfare Instruction and Annexes to all the Operations Plans (OPLANS) and Contingency Plans (CONPLANS) in coordination with US STRATCOM. - Manage NextGen interfaces with the GPS Wing, Joint Program Development Office (JPDO), and Air Force. Continue implementation of Red Key Sundown Policy.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605170D8Z / *Support to Networks and Information Integration*	**Project (Number/Name)** 004 / *PNT Navigation*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Provide staff support, perform research and conduct studies as directed by DEPSECDEF in his role as co-chair of the National Executive Committee for Space-Based PNT and for DoD CIO in his role as co-chair of the Executive Steering Group. - Perform annual update of National Five-year Plan for Space-Based Positioning, Navigation and Timing (PNT). - Apply Navigation Warfare Concept of Operations via the Joint Navigation Warfare Center (JNWC) and US STRATCOM to develop Doctrine, Tactics, Techniques and Procedures, Training, Equipment Validation and Material Solutions to Navigation Warfare challenges to the Military Services and Combatant Commanders in the scenarios defined in the CONPLANS and OPLANS. - Manage and implement the DoD PNT investment strategy using the NetCentric Operations CPM portfolio to insure PNT material solutions are developed in a synchronized fashion in JCIDs, DAS, and PPBE. - Implement additional Instructions (DoDIs) for public affairs and receiver certification, and DoDM for security policy. - Manage inventory of DoD GPS receivers. - Analyze and promote alternative PNT delivery means for inclusion in the force structure for force protection via PING. - PING includes biennial tasking to Intelligence Community (IC) to assess threat vectors to GPS and other means of PNT delivery; biennial operational assessments to reveal gaps in PNT delivery against OPLANS and CONPLANS of COCOMS; maintenance of PNT equipment inventories, refreshed biennially. - Develop Directives, Instructions, and Manuals for implementation of the PNT Strategy within the Department. - Continue special task directed by DCIO to address acceleration of development and fielding of advanced GPS receivers in the Joint Force. - Maintain and update inventory of existing GPS receiver equipage; expand to include antennae and antennae electronics; expand to include delivery of PNT via other-than-GPS equipment. - Address prioritized platforms in fielding plans and guidance to Services. - Develop MGUE “Roadmap” illustrating necessary fielding milestones for Joint Force MGUE equipage. - Administer PNT Council within DoD via Charter, supporting DoDDs and DoDIs, agendas and minutes for Council meetings, Council task disposition. ***FY 2018 Plans:*** Global Positioning System (GPS) User Equipment Synchronization with GPS space and control segments to conduct DoD CIO oversight of Global Positioning System (GPS) management and planning activities required for meeting JCIDs requirements and supporting the National Space-Based Positioning, Navigation and Timing Executive Committee. Funding will support: - Manage the International Supplement to GPS Security Policy as all sources PNT DoDM. - Manage the Information Assurance/COMSEC Supplement to GPS Security Policy as all sources PNT DoDM. - Manage the GPS Security Policy as all sources DoDM. - Continue implementation of the GPS Protection Profile matrix from Navigation Warfare Concept of Operations in conjunction with			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605170D8Z / *Support to Networks and Information Integration*	**Project (Number/Name)** 004 / *PNT Navigation*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Warfighting Operations Plans (OPLANS) and Contingency Plans (CONPLANS) in coordination with US STRATCOM. - Manage PNT Navigation Warfare Instruction and Annexes to all the Operations Plans (OPLANS) and Contingency Plans (CONPLANS) in coordination with US STRATCOM. - Manage NextGen interfaces with the GPS Wing, Joint Program Development Office (JPDO), and Air Force. Continue implementation of Red Key Sundown Policy. - Provide staff support, perform research and conduct studies as directed by DEPSECDEF in his role as co-chair of the National Executive Committee for Space-Based PNT and for DoD CIO in his role as co-chair of the Executive Steering Group. - Perform annual update of National Five-year Plan for Space-Based Positioning, Navigation and Timing (PNT). - Apply Navigation Warfare Concept of Operations via the Joint Navigation Warfare Center (JNWC) and US STRATCOM to develop Doctrine, Tactics, Techniques and Procedures, Training, Equipment Validation and Material Solutions to Navigation Warfare challenges to the Military Services and Combatant Commanders in the scenarios defined in the CONPLANS and OPLANS. - Manage and implement the DoD PNT investment strategy using the NetCentric Operations CPM portfolio to insure PNT material solutions are developed in a synchronized fashion in JCIDs, DAS, and PPBE. - Implement additional Instructions (DoDIs) for public affairs and receiver certification, and DoDM for security policy. - Manage inventory of DoD GPS receivers. - Analyze and promote alternative PNT delivery means for inclusion in the force structure for force protection via PING. - PING includes biennial tasking to Intelligence Community (IC) to assess threat vectors to GPS and other means of PNT delivery; biennial operational assessments to reveal gaps in PNT delivery against OPLANS and CONPLANS of COCOMS; maintenance of PNT equipment inventories, refreshed biennially. - Develop Directives, Instructions, and Manuals for implementation of the PNT Strategy within the Department. - Continue special task directed by DCIO to address acceleration of development and fielding of advanced GPS receivers in the Joint Force. - Maintain and update inventory of existing GPS receiver equipage; expand to include antennae and antennae electronics; expand to include delivery of PNT via other-than-GPS equipment. - Address prioritized platforms in fielding plans and guidance to Services. - Develop MGUE “Roadmap” illustrating necessary fielding milestones for Joint Force MGUE equipage. - Administer PNT Council within DoD via Charter, supporting DoDDs and DoDIs, agendas and minutes for Council meetings, Council task disposition. - Develop 2018 FRP.			
Accomplishments/Planned Programs Subtotals	2.785	2.858	2.905

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605170D8Z / *Support to Networks and Information Integration*	**Project (Number/Name)** 004 / *PNT Navigation*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Implement and successfully manage PNT Navigation Warfare Instructions and Manuals subordinate to DoDD 4650.05 and Annexes to applicable Operations Plans (OPLANS) and Contingency Plans (CONPLANS) in coordination with the appropriate Unified Combatant Command

- Implement the recommendations of the Analysis of Alternatives for the CIO and DCIO C4IIC Global Positioning System (GPS) portfolio of Position, Navigation, and Timing (PNT) programs and activities
- Provide staff support, perform research and conduct studies as directed by the CIO and DCIO C4IIC relating to the Global Positioning System (GPS) portfolio of Position, Navigation, and Timing (PNT) programs and activities

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0605170D8Z / *Support to Networks and Information Integration*	Project (Number/Name) 005 / *MARMS*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
005: *MARMS*	0.000	0.000	0.000	4.750	-	4.750	4.750	5.600	5.550	5.550	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Mission Assurance Risk Management System will fix critical shortfalls in the Department of Defense's ability to synchronize and integrate Mission Assurance programs and provide enterprise-level visibility to enable risk-informed decision making and assist in prioritizing limited resources to mitigate vulnerabilities.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: MARMS	-	-	4.750
FY 2018 Plans: Fix critical shortfalls in the Department of Defense's ability to synchronize and integrate Mission Assurance programs and provide enterprise-level visibility to enable risk-informed decision making and assist in prioritizing limited resources to mitigate vulnerabilities.			
Accomplishments/Planned Programs Subtotals	-	-	4.750

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Not Applicable.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0605200D8Z / *General Support to OUSD(I)*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	2.846	1.686	10.374	31.451	-	31.451	1.693	1.705	1.746	1.776	Continuing	Continuing
001: *Sensitive Activities*	2.128	1.060	1.242	0.812	-	0.812	1.047	1.052	1.085	1.107	Continuing	Continuing
002: *Defense Civilian Intelligence Personnel System*	0.268	0.276	0.282	0.289	-	0.289	0.296	0.303	0.311	0.319	Continuing	Continuing
003: *Intelligence, Surveillance, Reconnaissance (ISR) Operations*	0.450	0.350	8.850	30.350	-	30.350	0.350	0.350	0.350	0.350	Continuing	Continuing

A. Mission Description and Budget Item Justification

001: Sensitive Activities focuses on developing technologies and their applications on sensitive activities within the Office of the Under Secretary of Defense for Intelligence (OUSD(I)).

002: Defense Civilian Intelligence Personnel System (DCIPS) provides enhancements and updates to the Performance Appraisal Application in the Defense Civilian Personnel Data System used by Military Service Intelligence Components, the Defense Security Service and the OUSD(I) to evaluate the performance of their DCIPS employees. Funds are also used to provide enhancements and updates to the classified Global Force Management (GFM) Defense Intelligence Organizational Server (DIOS), a priority of the Vice Chairman of the Joint Chiefs of Staff, which tracks both civilian and military positions, associated grades and skill levels and hierarchical organizational relationships.

003: Intelligence, Surveillance, Reconnaissance (ISR) Operations requires expert engineering and technical assessments on a wide range of ISR operational issues. Funds will be used to support senior level discussions and decisions on ISR Operations related initiatives, platforms, and sensors.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0605200D8Z / *General Support to OUSD(I)*

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	1.686	1.874	2.214	-	2.214
Current President's Budget	1.686	10.374	31.451	-	31.451
Total Adjustments	0.000	8.500	29.237	-	29.237
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Service Requirements Review Board Directed Decrease	-	-	-0.635	-	-0.635
• Departmental Decrease	-	-	-0.128	-	-0.128
• FY 2017 Request for Additional Appropriations	-	8.500	-	-	-
• Departmental Increase	-	-	30.000	-	30.000

Change Summary Explanation

FY 2017 request for additional appropriations and FY 2018 Department Increase in support of ISR, primarily to support the DEPSECDEF directed standup of an Algorithmic Warfare Cross-Functional Team to bring automation to the Department.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0605200D8Z / *General Support to OUSD(I)*	Project (Number/Name) 001 / *Sensitive Activities*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
001: *Sensitive Activities*	2.128	1.060	1.242	0.812	-	0.812	1.047	1.052	1.085	1.107	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Sensitive Activities focuses on developing technologies and their applications on sensitive activities within the OUSD(I). It includes evaluation of concepts, technology development, and feasibility studies related to intelligence processes, shortfalls, and requirements that affect intelligence policy, planning, and operational guidance.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Sensitive Activities	1.060	1.242	0.812
FY 2016 Accomplishments: Initiated development of three sensitive capabilities enhancing effectiveness of OUSD(I), Partner Engagement across the Defense Intelligence Enterprise (DIE), and the Joint Intelligence Analytical domain.			
FY 2017 Plans: Continue to provide technology development and concept evaluation for applications in support of OUSD(I).			
FY 2018 Plans: Will continue to provide technology development and concept evaluation for applications in support of OUSD(I).			
Accomplishments/Planned Programs Subtotals	1.060	1.242	0.812

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0605200D8Z / *General Support to OUSD(I)*	Project (Number/Name) 002 / *Defense Civilian Intelligence Personnel System*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
002: *Defense Civilian Intelligence Personnel System*	0.268	0.276	0.282	0.289	-	0.289	0.296	0.303	0.311	0.319	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

DCIPS provides the Defense Intelligence Enterprise (DIE) with independent civilian personnel authorities necessary to hire, develop, reward, and retain the diverse, versatile, and highly qualified workforce necessary to perform the Defense intelligence mission and brings the entire DIE under one personnel framework.

These funds are used to develop modifications and updates to the Performance Appraisal Application in the Defense Civilian Personnel Data System and to the classified GFM DIOS. The Performance Appraisal Application is a performance management tool used by the Military Services Intelligence Components, Defense Security Service, and OUSD(I). The GFM DIOS tracks both civilian and military positions, associated grades, skill levels, and hierarchical organizational relationships.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Defense Civilian Intelligence Personnel System	0.276	0.282	0.289
FY 2016 Accomplishments: Designed enhancements to improve the effectiveness of the existing DCIPS performance management software and the GFM DIOS. Developed modifications and improvements to the GFM DIOS as additional requirements were identified by the Joint Staff J-8.			
FY 2017 Plans: Continue to design enhancements to improve the effectiveness of the existing DCIPS performance management software and the GFM DIOS. Continue to develop modifications and improvements to the GFM DIOS as additional requirements are identified by the Joint Staff J-8.			
FY 2018 Plans: Will continue to design enhancements to improve the effectiveness of the existing DCIPS performance management software and the GFM DIOS. Continue to develop modifications and improvements to the GFM DIOS as additional requirements are identified by the Joint Staff J-8.			
Accomplishments/Planned Programs Subtotals	0.276	0.282	0.289

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605200D8Z / *General Support to OUSD(I)*	**Project (Number/Name)** 002 / *Defense Civilian Intelligence Personnel System*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 0305192D8Z: *Defense Civilian Intelligence Personnel System*	1.555	1.815	1.850	-	1.850	1.792	1.800	1.835	1.875	Continuing	Continuing

Remarks

Funding will be used to develop policy, oversee implementation, assess, and continuously improve the effectiveness of DCIPS human capital programs across the DIE. Funding ensures the effectiveness of strategic human capital and workforce planning, and ongoing workforce management, in accordance with both good business practices and to support the effective and efficient conduct of the Defense and National Intelligence missions.

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance for this effort will be measured by the ability of the GFM DIOS to effectively and efficiently track both civilian and military positions, associated grades and skill levels, and hierarchical organizational relationships. Measures will include the ability to integrate upgrades to the system in the following areas: Security Access Enhancements, Common Access Point Website Enhancements, System Health Capabilities, Data Consumption Enhancements, and additional reporting capabilities.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0605200D8Z / *General Support to OUSD(I)*	Project (Number/Name) 003 / *Intelligence, Surveillance, Reconnaissance (ISR) Operations*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
003: *Intelligence, Surveillance, Reconnaissance (ISR) Operations*	0.450	0.350	8.850	30.350	-	30.350	0.350	0.350	0.350	0.350	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

ISR Operations initiatives fulfill the requirement for expert engineering and technical assessments on a wide range of ISR operational issues used to support senior level discussions and decisions on ISR Operations related initiatives, platforms, and sensors. The ISR Operations initiatives developed, expanded, and enhanced a prototype framework to ingest and process asset allocation, requirements, tasking, and post-mission artifacts and collected sensor data and analyst intelligence products in order to provide semi-automated assessments for CENTCOM/Joint Intel ISR assessments analysts.

ISR Operations initiatives provide expert engineering and technical assessments on a wide range of ISR issues; establish and maintain interfaces with the senior scientific and technical directorates within OUSD(I), the military services and the Combat Support Agencies; integrate ISR Operations technology roadmaps with related program plans and initiatives; and support senior level discussions and decisions on ISR Operations related initiatives, platforms, and sensors.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Intelligence, Surveillance, Reconnaissance Operations	0.350	8.850	30.350
Description: ISR Operations requires expert engineering and technical assessments on a wide range of ISR operational issues. Funds will be used to support senior level discussions and decisions on ISR Operations related initiatives, platforms, and sensors.			
FY 2016 Accomplishments: Provide expert engineering and technical assessments on a wide range of ISR operational issues. Funds support senior level discussions and decisions on ISR Operations related initiatives, platforms, and sensors.			
FY 2017 Plans: Provide expert engineering and technical assessments on a wide range of ISR operational issues. Funds support senior level discussions and decisions on ISR Operations related initiatives, platforms, and sensors. FY 2017 Supplemental request supports the DEPSECDEF directed stand up of the Algorithmic Warfare Cross-Functional Team (Project Maven) for modernizing Full Motion Video exploitation with Artificial Intelligence and Computer Vision. Funds support algorithm development, data labeling interfaces, and advanced hardware (GPUs) required for training neural nets.			
FY 2018 Plans: Will provide expert engineering and technical assessments on a wide range of ISR operational issues. Funds will be used to support senior level discussions and decisions on ISR Operations related initiatives, platforms. and sensors. FY 2018 increase			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605200D8Z / *General Support to OUSD(I)*	**Project (Number/Name)** 003 / *Intelligence, Surveillance, Reconnaissance (ISR) Operations*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
supports the DEPSECDEF directed stand up of the Algorithmic Warfare Cross-Functional Team (Project Maven) for modernizing Full Motion Video exploitation with Artificial Intelligence and Computer Vision. Funds support algorithm development, data labeling interfaces, and advanced hardware (GPUs) required for training neural nets.			
Accomplishments/Planned Programs Subtotals	0.350	8.850	30.350

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0605502D8Z *I Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR)*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	163.082	62.824	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
P502: *SBIR*	156.792	54.629	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
P500: *STTR*	6.290	8.195	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

The goals of the Office of the Secretary of Defense (OSD) Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs are to stimulate technological innovation, increase private sector commercialization of federal Research and Development (R&D), increase small business participation in federally funded R&D, and foster participation by minority and disadvantaged firms in technological innovation.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	62.824	0.000	0.000	-	0.000
Total Adjustments	62.824	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	62.824	-			
• SBIR	0.000	-	-	-	-
• SBIR2	0.000	-	-	-	-

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2016	FY 2017
Project: P500: *STTR*		
Congressional Add: *Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR)*	8.195	-
Congressional Add Subtotals for Project: P500	8.195	-
Congressional Add Totals for all Projects	8.195	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0605502D8Z / *Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR)*	Project (Number/Name) P502 / *SBIR*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P502: *SBIR*	156.792	54.629	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The goals of the Office of the Secretary of Defense (OSD) Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs are to stimulate technological innovation, increase private sector commercialization of federal Research and Development (R&D), increase small business participation in federally funded R&D, and foster participation by minority and disadvantaged firms in technological innovation.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: SBIR	54.629	-	-
Description: A set-aside program for small business to engage in defense R&D with potential for commercialization.			
FY 2016 Accomplishments: Program accomplishments will be provided at the end of FY17.			
Accomplishments/Planned Programs Subtotals	54.629	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0605502D8Z / *Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR)*	Project (Number/Name) P500 / *STTR*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P500: *STTR*	6.290	8.195	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The goals of the Office of the Secretary of Defense (OSD) Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs are to stimulate technological innovation, increase private sector commercialization of federal research and development (R&D), increase small business participation in federally funded R&D, and foster participation by minority and disadvantaged firms in technological innovation.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017
Congressional Add: Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR)	8.195	-
FY 2016 Accomplishments: Program accomplishments will be provided at the end of FY17.		
Congressional Adds Subtotals	8.195	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0605790D8Z *I Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR)*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	6.676	2.166	2.187	2.372	-	2.372	2.567	2.596	2.645	2.699	Continuing	Continuing
P518: *SBIR/Challenge Admin*	6.676	2.166	2.187	2.372	-	2.372	2.567	2.596	2.645	2.699	Continuing	Continuing

A. Mission Description and Budget Item Justification

This Program Element (PE) provides funding for the administration of the Department of Defense (DoD) Small Business Innovation Research (SBIR) Program and the Small Business Technology Transfer (STTR) Program. The SBIR/STTR Program funds over one billion dollars annually in mission oriented research and development projects via small technology companies. The purpose of the program is to stimulate technological innovation, increase private sector commercialization of Federal R&D, increase small business participation in Federally funded R&D, foster participation by minority and disadvantaged firms in technological innovation, and foster cooperative research & technology transfer between small business and research institutions. The SBIR/STTR Program is codified in 15 USC 638. The SBIR/STTR Programs competitively fund scientific and technical innovation to specifically address the needs of participating DoD components.

(U) DoD components participating in the SBIR and STTR Program include the: Army, Navy, Air Force, Defense Advanced Research Projects Agency (DARPA), Missile Defense Agency (MDA), Defense Threat Reduction Agency (DTRA), U.S. Special Operations Command (SOCOM), Joint Science & Technology Office for Chemical & Biological Defense (CBD), National Geospatial-Intelligence Agency (NGA), the Defense Logistics Agency (DLA), the Defense Microelectronics Activity (DMEA), the Defense Health Program (DHP) and the Office of Secretary of Defense (OSD.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	2.166	2.187	2.372	-	2.372
Current President's Budget	2.166	2.187	2.372	-	2.372
Total Adjustments	0.000	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0605790D8Z / *Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR)*	Project (Number/Name) P518 / *SBIR/Challenge Admin*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P518: *SBIR/Challenge Admin*	6.676	2.166	2.187	2.372	-	2.372	2.567	2.596	2.645	2.699	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

(U) The SBIR/STTR Program is executed in three phases. The purpose of Phase I is to determine, insofar as possible, the scientific technical and commercial merit, and feasibility of ideas submitted under the SBIR/STTR Program. Phase II awards are made to firms that have been awarded a Phase I contract on the basis of the results of their Phase I effort and the scientific, technical, and commercial merit of the Phase II proposal. Phase II is the principal research or research and development effort and is expected to produce a well-defined deliverable prototype. Phase III SBIR/STTR efforts derive from, extend or conclude Phase I or Phase II efforts, and are not funded with SBIR/STTR funds. Under Phase III, companies participating in the SBIR/STTR Program are expected to obtain funding from the private sector and/or non-SBIR/STTR government sources to develop the prototype into a viable product or non-R&D service for sale in military and/or private sector markets.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: SBIR/Challenge Admin	2.166	2.187	2.372
Description: (U) Program element (PE) 0605790D8Z is the only source of funds for the coordination, administration and execution of the Department's SBIR/STTR Programs. The DoD Office of Small Business Programs is tasked with providing Departmental SBIR/STTR policy guidance, oversight and implementation and therefore requires program element (PE) 0605790D8Z to fund these administrative activities. In addition to funding costs for program administration, coordination and execution, PE 0605790D8Z funds essential elements of the SBIR/STTR Program that are required by law including: (1) Coordinate and execute the administrative portions of the DoD SBIR/STTR Programs including the development of technical topics, preparation of SBIR/STTR R&D solicitations and receipt of proposal responses; (2) Maintain and modify automated processes across the entire SBIR/STTR lifecycle including the development and maintenance of information systems and software required for the measurement, evaluation, and effective management of the Department's SBIR/STTR Programs; (3) Implement an aggressive outreach program including the execution of two National conferences and outreach to small technology companies, potential investors in such companies, SDBs, WOSBs, Institutions of Higher Learning, underrepresented states, and others, to facilitate participation in the SBIR/STTR Programs; (4) Coordinate oversight, collect results, track execution and provide reporting of Phase II technology transition in the DoD SBIR Commercialization Readiness Program (CRP); and (5) Prepare all reports mandated by law and policy.			
FY 2016 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605790D8Z / *Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR)*	**Project (Number/Name)** P518 / *SBIR/Challenge Admin*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
(U) FY 2016 accomplishments includes successful program administration, coordination, and execution of the SBIR/STTR Program. Specifically, provide policy guidance and oversight regarding execution of the FY 2015 DoD SBIR/STTR budget between 13 Components to include: (1) Coordinated and executed the administrative portions of the DoD SBIR/STTR Programs including the development of technical topics, preparation of SBIR/STTR R&D solicitations, and receipt of proposal responses; (2) Maintained and modified automated processes across the entire SBIR/STTR lifecycle including the development and maintenance of information systems and software required for the measurement, evaluation, and effective management of the Departments' SBIR/STTR Programs; (3) Improved an outreach program to increase interest and facilitate participation of small technology companies, potential investors in such companies, research organizations, acquisition personnel, prime contractors and others in the SBIR/STTR Programs; (4) Leveraged DoD SBIR/STTR Commercialization and Outreach Working Groups to promote best practices for meeting legislative requirements and optimizing standard processes for improving SBIR/STTR technology transition and outreach activities; (5) Coordinated oversight, collect results, track execution and provide reporting of Phase II technology transition in DoD Commercialization Readiness Program (CRP); and (6) Prepared all reports mandated by law and policy.			
FY 2017 Plans: (U) FY 2017 plan includes program administration, coordination, and execution of the SBIR/STTR Program. Specifically, provide policy guidance and oversight regarding execution of the FY 2016 DoD SBIR/STTR budget between 13 Components to include: (1) Coordinate and execute the administrative portions of the DoD SBIR/STTR Programs including the development of technical topics, preparation of SBIR/STTR R&D solicitations, and receipt of proposal responses; (2) Maintain and modify automated processes across the entire SBIR/STTR lifecycle including the development and maintenance of information systems and software required for the measurement, evaluation, and effective management of the Departments' SBIR/STTR Programs; (3) Improve an outreach program to increase interest and facilitate participation of small technology companies, potential investors in such companies, research organizations, acquisition personnel, prime contractors and others in the SBIR/STTR Programs; (4) Leverage DoD SBIR/STTR Commercialization and Outreach Working Groups to promote best practices for meeting legislative requirements and optimizing standard processes for improving SBIR/STTR technology transition and outreach activities; (5) Coordinate oversight, collect results, track execution and provide reporting of Phase II technology transition in DoD Commercialization Readiness Program (CRP); and			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605790D8Z / *Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR)*	**Project (Number/Name)** P518 / *SBIR/Challenge Admin*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
(6) Prepare all reports mandated by law and policy. ***FY 2018 Plans:*** (U) Program element (PE) 0605790D8Z is the only source of funds for the coordination, administration and execution of the Department's SBIR/STTR Programs. The DoD Office of Small Business Programs is tasked with providing Departmental SBIR/ STTR policy guidance, oversight and implementation and therefore requires program element (PE) 0605790D8Z to fund these administrative activities. In addition to funding costs for program administration, coordination and execution, PE 0605790D8Z funds essential elements of the SBIR/STTR Program that are required by law including: (1) Coordinate and execute the administrative portions of the DoD SBIR/STTR Programs including the development of technical topics, preparation of SBIR/STTR R&D solicitations and receipt of proposal responses; (2) Maintain and modify automated processes across the entire SBIR/STTR lifecycle including the development and maintenance of information systems and software required for the measurement, evaluation, and effective management of the Department's SBIR/STTR Programs; (3) Implement an aggressive outreach program including the execution of two National conferences and outreach to small technology companies, potential investors in such companies, SDBs, WOSBs, Institutions of Higher Learning, underrepresented states, and others, to facilitate participation in the SBIR/STTR Programs; (4) Coordinate oversight, collect results, track execution and provide reporting of Phase II technology transition in the DoD SBIR Commercialization Readiness Program (CRP); and (5) Prepare all reports mandated by law and policy.			
Accomplishments/Planned Programs Subtotals	2.166	2.187	2.372

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Not applicable for this item.

E. Performance Metrics

(U) Performance is in support of the administration of the program and compliance with statutory requirements.

(U) For PE 0605790D8Z, management and administration of the DoD SBIR/STTR Programs, the following measures have been established to meet requirements as mandated by law: 1) Coordinate and execute the administrative portions of the DoD SBIR/STTR Programs, especially the creation of the five solicitations; 2) Maintain

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605790D8Z / *Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR)*	**Project (Number/Name)** P518 / *SBIR/Challenge Admin*

and improve automated processes across the entire SBIR/STTR lifecycle; 3) Develop and conduct an aggressive outreach program, especially the planning and execution of an annual government training workshop and one small business conference; 4) Coordinate oversight, collect results, track execution and provide reporting of Phase

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0605798D8Z / *Defense Technology Analysis*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	-	15.538	22.650	24.365	-	24.365	25.898	25.921	26.327	26.880	Continuing	Continuing
P796: *Laboratory Resource Management*	-	3.835	3.155	3.462	-	3.462	3.628	3.706	3.725	3.855	Continuing	Continuing
P797: *Defense Technology Analysis*	-	3.551	4.705	6.095	-	6.095	6.628	6.768	6.805	7.043	Continuing	Continuing
P798: *Defense Support Teams*	-	1.324	2.116	2.178	-	2.178	2.256	2.302	2.314	2.395	Continuing	Continuing
P579: *Critical Technology Assessments*	-	0.731	1.202	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
P102: *Data Vulnerability Assessment and Analysis*	-	6.097	11.472	12.630	-	12.630	13.386	13.145	13.483	13.587	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Assistant Secretary of Defense for Research and Engineering (ASD(R&E)) is the principal staff advisor to the Under Secretary of Defense for Acquisition, Technology and Logistics (USD(AT&L)) and the Secretary and Deputy Secretary of Defense for Research and Engineering (R&E) matters. In this capacity, the ASD(R&E) has the responsibility to conduct analyses and studies; develop policies; provide technical leadership, oversight and advice; make recommendations; and issue guidance for Department of Defense (DoD) R&E programs. Additionally, the ASD(R&E) provides technical support to the USD(AT&L) on R&E aspects of programs subject to review by the Defense Acquisition Board, to include assessments of technology maturity consistent with DoD acquisition policy. The mission of the DoD R&E program is to create, demonstrate, prototype, and apply technology that enables affordable and decisive military superiority. Pursuing the R&E mission requires attention to: (1) identification and development of new technological opportunities; (2) insertion of new technologies into warfighting systems and operations; and (3) management and evaluation of the effectiveness of technology programs. This program element (PE) provides mission support to the Office of the ASD(R&E) (OASD(R&E)) covering a wide range of studies and analysis in support of the R&E program and its impacts to the Department's decision to fund Research, Development, Test and Evaluation (RDT&E) efforts.

The PE provides funding for the Defense Laboratory Office within the ASD(R&E). The Defense Laboratory Office mission is to craft policy and provide the oversight necessary to both preserve current and develop future DoD in-house laboratory capability such that they continue to generate mission-critical innovations that increase the U.S. military advantage and enhance U.S. national security. The Defense Laboratory Office advocates and supports the DoD laboratory system in three areas: (1) facilities and infrastructure; (2) personnel and quality of workforce; and (3) technology transfer.

The PE provides engineering, scientific, and analytical support to the ASD(R&E) in its responsibility for direction, overall quality, and content of the science and technology (S&T) program, and ensures that the technology being developed is affordable and minimizes system development risk. The Defense Technology Analysis project conducts assessments and analysis to ensure maximum utilization of research and development funds and to accomplish the overall objectives of the S&T program. Funds are required for technical, analytical and management support, equipment and supplies, travel, and publications.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0605798D8Z / *Defense Technology Analysis*

The DoD's key expertise for reviewing and guiding R&E programs resides in the ASD(R&E). The ASD(R&E) staff augment their responsibilities through their connections to technology experts in various fields throughout academia, industry, and government. The Defense Support Teams project supports the directed responsibilities by building teams of technology experts to conduct program technical assessments. The teams analyze the key engineering problem areas and offer adjustments in the development and test plan; alternate technical approaches; or new technologies that could enable successful development. The teams provide unbiased reviews and gather advice from the Nation's leading technical experts.

The PE provides funding for Critical Technology Assessments within ASD(R&E). Critical Technology Assessments provide the technical reference guidance in support of development and implementation of DoD technology security policies on international transfers of defense related goods, services, and technologies. The program provides an ongoing assessment and analysis of global goods and technologies; determines significant advances in the development, production, and use of military capabilities by potential adversaries; and determines goods and technologies being developed worldwide with potential to significantly enhance or degrade U.S. military capabilities in the future.

This PE also provides funding for Data Vulnerability Assessment and Analysis to establish a joint analysis capability to conduct comprehensive assessments of unclassified information losses, engaging acquisition and intelligence sources to determine consequences and appropriate preventative/mitigation actions.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	115.933	22.650	25.867	-	25.867
Current President's Budget	15.538	22.650	24.365	-	24.365
Total Adjustments	-100.395	0.000	-1.502	-	-1.502
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-100.000	-			
• SBIR/STTR Transfer	-0.395	-			
• DTIC Offset	-	-	-0.430	-	-0.430
• Other Adjustments	-	-	-1.072	-	-1.072

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2016	FY 2017
Project: P796: *Laboratory Resource Management*		
Congressional Add: *Defense Technology Transfer Program*	2.000	-
Congressional Add Subtotals for Project: P796	2.000	-

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0605798D8Z / *Defense Technology Analysis*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2016	FY 2017
Congressional Add Totals for all Projects	2.000	-

Change Summary Explanation

FY 2016 Reprogramming: $100.000 million for the cyber vulnerability assessment was reprogrammed from Defense Technology Analysis, PE 0605798D8Z, to Assessments and Evaluation, PE 0604942D8Z, for proper oversight and execution by the Office of the Assistant Secretary of Defense for Acquisition (ASD(A)).

Activities within this document reflect headquarter-wide efficiency initiatives.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0605798D8Z / *Defense Technology Analysis*	Project (Number/Name) P796 / *Laboratory Resource Management*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P796: *Laboratory Resource Management*	-	3.835	3.155	3.462	-	3.462	3.628	3.706	3.725	3.855	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Defense Laboratory Office provides advocacy, strategic planning, and policy for the DoD's in-house laboratories. The DoD Laboratory Enterprise consists of more than 60 laboratories with approximately 67,000 employees (approximately 40,000 of whom are scientists and engineers). The Defense Laboratory Office develops plans and investment strategies for laboratory infrastructure, technology programs, and personnel development. Section 211 of the FY17 NDAA also transferred the management of the laboratory demonstration program at Science and Technology Reinvention Laboratories (STRLs) from USD(P&R) to the ASD(R&E). This transition requires additional resources and personnel to manage the day-to-day needs of processing lab demo authorities. A human resources specialist with experience managing unique personnel authorities will help in managing this increased workload.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Defense Laboratory Office	1.835	3.155	3.462
Description: Provides advocacy, strategic planning, and policy for the DoD's in-house laboratories. Develops plans and investment strategies for laboratory infrastructure, technology programs, and personnel development.			
FY 2016 Accomplishments: • Continued refinement of DoD laboratory metrics for assessment of in-house lab system. Formulated recommendations to ASD(R&E) and Service leadership for improvements to identify problem areas within the lab system based upon data collected and concurrent trends analyses. • Completed survey of laboratory customers to show value that the labs and engineering centers provide to program executive and program management offices. Survey was part of the Better Buying Power 3.0 Lab “Return on Investment” initiatives. • Developed report on mechanisms for technology transfer within the DoD Labs. • Collected, analyzed, and wrote the annual Section 219 report. • Collected, analyzed, and wrote the annual DoD Technology Transfer report.			
FY 2017 Plans: • Continue strategic planning and policy development for oversight of DoD in-house laboratories. • Conduct a DoD Lab Day in the Pentagon Center Courtyard. • Develop a communication strategy surrounding the DoD Labs. • Establish Laboratory Quality Enhancement Panel for Management and Technology Transfer.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605798D8Z / *Defense Technology Analysis*	**Project (Number/Name)** P796 / *Laboratory Resource Management*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Transition personnel responsibilities for the Science and Technology Reinvention Laboratories (STRLs) from USD(P&R) to ASD(R&E). • Process all lab demo items, to include changes to Federal Register Notices (FRNs) through modifications, new FRNs, and the adoption of existing authorities. ***FY 2018 Plans:*** • Continue strategic planning and policy development for oversight of DoD in-house laboratories. • Develop new standards for facility sustainment models for DoD labs. • Process all lab demo items, to include changes to Federal Register Notices (FRNs) through modifications, new FRNs, and the adoption of existing authorities. • Monitor status of Sec. 233 Management pilot programs at each of the Services.			
Accomplishments/Planned Programs Subtotals	1.835	3.155	3.462

	FY 2016	FY 2017
Congressional Add: Defense Technology Transfer Program	2.000	-
FY 2016 Accomplishments: There was no language associated with the $2.000M add for FY 2016. However, previous year (FY 2015) language stated: "The agreement includes $10,000,000 above the budget request for a regionally focused technology transfer innovation pilot program. The agreement directs the Assistant Secretary of Defense (Research and Engineering) to conduct a pilot program on public-private technology transfer ventures between Department of Defense research and development centers and regionally focused technology incubators, with the goal of increasing the commercialization of intellectual property developed in the Department's research and development enterprise in support of critical cross-service technological needs such as energetics, unmanned systems, and rapid prototyping. Technology incubator partners should be selected through full and open competition emphasizing strong business plans, demonstrated expertise in mentorship and commercialization, and strong regional partnerships. This language does not replace the report language on Technology Transfer included under Research, Development, Test and Evaluation, Air Force in Senate Report 113-211." The add was transferred to the US Army Aviation and Missile Research, Development, and Engineering Center (AMRDEC) for execution. AMRDEC has drafted the Partnership Intermediary Agreement Work Description, the topic of which is “Technology Transfer, Avionics Technology, and Teaming for Future Tactical Operations		

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605798D8Z / *Defense Technology Analysis*	**Project (Number/Name)** P796 / *Laboratory Resource Management*

	FY 2016	FY 2017
Challenges." This will be applied to both aviation and unmanned platforms and will be competed amongst a variety of institutions, including those in academia.		
Congressional Adds Subtotals	2.000	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

The performance of the Laboratory Resource Management project is based on the success of initiatives to implement strategic planning objectives. Measures include the quality and timeliness of policy, plans, guidance, reports, and processes.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0605798D8Z / *Defense Technology Analysis*	Project (Number/Name) P797 / *Defense Technology Analysis*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P797: *Defense Technology Analysis*	-	3.551	4.705	6.095	-	6.095	6.628	6.768	6.805	7.043	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Defense Technology Analysis (DTA) project provides engineering, scientific, and analytical support to the Office of the Deputy Assistant Secretary of Defense for Research (ODASD(R)) in its responsibility for direction, overall quality, and content of the science and technology (S&T) program. Furthermore, it ensures that the technology being developed is affordable and minimizes system development risk. The DTA program conducts assessments and analyses to ensure maximum utilization of research and development funds to accomplish the overall objectives of the S&T program. Funds are required for technical, analytical, management support, travel, and publications.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Defense Technology Analysis	3.551	4.705	6.095
Description: The Defense Technology Analysis (DTA) project provides engineering, scientific, and analytical support to the Office of the Deputy Assistant Secretary of Defense for Research (ODASD(R)) in its responsibility for direction, overall quality, and content of the science and technology (S&T) program. Furthermore, it ensures that the technology being developed is affordable and minimizes system development risk.			
FY 2016 Accomplishments: Provided engineering, scientific, analytical, and managerial support to the ODASD(R) in: • Developing strategies, plans, and policies to develop and exploit technology; • Conducting technology analyses, making recommendations, and developing guidance for S&T plans and programs; • Reviewing acquisition programs and making recommendations to optimize effectiveness of the DoD investments; • Oversight of S&T issues and initiatives and responding to Congressional special interests.			
FY 2017 Plans: Provide engineering, scientific, analytical, and managerial support to the ODASD(R) in: • Developing strategies, plans, and policies to develop and exploit technology; • Conducting technology analyses, making recommendations, and developing guidance for S&T plans and programs; • Reviewing acquisition programs and making recommendations to optimize effectiveness of the DoD investments; • Oversight of S&T issues and initiatives and responding to Congressional special interests.			
FY 2018 Plans: Provide engineering, scientific, analytical, and managerial support to the ODASD(R) in:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605798D8Z / *Defense Technology Analysis*	**Project (Number/Name)** P797 / *Defense Technology Analysis*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Developing strategies, plans, and policies to develop and exploit technology; • Conducting technology analyses, making recommendations, and developing guidance for S&T plans and programs; • Reviewing acquisition programs and making recommendations to optimize effectiveness of the DoD investments; • Oversight of S&T issues and initiatives and responding to Congressional special interests.			
Accomplishments/Planned Programs Subtotals	3.551	4.705	6.095

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Several indicators allow the Department to measure the success of the DTA program element. The number of efforts funded and completed satisfactorily and the OASD(R&E) influence on S&T program decisions serve as valuable indicators of the program's effectiveness. Feedback into the oversight mechanisms of the program to guide investment decisions serve as additional metrics.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0605798D8Z / *Defense Technology Analysis*	Project (Number/Name) P798 / *Defense Support Teams*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P798: *Defense Support Teams*	-	1.324	2.116	2.178	-	2.178	2.256	2.302	2.314	2.395	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Department's key expertise for reviewing and guiding research and engineering (R&E) programs resides in the Office of the Assistant Secretary of Defense for Research and Engineering (OASD(R&E)). The OASD(R&E) staff augment their responsibilities through connections to technology experts in various fields throughout academia, industry, and government. The Defense Support Teams project supports the directed responsibilities by building teams of technology experts to conduct program technical health check-ups. The teams analyze the key engineering problem areas and offer adjustments in the development and test plans, alternate technical approaches, or new technologies that could enable successful development. The teams provide unbiased reviews and gather advice from the Nation's leading technical experts.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Defense Support Teams	1.324	2.116	2.178
Description: The Defense Support Teams project supports the directed responsibilities by building teams of technology experts to conduct program technical health check-ups. The teams analyze the key problem areas and offer adjustments in the development plans, alternate technical approaches, or new technologies that could enable successful development. The teams provide unbiased reviews and gather advice from the Nation's leading technical experts. ***FY 2016 Accomplishments:*** Established support teams and conducted technology analyses to support R&E program investment decisions. For selected acquisition programs and efforts, reviewed in technical detail the respective program issues and offered technical solutions to program managers. Assessed the maturity of technologies that were candidates for transition to acquisition programs. ***FY 2017 Plans:*** Establish support teams and conduct technology analyses to support R&E program investment decisions. For selected acquisition programs and efforts, review in technical detail the respective program issues and offer technical solutions to program managers. Assess the maturity of technologies that are candidates for transition to acquisition programs. ***FY 2018 Plans:*** Establish support teams and conduct technology analyses to support R&E program investment decisions. For selected acquisition programs and efforts, review in technical detail the respective program issues and offer technical solutions to program managers. Assess the maturity of technologies that are candidates for transition to acquisition programs.			
Accomplishments/Planned Programs Subtotals	1.324	2.116	2.178

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605798D8Z / *Defense Technology Analysis*	**Project (Number/Name)** P798 / *Defense Support Teams*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Several indicators allow the Department to measure the success of the Defense Technology Analysis (DTA) PE. The number of technological introspections, as evidenced by completed support teams and OASD(R&E) influence on acquisition decisions, serve as valuable indicators of the program's effectiveness. The establishment and outputs of Defense Support Teams are additional indicators of program metrics. Feedback into the oversight mechanisms of the science and technology (S&T) program, to guide investment decisions, serve as additional metrics.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0605798D8Z / *Defense Technology Analysis*	Project (Number/Name) P579 / *Critical Technology Assessments*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P579: *Critical Technology Assessments*	-	0.731	1.202	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Critical Technology Assessments provide the technical reference guidance in support of development and implementation of DoD technology security policies on international transfers of defense related goods, services, and technologies. The export control program provides an ongoing assessment and analysis of global goods and technologies; determines significant advances in the development, production, and use of military capabilities by potential adversaries; and determines goods and technologies being developed worldwide with potential to significantly enhance or degrade U.S. military capabilities in the future. Identified in the Export Administration Act of 1979, and extended by Presidential Executive Order, to review militarily critical goods and technologies, and to consider worldwide technology capabilities, the Militarily Critical Technologies List (MCTL) is a congressionally-mandated source document for identification of leading edge and current technologies monitored worldwide for national security, nonproliferation control of weapons of mass destruction, and advanced conventional weapons.

Specific activities include:
- Monitor and assess dual-use and military technologies worldwide.
- Assist in the development of proposals for negotiation in various multilateral export control regimes.
- Provide limited worldwide technology capability assessments for the MCTL and other U.S. international critical technologies efforts.
- Identify and determine technical parameters for proposals for international control of weapons of mass destruction.
- Identify foreign technologies of interest to the DoD and opportunities for international cooperative research and development.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Critical Technology Assessments	0.731	1.202	-
Description: Critical Technology Assessments provide the technical reference guidance in support of development and implementation of DoD technology security policies on international transfers of defense related goods, services, and technologies. The export control program provides an ongoing assessment and analysis of global goods and technologies; determines significant advances in the development, production, and use of military capabilities by potential adversaries; and determines goods and technologies being developed worldwide with potential to significantly enhance or degrade U.S. military capabilities in the future.			
FY 2016 Accomplishments: - Maintained technical interface to technology security organizations and functions. - Maintained interface with user community for critical technology assessments.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605798D8Z / *Defense Technology Analysis*	**Project (Number/Name)** P579 / *Critical Technology Assessments*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Continued development of automated technology identification prototype. - Maintained prototype process and capability 'on the shelf', so-as-to enable the implementation of a DoD-wide technical reference, if required. ***FY 2017 Plans:*** - Maintain technical interface to technology security organizations and functions. - Maintain interface with user community for critical technology assessments. - Continue development of automated technology identification prototype. - Maintain prototype process and capability 'on the shelf', so-as-to enable the implementation of a DoD-wide technical reference, if required.			
Accomplishments/Planned Programs Subtotals	0.731	1.202	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

- Currency of the user community of critical technology assessments.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0605798D8Z / *Defense Technology Analysis*	Project (Number/Name) P102 / *Data Vulnerability Assessment and Analysis*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P102: *Data Vulnerability Assessment and Analysis*	-	6.097	11.472	12.630	-	12.630	13.386	13.145	13.483	13.587	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Most DoD technical information resides on unclassified networks where it is at risk of being targeted for cyber espionage campaigns. Protecting DoD unclassified controlled technical information is a high priority for the Department, and is critical to preserving intellectual property and competitive capabilities of our national industrial base. To maintain full confidence in our systems, the Department must also assess the effect the loss of this information has on our warfighting capabilities. DoD contractors who produce or access controlled technical information must incorporate security standards on their networks, and report cyber-intrusion incidents that result in the loss of this information. These requirements are important, but insufficient in the face of a determined adversary. The Department must take steps to understand the impacts of losses and rethink how we safeguard our capabilities. This information, while unclassified, includes data and intellectual property concerning defense systems requirements, concepts of operations, technologies, designs, engineering, systems production, and component manufacturing.

This project supports protection of unclassified controlled technical information, and analysis of losses, to determine consequences and appropriate requirements, acquisition, programmatic, and strategic courses of action.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Data Vulnerability Program	6.097	11.472	12.630
Description: The Data Vulnerability Assessment and Analysis project will establish a joint analysis capability to conduct comprehensive assessments of controlled unclassified technical information losses, and engaging acquisition and intelligence sources, to determine consequences and appropriate preventative/mitigation actions.			
FY 2016 Accomplishments: Developed the joint analysis capability to support net loss assessments by enabling collaboration between the acquisition, intelligence, counterintelligence, law enforcement, and operations communities as called out in the, “Strengthen cybersecurity throughout the product lifecycle,” portion of the Better Buying Power 3.0 initiative, and the DoD Cyber Strategy. The FY 2016 program demonstrated the ability of the joint analysis capability to integrate acquisition, intelligence, counterintelligence communities. The joint analysis capability integrated the Military Department’s critical acquisition programs and tiered them for proactive protection efforts. Completed initial policy guidance, signing of the Terms of Reference formally establishing the Joint Acquisition Protection and Exploitation Cell. Engaged in multiple pilots to identify feasible protection and safeguards and			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605798D8Z / *Defense Technology Analysis*	**Project (Number/Name)** P102 / *Data Vulnerability Assessment and Analysis*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
developed dynamic links with program protection planning activities. Continued to develop advanced analytic tools, coupled with identification of additional information feeds/sources of data. ***FY 2017 Plans:*** Continue to identify and engage appropriate partnerships, especially between the acquisition community and the Intelligence Community/Counterintelligence and Security Community. These partnerships will continue FY 2016 efforts to develop dynamic links with program protection efforts, identify and apply resources to priority programs, begin to anticipate proactive protection functions, and develop formal processes to track actions and feedback mechanisms between the various communities. Continue to develop advanced analytic tools. In FY 2017, necessary policy and guidance will be matured to enable transition of the joint analysis capability to initial operational capability. ***FY 2018 Plans:*** Develop manning for proactive protection efforts linked to the Department's critical acquisition programs and technologies. Develop links to the security community for critical acquisition programs and technologies. Identify and plan future resource requirements for enhanced security of critical acquisition programs.			
Accomplishments/Planned Programs Subtotals	6.097	11.472	12.630

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

The Data Vulnerability Assessment and Analysis metric is the number of completed cases.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0605804D8Z / *Development Test & Evaluation*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	37.531	20.749	19.541	20.571	0.000	20.571	20.321	20.121	20.455	20.875	Continuing	Continuing
P804: *Development Test & Evaluation*	37.531	20.749	19.541	20.571	-	20.571	20.321	20.121	20.455	20.875	Continuing	Continuing

A. Mission Description and Budget Item Justification

This Program Element (PE) establishes the dedicated funding line to carry out the duties In Accordance With Department of Defense Instruction (DoDI) 5000.02 Change 2 dated February 2017. Specific responsibilities are outlined in DoDI 5134.17 Change 1 dated September 2015. The Deputy Assistant Secretary of Defense for Development Test and Evaluation (DASD(DT&E)) is the principal advisor to the Secretary of Defense, the Under Secretary of Defense for Acquisition, Technology and Logistics (USD(AT&L)) and the Assistant Secretary of Defense for Research and Engineering (ASD(R&E)) on Development Test and Evaluation (DT&E) in the DoD.

The DT&E program element is budgeted in the Research Development Test and Evaluation (RDT&E) budget activity to support and improve the DT&E efforts of Major Defense Acquisition Program (MDAP), Major Automated Information System (MAIS) / Business System Category Programs, and other Special Interest (SI) acquisition programs designated by USD(AT&L) as they progress through the acquisition/development lifecycle; oversee the Test and Evaluation (T&E) career field of the defense acquisition workforce; develop policy and guidance for the conduct of DT&E within the DoD; and prepare reports to Congress as required.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	21.337	19.541	20.610	-	20.610
Current President's Budget	20.749	19.541	20.571	-	20.571
Total Adjustments	-0.588	0.000	-0.039	-	-0.039
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.588	-			
• Other program adjustments	-	-	-0.039	-	-0.039
• DTIC Offset	-	-	0.000	-	0.000

Change Summary Explanation

Activities within this document reflect headquarter-wide efficiency initiatives.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0605804D8Z / *Development Test & Evaluation*	Project (Number/Name) P804 / *Development Test & Evaluation*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P804: *Development Test & Evaluation*	37.531	20.749	19.541	20.571	-	20.571	20.321	20.121	20.455	20.875	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project provides resources to support Acquisition Program Managers, Chief Developmental Testers, and Lead DT&E Organizations in the development of comprehensive and efficient DT&E strategies to support key acquisition milestones and engineering decisions. This project also manages the Test & Evaluation (T&E) career field and curriculum for the DoD acquisition workforce, develops policy and guidance for the conduct of DT&E within DoD, and prepares reports report to Congress as required. Specific activities include the following:

- The Deputy Assistant Secretary of Defense DT&E (DASD(DT&E)) ensures that test strategies beginning at Milestone A, are documented in the Test and Evaluation Master Plans (TEMPs). DASD(DT&E) reviews and approves/disapproves the developmental test and evaluation strategy within the TEMPs.
- Provide formal DT&E Assessments prior to major milestone decisions to inform the acquisition decision-makers on the readiness of programs to release the Engineering and Manufacturing Development (EMD) Request For Proposal (RFP) pre Milestone B, and begin production, Milestone C, with the goal of reducing discovery of performance issues later in the acquisition cycle.
- Managing the Scientific Test and Analysis Techniques Center of Excellence (STAT COE). Over the last 4 years, the STAT COE has supported over 40 Acquisition Program Managers in the development of statistically optimized test programs. These efforts have resulted in 83 more efficient and effective test plans and a test cost avoidance of about $150M.
- Coordinate with the Test Resources Management Center (TRMC) to identify DoD test infrastructure gaps and support development of the TRMC strategic plan.
- Coordinate with the Director of Systems Engineering (SE) to ensure that the DT&E activities of the DoD are fully integrated into, and consistent with, the SE and development planning processes of the Department.
- Develop policy and guidance to ensure efficient and effective DT&E across DoD, including policy and guidance for developmental testing of interoperability and cybersecurity in coordination with the Joint Staff and DoD Chief Information Officer (CIO).
- As the T&E Functional Leader, establish, oversee, and maintain the education, training and experience requirements including competencies and certification standards to enhance the T&E acquisition workforce. Monitor and facilitate Defense Acquisition University (DAU) updates of T&E courses to ensure the curriculum supports the certification standards and provides the appropriate education and training.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Developmental Test and Evaluation	20.749	19.541	20.571
Description: This program supports and improves the DT&E efforts of Major Defense Acquisition Program (MDAP), Major Automated Information System (MAIS) /Business System Category Programs, and other Special Interest (SI) acquisition programs as they progress through the acquisition/development lifecycle; oversee the Test and Evaluation (T&E) career field of the defense			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605804D8Z / *Development Test & Evaluation*	**Project (Number/Name)** P804 / *Development Test & Evaluation*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018

acquisition workforce; develop policy and guidance for the conduct of DT&E within the DoD; and prepare the annual DT&E report to Congress.

FY 2016 Accomplishments:

-Worked with over 150 MDAP/MAIS/SI Program Managers, Chief Developmental Testers, and Lead DT&E organizations to improve DT&E planning and develop comprehensive and efficient DT&E strategies through the use of disciplined Evaluation Framework Matrixes and Scientific Test and Analysis Techniques (STAT).

-Continued to implement the DASD(DT&E) 'Shift Left' philosophy that focuses on ensuring DT&E strategies are developed in advance of releasing Technology Maturation and Risk Reduction (TMRR) and Engineering and Manufacturing Development (EMD) Request For Proposals (RFPs), and increasing the amount and quality of data available to support production decisions with specific focus on cybersecurity, interoperability, and reliability.

-Reviewed and approved 28 Test and Evaluation Master Plans (TEMPs) submitted to support major acquisition reviews for MDAPs. Ensured DT&E planning is complete prior to the start of DT&E activities.

-Refined DT&E policies and methodologies addressing DT&E across all Acquisition programs. Incorporated the T&E cybersecurity process into the DoDI 5000.02 enclosure 14.

-Published 30 DT&E data-based system performance assessments to support Defense Acquisition Board (DAB) review of MDAP and MAIS programs proceeding to major milestones. Supported 24 Defense Acquisition Boards and 31 Overarching Integrated Product Team acquisition program reviews.

-Promoted the application of sound DT&E and related technical disciplines across the Department's acquisition community and programs.

-Sustained the Scientific Test and Analysis Techniques Center of Excellence (STAT COE) to support Acquisition Program Managers in the development of statistically optimized test programs.

-Convened the Second T&E Key Leadership Position Certification Board that certified an additional 26 individuals as qualified to fill key T&E leadership positions.

-Served as Functional Manager of the 8,738 member T&E acquisition workforce. Over 95 percent of the workforce achieved the certification standards required of the Defense Acquisition T&E Workforce (exceeded 90 percent goal).

-Provided direction to the Defense Acquisition University (DAU) on the FY 2017 T&E education, training, and experience requirements including competencies and certification standards; position category description(s); and content of the DAU courses

-Prepared and submitted the Highly Accelerated Life Testing (HALT) and Highly Accelerated Stress Screening (HASS) Report to Congress (June 2016) required by FY 2016 NDAA House Report

-Completed the FY 2015 DT&E Annual Report to Congress that provides an assessment of MDAP DT&E progress and assesses the T&E workforce. Begin development of the FY 2016 Annual Report to Congress.

FY 2017 Plans:

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605804D8Z / *Development Test & Evaluation*	**Project (Number/Name)** P804 / *Development Test & Evaluation*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
-Work with Acquisition Program Managers, Chief Developmental Testers, and Lead DT&E organizations to improve DT&E planning and develop comprehensive and efficient DT&E strategies through the use of disciplined Evaluation Framework Matrixes and Scientific Test and Analysis Techniques (STAT). -Continued to implement the DASD(DT&E) 'Shift Left' philosophy that focuses on ensuring DT&E strategies are developed in advance of releasing Technology Maturation and Risk Reduction (TMRR) and Engineering and Manufacturing Development (EMD) Request For Proposals (RFPs), and increasing the amount and quality of data available to support production decisions with specific focus on cybersecurity, interoperability, and reliability. -Review/Approve all TEMPs submitted to support milestone reviews. Ensure DT&E planning is complete prior to the start of DT&E activities. -Refine DT&E policies and methodologies addressing DT&E across all Acquisition programs. -Publish DT&E data-based system performance assessments to support Defense Acquisition Board (DAB) review of MDAP and Business System Category programs proceeding to major milestones. -Promote the application of sound DT&E and related technical disciplines across the Department's acquisition community and programs. -Sustain the Scientific Test and Analysis Techniques Center of Excellence (STAT COE) to support Acquisition Program Managers in the development of statistically optimized test programs. Work with the Services to identify funding to sustain the STAT COE in FY 2018. -Convene the T&E Key Leadership Position Certification Board to review T&E key leadership candidates. -Serve as Functional Manager of the T&E acquisition workforce. -Review the Defense Acquisition University (DAU) T&E education, training, and experience requirements including competencies and certification standards; position category description(s); and content of the DAU courses. Provide direction on needed changes. -Complete the FY 2016 DT&E Annual Report to Congress that provides an assessment of MDAP DT&E progress and assesses the T&E workforce. Prepare reports to Congress as required.			
FY 2018 Plans: -Work with Acquisition Program Managers, Chief Developmental Testers, and Lead DT&E organizations to improve DT&E planning and develop comprehensive and efficient DT&E strategies through the use of disciplined Evaluation Framework Matrixes and Scientific Test and Analysis Techniques (STAT). -Continue to implement the DASD(DT&E) 'Shift Left' philosophy that focuses on ensuring DT&E strategies are developed in advance of releasing Technology Maturation and Risk Reduction (TMRR) and Engineering and Manufacturing Development (EMD) Request For Proposals (RFPs), and increasing the amount and quality of data available to support production decisions with specific focus on cybersecurity, interoperability, and reliability.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605804D8Z / *Development Test & Evaluation*	**Project (Number/Name)** P804 / *Development Test & Evaluation*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
-Review/Approve all TEMPs submitted to support milestone reviews. Ensure DT&E planning is complete prior to the start of DT&E activities. -Refine DT&E policies and methodologies addressing DT&E across all Acquisition programs. -Publish DT&E data-based system performance assessments to support Defense Acquisition Board (DAB) review of MDAP and Business System Category programs proceeding to major milestones. -Promote the application of sound DT&E and related technical disciplines across the Department's acquisition community and programs. -Convene the T&E Key Leadership Position Certification Board to review T&E key leadership candidates. -Serve as Functional Manager of the T&E acquisition workforce. -Review the Defense Acquisition University (DAU) T&E education, training, and experience requirements including competencies and certification standards; position category description(s); and content of the DAU courses. Provide direction on needed changes. -Prepare reports to Congress as required.			
Accomplishments/Planned Programs Subtotals	20.749	19.541	20.571

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

- Engaged and conducted oversight on all AT&L-designated MDAP, MAIS, and SI programs.
- Advised at Defense Acquisition Board (DAB), Overarching Integrated Product Teams (OIPT), and Nunn-McCurdy Reviews.
- Reviewed DT&E strategy in Test and Evaluation Master Plans (TEMPs) for MDAP, MAIS, and Special Interest programs.
- Prepared formal DT&E assessments to inform Acquisition decision makers of readiness to enter EMD or begin Low Rate Initial Production.
- Supported OSD led Peer Reviews.
- The Scientific Test and Analysis Techniques Center of Excellence (STAT COE) supported development of disciplined test strategies.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0606100D8Z / *Budget and Program Assessments*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	22.607	3.973	4.014	3.992	-	3.992	4.009	4.059	4.140	4.224	Continuing	Continuing
101: *Budget and Program Assessments*	22.607	3.973	4.014	3.992	-	3.992	4.009	4.059	4.140	4.224	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program supports the Office of the Director, Cost Assessment & Program Evaluation (CAPE). It funds assessments that help to resolve budget and programmatic issues across the full range of the Department's activities. Projects that support this effort help to inform the leadership on program alternatives, capability concept development, design and cost, as well as the appropriate balance of capabilities across the force, and also to identify how well the Department's expenditures are meeting its goals, and how well the force can implement the Defense strategy.

This program provides for analytical research across the entire spectrum of defense issues and concerns. The research agenda is focused on near to long-term problems identified by the Secretary of Defense, and addresses difficult and complex questions linked to program alternatives for current and future capabilities and forces in order to enhance the senior leadership's deliberations and decision-making.

This program provides the scientific and technical engineering services needed for research studies in the development of models and simulations and the evaluation of current analytical tools and scientific methods used to evaluate and assess weapons systems and warfighting capabilities for warfighting environments and scenarios, and related force structure. Deliverables from this program will include reports, briefings, and analyses designed to illuminate critical issues facing the Department. Outcomes include recommendations for new modeling techniques, programmatic alternatives, and scenario development.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	4.116	4.014	4.159	-	4.159
Current President's Budget	3.973	4.014	3.992	-	3.992
Total Adjustments	-0.143	0.000	-0.167	-	-0.167
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.143	-			
• Internal Realignment	-	-	-0.004	-	-0.004
• SRRB Savings	-	-	-0.163	-	-0.163

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0606100D8Z *I Budget and Program Assessments*

Change Summary Explanation

This program was internally realigned to achieve efficiencies and better align with Department priorities.

Service Requirement Review Board (SRRB) - As part of the Department of Defense reform agenda, the incremental reduction accounts for consolidation and reduction of service contracts

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0606100D8Z / *Budget and Program Assessments*	Project (Number/Name) 101 / *Budget and Program Assessments*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
101: *Budget and Program Assessments*	22.607	3.973	4.014	3.992	-	3.992	4.009	4.059	4.140	4.224	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This program supports the Office of the Director, Cost Assessment & Program Evaluation (CAPE). It funds assessments that help to resolve budget and programmatic issues across the full range of the Department's activities. Projects that support this effort help to inform the leadership on program alternatives, capability concept development, design and cost, the appropriate balance of capabilities across the force, and also to identify how well the Department's expenditures are meeting its goals, and how well the force can implement the Defense strategy.

This program provides for analytical research across the entire spectrum of defense issues and concerns. The research agenda is focused on near to long-term problems identified by the Secretary of Defense, and addresses difficult and complex questions linked to program alternatives for current and future capabilities and forces in order to enhance DoD senior leadership's deliberations and decision-making.

This program provides the scientific and technical engineering services needed for research studies in the development of models and simulations and the evaluation of current analytical tools and scientific methods used to evaluate and assess weapons systems and warfighting capabilities for warfighting environments and scenarios, and related force structure. Deliverables from this program will include reports, briefings, and analyses designed to illuminate critical issues facing the Department. Outcomes include recommendations for new modeling techniques, programmatic alternatives, and scenario development.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: OSD Support for Programming Budget	3.973	4.014	3.992
Description: This program provides for analytical research across the entire spectrum of defense issues and concerns. The research agenda is focused on near to long-term problems identified by the Secretary of Defense, and addresses difficult and complex questions linked to program alternatives for current and future capabilities and forces in order to enhance senior leadership deliberations and decision-making.			
FY 2016 Accomplishments: - Evaluated and upgraded the cost analysis tools used to inform program, budget, and Defense Acquisition Board reviews. - Analyzed war-fighting and joint operations to support major defense reviews, including transformation initiatives, force and weapons systems requirements, and AoAs to support major acquisition decisions; land forces, including the manning, equipping, training, sustaining, and fielding of these forces with special emphasis on the resources needed to accomplish these activities.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0606100D8Z / *Budget and Program Assessments*	**Project (Number/Name)** 101 / *Budget and Program Assessments*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Analyzed mobility requirements and modernization decisions for airlift aircraft, sealift vessels, and tankers in support of the defense strategy; also, force structure and investment decisions for pre-positioning ashore and afloat and the impact of forward presence postures. - Evaluated scenarios for reducing logistics vulnerabilities, to include evaluation of threat databases, demographics, and technological trends; and developed strategies to reduce the impact of national security resources. - Analyzed scenarios of national security interest to support transformation initiatives. - Improved medical cost growth forecasting methodology to reliably forecast costs for budgeting using the tool developed to evaluate the impact of alternative benefit structures and policies on future costs. - Analyzed alternative cyber defense strategies to improve the cyber security and mission assurance of the Department of Defense by supporting training objectives and advocating for and assisting in the development of a data-driven analysis. - Modified and supported a wargaming repository. - Analyzed Overseas Contingency Operations (OCO) funding data to determine how funding was actually spent as distinguished from DoD base budget resources. Updated normalization information to be applied to existing Defense Resources Data Warehouse (DRDW) data. - Analyzed sexual assault investigations from Service Military Criminal Investigative Organizations to identify programs that can be developed or expanded to mitigate the problem.			
FY 2017 Plans: Studies, analyses, and assessments will be focused on: - Improving cost analysis tools to inform program, budget, and Defense Acquisition Board reviews. - In support of the Weapon System Acquisition Reform Act (WSARA), independently assessing, analyzing, and where appropriate, updating cost indices, inflation rates, and escalation rates used in preparing the President's Budget for major acquisition programs. - Developing, assessing, and enhancing databases that provide cost data for major weapon systems. - Improving estimates produced by the Defense Employment and Purchases Projection System (DEPPS) and Defense Translator, which are used to support decision briefs to the President, Congress, Secretary of Defense, and Deputy Secretary of Defense. - Modeling and analyzing aircraft survivability against various threat detection approaches and in various operational environments. Assessing the ability of aircraft and weapons to operation in anti-access/area denial regions. - Modeling logistical vulnerabilities against various threats and in various operational environments and assessing the cost and mission effectiveness of proposed improvements. - Modifying, and supporting a wargaming repository. - Analyzing OCO funding data to determine how funding was actually spent as distinguished from DoD base budget resources. Providing normalization information that can be applied to existing Defense Resources Data Warehouse (DRDW) data for the current budget position.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0606100D8Z / *Budget and Program Assessments*	**Project (Number/Name)** 101 / *Budget and Program Assessments*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Developing scenarios and modeling for mobile intelligence targets. - In support of the Defense Strategic Guidance, analyzing programs to assess alternative platforms; examining the cost of all mission alternatives and acquisition strategies. ***FY 2018 Plans:*** Studies, analyses, and assessments will be focused on: - Improving cost analysis tools to inform program, budget, and Defense Acquisition Board reviews. - In support of the Weapon System Acquisition Reform Act (WSARA), independently assessing, analyzing, and where appropriate, updating cost indices, inflation rates, and escalation rates used in preparing the President's Budget for major acquisition programs. - Developing, assessing, and enhancing databases that provide cost data for major weapon systems. - Improving estimates produced by the Defense Employment and Purchases Projection System (DEPPS) and Defense Translator, which are used to support decision briefs to the President, Congress, Secretary of Defense, and Deputy Secretary of Defense. - Modeling and analyzing aircraft survivability against various threat detection approaches and in various operational environments. Assessing the ability of aircraft and weapons to operation in anti-access/area denial regions. - Modeling logistical vulnerabilities against various threats and in various operational environments. Assessing the cost and mission effectiveness of proposed improvements. - Modifying and supporting a wargaming repository. - Analyzing OCO funding data to determine how funding was actually spent as distinguished from DoD base budget resources. Provide normalization information that can be applied to existing Defense Resources Data Warehouse (DRDW) data for the current budget position.			
Accomplishments/Planned Programs Subtotals	3.973	4.014	3.992

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

A mix of competitive contracts with commercial firms and research provided by university-affiliated research centers (UARCs), and Federally Funded Research and Development Centers (FFRDCs).

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0606100D8Z / *Budget and Program Assessments*	**Project (Number/Name)** 101 / *Budget and Program Assessments*

E. Performance Metrics

The products or expected outcomes of this program are studies and analyses to support resource allocation decisions, major defense acquisition decisions, and issues of high interest to the Secretary of Defense. Performance is measured by the quality of the analyses and is monitored through the review of the organizational assessment process. The primary goal is to ensure that study and analytical products are timely, clear, complete, accurate, responsive, balanced, and objective.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0606225D8Z / *ODNA Technology & Research Analysis*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	0.000	3.500	1.000	1.000	-	1.000	0.000	0.000	0.000	0.000	Continuing	Continuing
P225: *Technology and Research Analysis*	-	3.500	1.000	1.000	-	1.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Program Element established during FY 2016 year of execution.

A. Mission Description and Budget Item Justification

The Office of Net Assessment develops and coordinates analyses that examine the standing trends and future prospects of U.S. and other military capabilities and military potential. The net assessments address near and long-term problems and opportunities for the U.S. military forces to help counter technological advantages of potential adversaries of the United States. These efforts will pursue research to analyze the future security environment.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	3.500	1.000	1.000	-	1.000
Total Adjustments	3.500	1.000	1.000	-	1.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	3.500	-			
• SBIR/STTR Transfer	-	-			
• FY 2017 Request for Additional Appropriations	-	1.000	-	-	-
• FY 2018 Reques for Additional Appropriations	-	-	1.000	-	1.000

Change Summary Explanation

FY 2016 increase due to reprogramming actions from other OSD programs.

FY 2017 funding request of +$1.000 million is required to address emergency warfighting readiness requirements.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0606225D8Z / *ODNA Technology & Research Analysis*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Technology and Research Analysis	3.500	1.000	1.000
Description: The Office of Net Assessment develops and coordinates analyses that examine the standing trends and future prospect of U.S. and other military capabilities and military potential. The net assessments address near and long-term problems and opportunities for the U.S. military forces to help counter technological advantages of potential adversaries of the United States. These efforts will pursue research to analyze the future security environment. ***FY 2016 Accomplishments:*** - Initiated research into possible technical and operational applications for robotics and autonomous systems. - Examined evolving business models and RD&A practices within the global market, how they have changed in the past ten years, and initiated forecast trends. - Conducted analysis of future concepts of operation and possible adversary courses of action and responses to emerging capabilities. ***FY 2017 Plans:*** - Develop analysis of potential advances in machine learning and human machine teaming. - Continue to conduct analysis of future concepts of operation and possible courses of action and responses to emerging capabilities. - Invest in assessment of new research areas to assess potential revolutionary advances and their implications to the character of future military conflict. ***FY 2018 Plans:*** - Invest in Biosciences Net Assessment to assess potential revolutionary advances. - Continue to conduct analysis on future concepts of operation and possible courses of action and responses to emerging capabilities. - Conduct analysis in AI/Human Machine Teaming to identify areas of consideration for potential advanced capability demonstrations.			
Accomplishments/Planned Programs Subtotals	3.500	1.000	1.000

D. Other Program Funding Summary ($ in Millions)

N/A

Remarks

E. Acquisition Strategy

N/A

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0606225D8Z / *ODNA Technology & Research Analysis*

F. Performance Metrics

N/A

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0203345D8Z / *Defense Operations Security Initiative (DOSI)*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	1.900	1.888	2.072	2.551	-	2.551	3.015	3.054	3.116	3.182	Continuing	Continuing
345: *Defense Operations Security Initiative*	1.900	1.888	2.072	2.551	-	2.551	3.015	3.054	3.116	3.182	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

DOSI establishes and leads the Department's next generation OPSEC capability development and affiliated investment strategy. Investments support DoD's current and emerging OPSEC capability gaps, including countering advances in non-U.S. ISR capabilities and denying understanding of U.S. capability, capacity, and readiness. These investments spur Department innovation and preserve U.S. technology superiority. Produced prototypes lead the community's ability to sustain and maximize technology advantage as they are transitioned to Service and Agency programs for sustainment, maintenance, and capacity programming. Test and evaluation analyses establish measure and countermeasure effectiveness in current and emerging operational environments.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	1.888	2.072	2.685	-	2.685
Current President's Budget	1.888	2.072	2.551	-	2.551
Total Adjustments	0.000	0.000	-0.134	-	-0.134
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Service Requirements Review Board Directed Decrease	-	-	-0.134	-	-0.134

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Defense Operations Security Initiative	1.888	2.072	2.551
FY 2016 Accomplishments: - Researched, developed, and tested signature management and OPSEC technologies to support CCMD and DoD Component requirements that enable planning at strategic and operatonal levels.			

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0203345D8Z / *Defense Operations Security Initiative (DOSI)*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Ensured developed prototypes and capabilities transition into formalized program offices and program executive offices across DoD Components. - Assessed historic RDT&E investments to identify Return On Invest (ROI) metrics on DoD OPSEC capability and capacity progression. ***FY 2017 Plans:*** - Oversee two research, development and testing projects on signature management and OPSEC technologies to support CCMD and Component requirements - Provide oversight and advocacy for transitioning developed prototypes and capabilities into formalized program offices and program executive offices across DoD Components. - Continue to assess historic RDT&E investments to identify ROI metrics on DoD OPSEC capability and capacity progression. ***FY 2018 Plans:*** - Will oversee research, development, and testing on next generation capabilities that counter foreign ISR capabilities and deny understanding of U.S. capability, capacity and readiness. - Will provide oversight and advocacy for transitioning developed prototypes and capabilities into formalized program offices and program executive offices across DoD Components. - Will participate in Defense RDT&E processes to advance basic and applied research, science, and technology, and technology development and testing to elevate OPSEC capability and capacity across the Department.			
Accomplishments/Planned Programs Subtotals	1.888	2.072	2.551

D. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 0203345D8Z O&M DW: *Defense Operations Security Initiative*	3.669	3.775	3.736	-	3.736	3.932	3.917	3.989	3.989	Continuing	Continuing

Remarks

E. Acquisition Strategy

The acquisition, management, and contracting strategy involves the following:
• Adhere to guidance outlined in DoD 5000, Directive 7, Federal Acquisition Regulations (FAR), and FAR Supplement Policies and Procedures.
• RDT&E OPSEC capabilities, systems, tools, products, and services through a disciplined, yet agile, process that ensures signature management and signature obfuscation capabilities are available for DoD components.
• Sustain an acquisition process that is responsive and responsible to internal and external customers and stakeholders.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0203345D8Z / *Defense Operations Security Initiative (DOSI)*

• Continue to support the warfighter's need for capabilities that dominate today's dynamic, networked battlespace by providing strategy across the DoD for the planning and execution of OPSEC.

F. Performance Metrics

RDT&E performance metrics are used to establish baseline and assess progress toward enhancement and increase of OPSEC capabilities and capacities across the DoD's assigned responsibilities. The following metrics are based on the ROI of RDT&E investments and provide assessment to meeting:
1) operational requirements for OPSEC capabilities, 2) technical requirements for successful engineering, and 3) programmatic requirements for sustaining RDT&E successes across the Department:
- Seventy percent of evaluations and tests on engineered prototypes and next generation capabilities address CCMD and/or DoD Component requirements. The remaining thirty percent serve as the pivot to improve service level operational capabilities or to address alternate technologies.
- One hundred percent of completed prototype development includes affiliated specifications, architecture, raw material inventories and documentation. They are maintained in a centralized database repository used to support feedback and future efforts.
- Fifty percent of prototypes and next generation capabilities transition into DoD Component Program Management Offices and Program Executive Offices to fulfill DoD urgent needs, while the remaining fifty percent are reviewed for alternative operational utility and sent to the appropriate Service or Agency for application.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0303260D8Z / *Defense Military Deception Program Office (DMDPO)*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	0.925	0.942	0.916	1.006	-	1.006	1.025	1.040	1.062	1.076	Continuing	Continuing
891: *Defense Military Deception Program*	0.925	0.942	0.916	1.006	-	1.006	1.025	1.040	1.062	1.076	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

DMDPO establishes and leads the Department's next generation physical and electromagnetic decoys capability and affiliated investment strategy. Investments support DoD's current and emerging MILDEC capability gaps, including multi-spectrum signature emulation. These investments spur technology innovation maximizing Joint Force Commanders' ability to reduce operational risks across system survivability and force protection while maximizing the ability to dictate operational conditions such as freedom of maneuver, positional advantage, and initiative. R&D prototypes are transitioned to Service and Agency programs for sustainment, maintenance, and capacity programming. Test and evaluation analyses establish Department requirement forecasts on capability programming.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	0.942	0.916	1.059	-	1.059
Current President's Budget	0.942	0.916	1.006	-	1.006
Total Adjustments	0.000	0.000	-0.053	-	-0.053
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Service Requirements Review Board Directed Decrease	-	-	-0.053	-	-0.053

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Defense Military Deception Program Office	0.942	0.916	1.006
FY 2016 Accomplishments: - Researched, developed, and tested two high-fidelity next generation decoys and capabilities to meet Combatant Commands (CCMD) and DoD Component MILDEC requirements. - Developed technology feasibility reports on potential deception threats to U.S. systems.			

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0303260D8Z / *Defense Military Deception Program Office (DMDPO)*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Ensured developed prototypes and capabilities transition into formalized program offices and program executive offices across DoD Service Components. - Executed a use case, in coordination with Army, through JCIDS for MILDEC requirement contextualization for a pre-milestone A acquisition package. - Participated in Defense RDT&E processes to advance basic and applied research, science and technology, and technology development and testing to elevate MILDEC capability and capacity across the Department. ***FY 2017 Plans:*** - Continue to research, develop, and test high-fidelity next generation decoys and capabilities to meet CCMD and DoD Component MILDEC requirements. - Continue to develop technology feasibility reports on potential deception threats to U.S. systems. - Continue to ensure developed prototypes and capabilities transition into formalized program offices and program executive offices across DoD Components. - Continue to participate in Defense RDT&E processes to advance basic and applied research, science and technology, and technology development and testing to elevate MILDEC capability and capacity across the Department. - Continue to assess historic operational prototypes to identify ROI metric on DoD MILDEC capability and capacity progression. ***FY 2018 Plans:*** - Will oversee research, development and testing on a high-fidelity next generation decoys affiliated with current CCMD and Service requirements - Will provide oversight and advocacy for transitioning developed prototypes and capabilities into formalized program offices and program executive offices across DoD Components. - Will participate in Defense RDT&E processes to advance basic and applied research, science and technology, and technology development and testing to elevate MILDEC capability and capacity across the Department.			
Accomplishments/Planned Programs Subtotals	0.942	0.916	1.006

D. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 0303260D8Z O&M DW: *Defense Military Deception Program Office*	3.134	2.287	2.227	-	2.227	2.268	2.278	2.307	2.336	Continuing	Continuing

Remarks

N/A

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0303260D8Z / *Defense Military Deception Program Office (DMDPO)*

E. Acquisition Strategy

The acquisition, management, and contracting strategy involves the following:

• Adhere to guidance outlined in DoD 5000, Directive 7, Federal Acquisition Regulations (FAR), and FAR Supplement Policies and Procedures.

• Acquire and sustain MILDEC capabilities, systems, tools, products, and services through a disciplined, yet agile, process that ensures information related capabilities are available for DoD components.

• Sustain an acquisition process that is responsive and responsible to internal and external customers and stakeholders.

• Continue to support the warfighter's need for capabilities that dominate today's dynamic, networked battlespace by providing governance, oversight, and strategy across the DoD for the planning and execution of MILDEC activities.

F. Performance Metrics

RDT&E performance metrics are among the metrics used to establish the baseline and assess progress toward revitalization of MILDEC capabilities and capacities across the DoD's assigned responsibilities. The following metrics are based on the return on investment of RDT&E investments and provide assessment to meeting: 1) operational requirements for MILDEC capabilities, 2) technical requirements for successful engineering, and 3) programmatic requirements for sustaining RDT&E successes across the Department:

Performance metrics are measured through an increase of MILDEC capability and capacity as demonstrated by the following:

- Seventy percent of evaluations and tests on engineered prototypes and next generation capabilities address CCMD and DoD Component requirements. The remaining thirty percent serve as the pivot to improve service level operational capabilities or to address alternate technologies.
- One hundred percent of completed prototype development includes affiliated specifications, architecture, raw material inventories, and documentation. They are maintained in a centralized database repository used to support feedback and future efforts.
- Fifty percent of prototypes and next generation capabilities transition into DoD Component Program Management Offices and Program Executive Offices to fulfill DoD urgent needs, while the remaining fifty percent are reviewed for alternative operational utility and sent to the appropriate Service or Agency for application.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0305193D8Z / *Cyber Intelligence*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	6.735	6.567	18.523	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	31.825
001: *Intelligence Support to Cyber Operations*	6.735	6.567	18.523	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	31.825

A. Mission Description and Budget Item Justification

Intelligence Support to Cyber Operations funds development, testing, prototyping, and demonstration of innovative intelligence capabilities to integrate intelligence and counterintelligence activities across numerous domains and technical areas including signals intelligence (SIGINT), measurements and signature intelligence (MASINT), electronic warfare, cyber, geospatial intelligence (GEOINT), multi-sensor integration, biometrics, identity management, collection management, special communications, clandestine operations, and tagging, tracking and locating. Innovation is the rapid experimentation and development of existing technologies (hardware, software, licenses, databases, analytics, etc.) to create new capabilities and demonstrate their intelligence value in support of warfighter operations. Beginning in FY 2018, these funds have moved to PE 0305245D8Z, Intelligence Capabilities and Innovation.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	6.567	18.523	18.992	-	18.992
Current President's Budget	6.567	18.523	0.000	-	0.000
Total Adjustments	0.000	0.000	-18.992	-	-18.992
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Transfer to PE 0305245D8Z	-	-	-18.992	-	-18.992

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0305193D8Z / *Cyber Intelligence*	Project (Number/Name) 001 / *Intelligence Support to Cyber Operations*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
001: *Intelligence Support to Cyber Operations*	6.735	6.567	18.523	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	31.825
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Cyber and II will integrate intelligence activities in the information/collaborative environment and Cyberspace with conventional and asymmetric military operations. Further, it will provide new and emerging technologies, methodologies, and processes to increase the delivery of actionable intelligence from the Defense Intelligence Enterprise to the Warfighter. The broadened scope will include SIGINT, electronic warfare, clandestine operations, global access, MASINT, GEOINT, special communications, collection management, multi-sensor integration, and identity intelligence.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Intelligence Support to Cyber Operations	6.567	18.523	-
FY 2016 Accomplishments: Developed Cyber and II capabilities and capacity to support combatant commands, combat service agencies, and Services to execute cyber and asymmetric operations activities to include critical and emerging cyber, cyber intelligence, and II technologies that supported warfighter needs.			
FY 2017 Plans: Continue to develop Cyber and II capabilities and capacity to support combatant commands, combat service agencies, and Services to execute cyber and asymmetric operations activities to include critical and emerging cyber, cyber intelligence, and II technologies that support warfighter needs. In addition, expand focus and scope to include emerging technology solutions in support of Defense Intelligence Enterprise cyber and technical collection requirements and gaps.			
Accomplishments/Planned Programs Subtotals	6.567	18.523	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

The Cyber and II acquisition, management and contracting strategy follows guidance outlined in the DoD 5000 series directives, Federal Acquisition Regulation (FAR), and FAR supplement policies and procedures. Management uses project management tools and meetings to ensure delivery of stated capabilities and performance criteria.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0305193D8Z / *Cyber Intelligence*	**Project (Number/Name)** 001 / *Intelligence Support to Cyber Operations*

E. Performance Metrics

Performance metrics are measured through internal management controls and external assessments. Performance metrics include, but are not limited to, time, money, realism, fidelity, and transition as defined below:

- Time – Enable the warfighter to speed up processes faster than current capabilities allow.
- Money – Enable the warfighter to reduce duplication of effort and to prepare and execute events at a more effective and efficient cost than current capabilities allow.
- Realism – Enable the warfighter to create an environment that is closer to the real world environment than current capabilities allow.
- Fidelity – Ensure unity of efforts throughout the Cyber and II Communities.
- Transition – Select projects that have the greatest likelihood of transitioning into operational capabilities.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0305245D8Z / *Intelligence Capabilities and Innovation*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	18.992	-	18.992	19.427	19.528	19.676	20.074	Continuing	Continuing
001: *Intelligence Capabilities and Innovation*	-	0.000	0.000	18.992	-	18.992	19.427	19.528	19.676	20.074	Continuing	Continuing

A. Mission Description and Budget Item Justification

These funds were transferred from PE 0305193D8Z, Cyber Intelligence in order to support the expansion from a predominantly cyber focus to include broader intelligence capabilities activities. Intelligence Capabilities and Innovation funds development, testing, prototyping and demonstration of innovative intelligence capabilities to integrate intelligence and counterintelligence activities across numerous domains and technical areas including signals intelligence (SIGINT), measurements and signature intelligence (MASINT), electronic warfare, cyber, geospatial intelligence (GEOINT), multi-sensor integration, biometrics, identity management, collection management, special communications, clandestine operations, and tagging, tracking and locating. Innovation is the rapid experimentation and development of existing technologies (hardware, software, licenses, databases, analytics, etc.) to create new capabilities and demonstrate their intelligence value in support of warfighter operations.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	0.000	0.000	18.992	-	18.992
Current President's Budget	0.000	0.000	18.992	-	18.992
Total Adjustments	0.000	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			

Change Summary Explanation

This PE was created in FY 2018 in order to describe the expanded focus and scope to include emerging technology solutions in support of the Defense Intelligence Enterprise cyber and technical collection requirements and gaps.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0305245D8Z / *Intelligence Capabilities and Innovation*	Project (Number/Name) 001 / *Intelligence Capabilities and Innovation*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
001: *Intelligence Capabilities and Innovation*	-	0.000	0.000	18.992	-	18.992	19.427	19.528	19.676	20.074	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Intelligence Capabilities and Innovation funds development, testing, prototyping and demonstration of innovative intelligence capabilities to integrate intelligence and counterintelligence activities across numerous domains and technical areas including SIGINT, MASINT, electronic warfare, cyber, GEOINT, multi-sensor integration, biometrics, identity management, collection management, special communications, clandestine operations, and tagging, tracking and locating.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Intelligence Capabilities and Innovation	0.000	0.000	18.992
FY 2016 Accomplishments: N/A			
FY 2017 Plans: N/A			
FY 2018 Plans: Will develop Intelligence Capabilities and Innovation capabilities and capacity to support combatant commands, combat support agencies, and Services to execute cyber and asymmetric operations activities to include critical and emerging intelligence capabilities and innovation as well as emerging technology solutions in support of Defense Intelligence Enterprise cyber and technical collection requirements and gaps.			
Accomplishments/Planned Programs Subtotals	0.000	0.000	18.992

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Intelligence Capabilities and Innovation acquisition, management, and contracting strategy follows guidance outlined in the DoD 5000 series directives, Federal Acquisition Regulation (FAR) and FAR supplement policies and procedures. Management uses project management tools and meetings to ensure delivery of stated capabilities and performance criteria.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0305245D8Z / *Intelligence Capabilities and Innovation*	**Project (Number/Name)** 001 / *Intelligence Capabilities and Innovation*

E. Performance Metrics

Performance Metrics are measured through internal management controls and external assessments. Performance metrics include, but are not limited to, time, money, realism, fidelity, and transition as defined below:

- Time – Enable the warfighter to speed up processes faster than current capabilities allow.
- Money – Enable the warfighter to reduce duplication of effort and to prepare and execute events at a more effective and efficient cost than current capabilities allow.
- Realism – Enable the warfighter to create an environment that is close to the real world environment that current capabilities allow.
- Fidelity – Ensure unity of efforts throughout the Intelligence Capabilities and Innovation communities.
- Transition – Select projects that have the greatest likelihood of transition to operational capabilities.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0306310D8Z / *CWMD Systems: RDT&E Management Support*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	0.000	0.000	0.000	1.231	0.000	1.231	1.251	1.280	1.310	1.333	Continuing	Continuing
1: *P*814 / RDT&E Management*	0.000	0.000	0.000	1.231	0.000	1.231	1.251	1.280	1.310	1.333	Continuing	Continuing

Note

FY2018 increase reallocated from PE 0303310D8Z to support transition of technologies to acquisition programs of record and/or fielded systems.

A. Mission Description and Budget Item Justification

The Countering Weapons of Mass Destruction (CWMD) Systems program provides funding for research, development, integration, and deployment of CWMD capabilities. Funding is allocated to a portfolio of projects and activities in response to Combatant Command needs and research initiatives.

A focal point of this program is development of CWMD situational awareness capabilities. The Joint Requirements Oversight Council approved the Information Systems Initial Capabilities Document for CWMD Situational Awareness on 23 December 2015, which identifies the need for a family of systems to mitigate capability gaps identified by the Combatant Commands. U.S. Special Operations Command, which assumed CWMD mission responsibilities in January 2017 per the Unified Command Plan, is providing focus and direction for development of CWMD situational awareness capabilities. Gaining situational awareness of weapons of mass destruction (WMD) threats and risks, as well as U.S. and international efforts to counter WMD proliferation, requires expertise and information access. Relevant information is spread across disconnected systems, on multiple networks, and in the open source domain, making it difficult to discover and use information to support mission needs. WMD-related situations in recent years, including the removal of chemical weapons from Syria and the response to the West African Ebola outbreak, have demonstrated the need for Combatant Commands to access and share CWMD information, collaborate on planning and operations, and have a common understanding of the operational environment with mission partners. CWMD Systems is addressing existing gaps and deficiencies through a portfolio of investments.

The CWMD Systems program provides funding for two technology-enabled fusion cells at the Defense Threat Reduction Agency (DTRA) and the Defense Intelligence Agency (DIA), which utilize information systems and applications to enable CWMD situational awareness. Existing DoD information systems, networks, and applications are utilized and/or modified using CWMD Systems funding. Development of new applications reuses software to the extent possible. The DTRA and DIA cells curate, synthesize, and contextualize CWMD information for end-users. This hybrid approach facilitates cross-organizational information sharing and collaboration, necessary for addressing the transregional character of WMD proliferation.

The CWMD Systems program utilizes four Research, Development, Test & Evaluation (RDT&E) program elements (BA-3 / PE#0303310D8Z, BA-5 / PE#0305310D8Z, BA-6 / PE#0306310D8Z, and BA-7 / PE#0607310D8Z), as well as an Operations and Maintenance (O&M) "CWMD Sustainment" line (ORC-2531).

This Program Element (PE) funds research, development, test and evaluations efforts to support planning, development, and sustainment of CWMD situational awareness information systems, or other systems as needed.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0306310D8Z / *CWMD Systems: RDT&E Management Support*

This appropriation funds travel to support the requirements of this program, and work (including manpower) performed by a government agency or by private individuals or organizations under a contractual or grant arrangement with the government who conduct research, development and test and evaluation efforts.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	1.231	-	1.231
Total Adjustments	0.000	0.000	1.231	-	1.231
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Realigned from BA-3 / PE 0303310D8Z	-	-	1.238	-	1.238
• DTIC Offset	-	-	-0.008	-	-0.008
• SRRB adjustment	-	-	0.001	-	0.001

Change Summary Explanation

FY2018 increase reallocated from 03/0303310D8Z to support transition to an acquisition program of record and mature system capabilities.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0306310D8Z / *CWMD Systems: RDT&E Management Support*	Project (Number/Name) 1 / *P*814 / RDT&E Management*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
1: *P*814 / RDT&E Management*	0.000	0.000	0.000	1.231	0.000	1.231	1.251	1.280	1.310	1.333	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

FY2018 increase reallocated from PE 0303310D8Z to support transition of technologies to acquisition programs of record and/or fielded systems.

A. Mission Description and Budget Item Justification

The Countering Weapons of Mass Destruction (CWMD) Systems program provides funding for research, development, integration, and deployment of CWMD capabilities. Funding is allocated to a portfolio of projects and activities in response to Combatant Command needs and research initiatives.

A focal point of this program is development of CWMD situational awareness capabilities. The Joint Requirements Oversight Council approved the Information Systems Initial Capabilities Document for CWMD Situational Awareness on 23 December 2015, which identifies the need for a family of systems to mitigate capability gaps identified by the Combatant Commands. U.S. Special Operations Command, which assumed CWMD mission responsibilities in January 2017 per the Unified Command Plan, is providing focus and direction for development of CWMD situational awareness capabilities. Gaining situational awareness of weapons of mass destruction (WMD) threats and risks, as well as U.S. and international efforts to counter WMD proliferation, requires expertise and information access. Relevant information is spread across disconnected systems, on multiple networks, and in the open source domain, making it difficult to discover and use information to support mission needs. WMD-related situations in recent years, including the removal of chemical weapons from Syria and the response to the West African Ebola outbreak, have demonstrated the need for Combatant Commands to access and share CWMD information, collaborate on planning and operations, and have a common understanding of the operational environment with mission partners. CWMD Systems is addressing existing gaps and deficiencies through a portfolio of investments.

The CWMD Systems program provides funding for two technology-enabled fusion cells at the Defense Threat Reduction Agency (DTRA) and the Defense Intelligence Agency (DIA), which utilize information systems and applications to enable CWMD situational awareness. Existing DoD information systems, networks, and applications are utilized and/or modified using CWMD Systems funding. Development of new applications reuses software to the extent possible. The DTRA and DIA cells curate, synthesize, and contextualize CWMD information for end-users. This hybrid approach facilitates cross-organizational information sharing and collaboration, necessary for addressing the transregional character of WMD proliferation.

The CWMD Systems program utilizes four Research, Development, Test & Evaluation (RDT&E) program elements (BA-3 / PE#0303310D8Z, BA-5 / PE#0305310D8Z, BA-6 / PE#0306310D8Z, and BA-7 / PE#0607310D8Z), as well as an Operations and Maintenance (O&M) "CWMD Sustainment" line (ORC-2531).

This Program Element (PE) funds research, development, test and evaluations efforts to support planning, development, and sustainment of CWMD situational awareness information systems, or other systems as needed.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0306310D8Z / *CWMD Systems: RDT&E Management Support*	**Project (Number/Name)** 1 / *P*814 / RDT&E Management*

This project funds travel to support the requirements of this program, and work (including manpower) performed by a government agency or by private individuals or organizations under a contractual or grant arrangement with the government who conduct research, development and test and evaluation efforts.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: P*001 / RDT&E Management	0.000	0.000	1.231
Description: • Perform activities to support the planning, development, and sustainment of CWMD situational awareness information systems, or other systems as needed. ***FY 2016 Accomplishments:*** None ***FY 2017 Plans:*** None ***FY 2018 Plans:*** • Perform studies and analysis to support the planning, development, and sustainment of CWMD situational awareness information systems			
Accomplishments/Planned Programs Subtotals	0.000	0.000	1.231

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Utilize or reuse information technologies to field initial capabilities to end-users. As technologies mature and user needs are refined, systems or applications may transition to acquisition program(s) or be sustained separately. Integration of or interoperability among systems is also an acquisition pathway.

E. Performance Metrics

Success in this area is measured by compliance with various statutes and DoD directives that govern the conduct of the affairs within the Office of the Assistant Secretary of Defense for Nuclear, Chemical and Biological Defense Programs (OASD/NCB). Maintain cost, schedule, and performance reporting, review, and adjudication. Maintain requirements traceability matrix.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0804767D8Z / *COCOM Exercise Engagement and Training Transformation (CE2T2)*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	195.875	41.735	34.384	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
758: *Joint National Training Capability (JNTC)*	106.642	28.846	25.495	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
761: *Joint Simulations Systems (JSS)*	15.150	2.139	1.016	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
769: *Joint Knowledge Development & Distribution Capability (JKDDC)*	16.792	3.593	3.756	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
770: *U.S. Forces Korea Training and Exercise Support*	33.908	0.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	33.908
701: *Air Force Joint National Training Capability (JNTC)*	9.524	2.643	2.524	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
772: *Navy Joint National Training Capability (JNTC)*	13.859	2.514	1.593	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
079: *USSTRATCOM SPACE CYBER*	0.000	2.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.000

Note

This program transfers to the Joint Staff (PE 0804767J) beginning in FY 2018.

A. Mission Description and Budget Item Justification

These programs support readiness of the joint force by creating a Joint Training Environment to replicate the complex and changing operational environment. The funding increase beginning in FY 2016 represents planned growth and internal reprogramming decisions to accelerate development of a cloud-enabled joint training environment. These investments directly support defense strategic guidance and enhance joint warfighting readiness by building training capabilities that support the operational readiness of the force. The elements associated with this coordinated effort consist of:

- Joint National Training Capability (JNTC)
- Joint Simulation System (JSS)
- Joint Knowledge Development & Distribution Capability (JKDDC)
- U.S. Forces Korea Training & Exercise Support (USFK)
- Air Force Joint National Training Capability (JNTC)

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0804767D8Z / *COCOM Exercise Engagement and Training Transformation (CE2T2)*

- Navy Joint National Training Capability (JNTC)

JNTC: The mission of the Joint National Training Capability (JNTC) program is to advance joint capabilities and interoperability by concentrating on emerging joint training requirements through collective training experiences using a managed set of globally distributed capabilities and activities. The program resources Service and SOF joint training and enabling capabilities that improve interoperability and realism of tactical and operational joint training between the Services and USSOCOM. JNTC enables joint collective training for Combatant Commands and Services by developing relevant joint training content and ensuring global distributed access. The enabling capabilities support the Services and USSOCOM in their requirement to provide trained and ready forces in support of Combatant Command operational requirements. This program will focus efforts on improving, rather than consuming, readiness and create a ready surge force consistent with Chairman's guidance.

JSS: The Joint Simulation System (JSS) provides a low cost, distributed or deployable, web-based joint training capability with a small technical and operator footprint. The JSS funding provides warfighters with joint simulations and tools that enhance and enable Joint training across Services, Combatant Commands, Combat Support Agencies, NATO and multinational partners. The Joint simulations and tools provided by JSS funding are critical enablers that support the delivery of trained, capable, and interoperable joint forces. JSS's intent is to maintain a capability to share simulation environments with coalition partners.

JKDDC: Joint Knowledge Development & Distribution Capability (JKDDC) Joint Knowledge Online (JKO) is the JS J7 program of record for online joint training that implements and operationalizes the OSD T2 JKDDC. JKO directly supports the CE2T2 program by developing, delivering, tracking, and reporting online training for Combatant Command exercises; Combatant Command required training; doctrinally based Joint Operations Core Curriculum; multinational, coalition, IA training; and OSD required training (externally funded). JKO also expends funding for leading edge technology review, market research, and integration to directly enhance specific aspects of the training capability as required for J7 support to Combatant Commanders. JKO satisfies all requirements necessary to provide the CE2T2 stakeholders with a distributed learning capability and access to web-based training content.

USFK: FY 2015 is the last year for dedicated funding within the overall program. The U.S. Forces Korea (USFK) Training & Exercise Support program develops simulations capable of satisfying all joint exercise training requirements in the Korean Theater of Operations. Interoperability with the Republic of Korea-developed Korean Simulation System (KSIMS) is a critical and unique requirement of this USFK RDT&E program. This solution will be capable of interoperating in a common battle space that realistically represents the operating environment to all levels of training audiences -- tactical to strategic -- in Korean theater exercises. While supporting USFK's specific requirements, this solution will contain enhancements that will benefit other combatant commander training programs that use the aging Joint, Live, Virtual, and Constructive (JLVC) simulations and the emerging JLVC 2020 simulations.

Air Force JNTC: The Air Force JNTC funding provides a focused upgrade to develop models for space-based capabilities for integration into the JLVC environment. The Air Force supports development of cross-domain solutions that enable the integration of systems with disparate security requirements, and significantly increases the training audience to additional joint and coalition participants.

Navy JNTC: These funds enable the Navy to develop unique maritime capabilities that integrate JLVC elements into a seamless joint training environment. The Navy program activities include conducting research, development, test and evaluation, and cross-service architecture certification on joint-capable systems. Additionally, the

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0804767D8Z *I COCOM Exercise Engagement and Training Transformation (CE2T2)*

program develops cross-domain architectures for U.S. and Coalition Forces and ensures sister service modeling/simulation and instrumentation efforts follow a unified standard.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	42.679	34.384	46.241	-	46.241
Current President's Budget	41.735	34.384	0.000	-	0.000
Total Adjustments	-0.944	0.000	-46.241	-	-46.241
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.944	-			
• Other Adjustment	-	-	-1.741	-	-1.741
• Program Transfer	-	-	-44.500	-	-44.500

Change Summary Explanation

The CE2T2 program transfers to the Joint Staff (PE 0804767J) beginning in FY 2018.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0804767D8Z / *COCOM Exercise Engagement and Training Transformation (CE2T2)*	**Project (Number/Name)** 758 / *Joint National Training Capability (JNTC)*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
758: *Joint National Training Capability (JNTC)*	106.642	28.846	25.495	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

CE2T2 Project 758: Joint National Training Capability transfers from USD-PR PE 0804767D8Z to Joint Staff PE 0804767J in fiscal year 2018

A. Mission Description and Budget Item Justification

Investment in the Joint National Training Capability (JNTC) program will enable Service and Combatant Commands to train as they operate. The funding requested continues development of exercise Scenario Management Tools and services that support planning and execution of joint training, and continued maturation of a single integrating architecture for Joint Training. Funding supports the development of cloud-enabled modular training application services. Program intent is to reduce dependence on touch labor, and mitigate the impact of reductions in operation and sustainment funding. Focus must be maintained to deliver operationally relevant training environments and respond to changes in the warfighter's operational environment. JNTC enables the Department of Defense to be responsive to the warfighters' pace of changing operational concepts, threat environments, and best practices. In FY 2017, this investment continues expanding access for Service and Combatant Command trainers to plan and execute joint training. Funds support improved relevance and realism of training by providing capabilities that replicate the contemporary and future operating environment.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Joint National Training Capability (JNTC)	28.846	25.495	0.000
Description: JNTC provides the technical standards, architecture (blueprint), and development processes required to integrate/ link joint training programs. The Joint Training Environment is envisioned as an integrated network of training sites and nodes, and accessible joint training and force development services. By leveraging existing training programs and initiating specific actions, JNTC develops credible opposing force capabilities and expanded access to assets typically unavailable to the training audience. This enhances the integration of joint training objectives into Service training events. Funding in this account supports the technical integration of Joint and Service modeling and simulation training capabilities. Technical integration enables selective aggregation of training audiences at the Combatant Command, Joint Task Force, and Component Command Headquarter levels. The funding supports modernization of the Joint Training Environment (JTE) to increase warfighter access to automated training enablers within the Joint Training Synthetic Environment (JTSE) through web-based and cloud capabilities. The Adaptive Training Capability Program (ATCP) is a subordinate component of JNTC that enables the Joint Force to be responsive to the warfighters' pace of changing operational concepts, threat environments, and best practices. ATCP funding			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0804767D8Z / *COCOM Exercise Engagement and Training Transformation (CE2T2)*	**Project (Number/Name)** 758 / *Joint National Training Capability (JNTC)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018

advances joint capabilities and interoperability by addressing emerging joint training requirements through a managed set of globally distributed JLVC enablers. ATCP funding promotes joint context to Service training programs and joint enablers supporting Combatant Command training requirements and CJCS High Interest Training Issues identified in the Chairman's Annual Training Guidance.

FY 2016 Accomplishments:

• Released Joint Live Virtual Constructive version 0.8 in February 2016. Conducted (3) development events, (3) software integration events, (3) Korea Command Bridge tests to support the Pacific theater, (1) verification event and and (2) validation events in preparation for Joint Live Virtual Constructive v1.0 due for release December 2016.

• Transitioned from DoD Information Assurance Certification and Accreditation process to Risk Management Framework. This increased cybersecurity focus came with additional requirements adopted in the development effort and sustainment of current capabilities.

• In May 2016, published the Joint Training Synthetic Environment Modeling and Simulation Roadmap that implements the Joint training project plan outlined in the Information Systems -Initial Capabilities Document. The roadmap codifies various use cases, capability gaps, capability requirements, and functional requirements.

• Integrated security services into the newly developed Joint Training Tools establishing a single sign-on capability supporting most joint Training Enterprise Network services.

• Released Joint Training Data Services version 4.2 which includes a web-enabled, enhanced Order of Battle Service and a new Terrain Generation Service capability. Order of Battle Service provides enhanced capability to produce simulation ready force data. Terrain Generation Services provides individual users' ability to request and receive simulation ready terrain for several simulations with plans to support more simulations. Terrain Generation Service also provides the ability to layer content over standard geographic maps to enrich the standard information available on the map.

• Completed the overarching and comprehensive data model supporting the new web-services based Joint Training Tool software architecture.

•Within a cloud construct, leveraged current technologies to lessen the burden of specific physical machines and allow quicker build and tear-down of systems through virtualization. Explored public cloud offerings in alignment with the DoD Chief Information Officer's Cloud Computing Strategy.

FY 2017 Plans:

• Continue the annual requirement for Service simulation integration by providing direction, specification, standards, and testing environments to enable the integration of Service, Joint Combatant Command and Agency simulations, services and tools.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0804767D8Z / *COCOM Exercise Engagement and Training Transformation (CE2T2)*	**Project (Number/Name)** 758 / *Joint National Training Capability (JNTC)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Invest in IT capabilities that continue to modernize Joint Staff J-7's Suffolk data center to support virtualized, cloud-enabled delivery of training capabilities to Services and Combatant Commands. Investments support the shift to a joint training strategy whereby more realistic training is available as the joint force more heavily relies on training from home station. • Continue development of Joint Training Environment tools/services that support reduction in out-year training operations and sustainment costs, for planning, designing, provisioning, and executing Combatant Command and Service joint training activities. • Continue development of cloud management services that provide on demand, auto-initiated, and load-balanced Joint Training Environment services (i.e., data, simulation, planning tools, virtualized command and control, etc.). • Release beta version of the new Joint Training Tool software that uses the modernized IT architecture. • Develop role-play capability in Joint Training Tools such that users are able to access only their particular software capability and data, (e.g., a red force planner has access to red force laydown). • Investigate opportunities to use the Joint Information Environment Mission Partner Environment to meet coalition training requirements. • Continue to align IT infrastructure with Joint information Environment requirements. ***FY 2018 Plans:*** -			
Accomplishments/Planned Programs Subtotals	28.846	25.495	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 0804767D8Z: *JNTC O&M Funding*	36.341	35.880	-	-	-	-	-	-	-	Continuing	Continuing

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

RDT&E development efforts are evaluated based on the performance metrics below. This ensures the Joint Force Trainer capabilities development effort synchronizes with warfighter requirements. Performance metrics include, but are not limited to; access, cost, realism, relevance and technology as defined below:

• Access – Develop design standards that enable participation across DoD and, as applicable, with Coalition Partners. Make the environment available to meet user demands.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0804767D8Z / *COCOM Exercise Engagement and Training Transformation (CE2T2)*	**Project (Number/Name)** 758 / *Joint National Training Capability (JNTC)*

- Cost – Enable the Joint Force Trainer to prepare and execute training at a more effective and efficient cost than current capabilities allow.
- Realism – Enable the Joint Force Trainer to create a training environment that is closer to the real world environment than current capabilities allow.
- Relevance – Maintain operational relevance through adaptation to the changing operational environment.
- Technology – Sustain the training environment network through developments for distributed home station training that include modular cloud-enabled training services.

Measures:

- Cost- Vendors provide ordered hours and project costs remain within 10 percent of government estimates.
- Schedule- Task completions (software enhancements, bug fixes, and cyber security requirements) delivered within 6 months of government estimate.
- Performance- Product results, outcomes, or milestones meet specific requirements and successfully pass more than 80 percent of operational assessment test cases.
- DoD Demand- Number of Commands, Services, and Agencies using Joint Staff developed training products.
- Partner Nation Demand- Number of partner nations using Joint Staff developed training products.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0804767D8Z / *COCOM Exercise Engagement and Training Transformation (CE2T2)*	Project (Number/Name) 761 / *Joint Simulations Systems (JSS)*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
761: *Joint Simulations Systems (JSS)*	15.150	2.139	1.016	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

CE2T2 Project 761: Joint Simulations Systems (JSS) transfers from USD-PR PE 0804767D8Z to Joint Staff PE 0804767J in fiscal year 2018

A. Mission Description and Budget Item Justification

The Joint Simulation System (JSS) will decompose, harvest, and reuse DoD investment in joint simulations to develop cloud-enabled modular services (CEMS), reaching Initial Operating Capability in FY 2016. JSS will further development of existing Joint Conflict and Tactical Simulation (JCATS) and Joint Theater Level Simulation (JTLS) as required, to remain relevant and responsive to meet Combatant Command training requirements as the Joint Training Environment is implemented. JSS will provide design and development of web-based applications used as services in CEMS environment.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Joint Simulation System (JSS)	2.139	1.016	-

Description: This effort provides warfighters with joint simulations and tools that enhance and enable Joint training across Services, Combatant Commands, agencies and coalition partners. These joint simulations and tools are part of an overall JLVC baseline of training capabilities. They represent a set of training enablers, and “certified systems” that are interoperable and acceptable for usage within the joint training environment. The joint simulations and tools provided by JSS are critical enablers that support the delivery of trained, capable, and interoperable Joint Forces.

FY 2016 Accomplishments:

• Met joint training requirement gaps with joint simulation and tools that enhance and enable Joint training across the Services, Combatant Commands, agencies and Coalition partners.
• Provided low cost capability to Combatant Commands, Services, NATO training venues, and 30 international partners (NATO's primary training simulation0 enabling increased interoperability and cooperation between the U.S. and our NATO allies.
• Developed the Air Tasking Order Generator and an Air Tasking Order Translator web-based modular services from legacy models, leading change throughout the DoD to a globally distributed, cloud based joint training capability.

FY 2017 Plans:

• Continue to enhance existing tools and accelerate the development of web-based modular services in support of the Joint Training Synthetic Environment from legacy tools/capabilities enhancing joint training effectiveness, affordability, and security.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0804767D8Z / *COCOM Exercise Engagement and Training Transformation (CE2T2)*	**Project (Number/Name)** 761 / *Joint Simulations Systems (JSS)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Continue to meet the joint training capability requirements of Combatant Commands, Services, agencies and coalition partners with globally-focused, multi-domain multi-command, low cost, low overhead, and secure capabilities. • Operationalize the developed Air Tasking Order Generator and Air Tasking Order Translator web-based module services for Combatant Command, Services, agencies and coalition training.			
Accomplishments/Planned Programs Subtotals	2.139	1.016	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 0804767D8Z: *JSS O&M Funding*	0.927	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

RDT&E development efforts are evaluated based on performance metrics. This ensures the development of Joint Force Trainer capabilities synchronizes with warfighter requirements. Performance metrics include, but are not limited to; time, cost, realism, and fidelity as defined below:

• Time – Will the effort enable the Joint Force Trainer to prepare and execute training more timely than current capabilities allow?
• Cost – Will the effort enable the Joint Force Trainer to prepare and execute training at a more effective and efficient cost than current capabilities allow?
• Realism – Will the effort enable the Joint Force Trainer to create a training environment that is closer to the real world environment than current capabilities allow?
• Fidelity – Will the effort enable the Joint Force Trainer to create more detailed capabilities in the training environment than current capabilities allow?

Measures:
• Cost- Vendors provide ordered hours and project costs remain within 10 percent of government estimates.
• Schedule-Task completions (software enhancements, bug fixes, and cyber security requirements) delivered within 6 months of government estimate.
• Performance- Produce results, outcomes or milestones meet specified requirements and successfully pass more than 80 percent of operational assessment test cases. JTLS and JCATs availability of use in support of all training activities remains above 95 percent.
• DoD Demand- Number of exercises/events supported by JTLS/JCATS.
• Partner Nation Demand- Number partner nations using Joint Staff developed training products (active foreign military sales cases).

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0804767D8Z / *COCOM Exercise Engagement and Training Transformation (CE2T2)*	Project (Number/Name) 769 / *Joint Knowledge Development & Distribution Capability (JKDDC)*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
769: *Joint Knowledge Development & Distribution Capability (JKDDC)*	16.792	3.593	3.756	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

CE2T2 Project 769: Joint Knowledge Development & Distribution Capability (JKDDC) transfers from USD-PR PE 0804767D8Z to Joint Staff PE 0804767J in fiscal year 2018

A. Mission Description and Budget Item Justification

Joint Knowledge Online (JKO) is the DoD unique and authoritative source for online joint training. JKO is tasked to develop a DoD enterprise-wide, Joint Individual Training Toolkit of web-enabled individual and small group training products, services and enabling training technology. Products and services are developed in response to OSD(P&R) CE2T2 Program Goals & Objectives guidance, CJCS High Interest Training Issues, Joint Staff J7 training priorities, and JKO Stakeholder (Combatant Commands, Services, and Combat Support Agencies) prioritized training requirements. JKO supports a career-long joint learning continuum, joint professional military education, and tailored common training standards to Service members for tasks that are jointly executed, resulting in trained, capable, and interoperable joint forces. JKO research and development will improve all components of the Joint Content Management Architecture including:

• JKO Learning Content Management System (LCMS): Development and enhancement is required to integrate advanced individual and staff training technologies and methodologies with larger scale, collective training exercises, and modernize military training capability with a DoD enterprise-wide online training toolkit. JKO LCMS is necessary to develop, host and deliver JKO courses and track/report students' progress, completions and survey results more effectively and efficiently. JKO LCMS extends web-based, distributed access to mission-critical joint training requirements. There are currently over 2.7 million registered users of the JKO LCMS.

• Small Group Scenario Trainer (SGST) desktop modeling and simulation based training: This JKO capability trains and prepares thousands of military and civilian personnel deploying to Combatant Command theaters of operation prior to serving in their assigned Combined/Joint Task Force (C/JTF) billets. Specifically, C/JTF 'battle staffs' will be adequately trained, as individuals and the staffs collectively, based on SGST development and implementation throughout the joint training enterprise. JKO integration of SGST simulation exercise scenarios and pre-requisite JKO courses enable blended learning training support to large-scale, collective training exercises that augment the Joint Event Learning Cycle and in meeting combatant commanders exercise objectives.

• JKO mobile application training device development: Development and enhancements facilitate the global distribution of web-based joint training content on portable, hand-held platforms (cell pones and tablets). JKO Mobile App extends access to training courses and learning resources to personal use of mobile phones and tablets.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Joint Knowledge Development & Distribution Capability (JKDDC)	3.593	3.756	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0804767D8Z / *COCOM Exercise Engagement and Training Transformation (CE2T2)*	**Project (Number/Name)** 769 / *Joint Knowledge Development & Distribution Capability (JKDDC)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018

Description: JKDDC Joint Knowledge Online (JKO) advanced technology initiatives primarily include the JKO Learning Content Management System (LCMS) application, Small Group Scenario Trainer (SGST) desktop modeling and simulation based training capability, and mobile courseware training devices.. These capabilities facilitate the training and preparation of tens of thousands of military and civilian personnel deploying to Combatant Command (CCMD) theaters of operation prior to serving in their assigned Combined/Joint Task Force (C/JTF) billets. Specifically, JKO LCMS development and enhancements are required to host and deliver JKO courses and track/report students' completions more effectively and efficiently. C/JTF "battle staffs" will be better trained, as individuals and the staffs collectively, based on SGST development and implementation throughout the joint training enterprise. JKO mobile courseware training device development facilitates the global distribution of web-based joint training content on portable, hand-held platforms (cell phones and tablets) for DoD personnel.

FY 2016 Accomplishments:

•Developed, tested, and delivered a major conversion of JKO LCMS code base to harden the system for cybersecurity compliance, resulting in a more effective and efficient online training management application that is interoperable with DoD personnel management systems. Requirements were derived from CCMD user feedback and DoD training priorities directed by the Deputy Assistant Secretary of Defense for Readiness (DASD(R) for JKO to "develop content for pre-exercise training and support-as required by the Army, Marine Corps and supported GCCs and support individual and unit training for REF/SP-MAGTF missions." These enhancements have improved the ease of use for the current ~40,000 daily log-ins and ~450,000 monthly course completions by DoD personnel. Improvements to the JKO LCMS reflect the software requirements needed to ensure cyber security. Improvements also benefited thousands of individuals by easing their requirement to complete mandatory join individual web-based training as a precursor to their participation in numerous CCMD exercise training events.

• Developed, tested and delivered multiple JKO Small Group Scenario Trainer (SGST) desktop modeling and simulation application releases resulting in a more effective and efficient training capability integrated within the LCMS. JKO updated products and services are derived from practical application in the field. CCMD user feedback contributes to a more effective and efficient training capability, improving the OSD endorsed Blended Learning Training component of CCMD collective training exercises. The JKO SGST capability was leveraged to prepare individuals serving on CCMD required small functional teams and C/JTF 'battle staffs' in preparation for USTRANSCOM's, USNORTHCOM's, USSOUTHCOM's, USPACOM's, and USEUCOM's collective training exercises. Individual training proficiency improvement was measured and quantified as a key component of the exercise design. DoD mandated network cyber security enhancements were successfully integrated in the release.

• Assessed, refined and continued executing JKO's comprehensive plan to develop mobile training device capabilities focused on JKO's entire Joint Individual Training Toolkit. Provided JKO courseware and video conversions to portable hand-held devices (cell phones and tablets). Leveraged and ported numerous other DoD agency, interagency and multinational training courseware to JKO Mobile app. A good example is OSD's Transition Veterans Program Office training on JKO Mobile which benefited military

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0804767D8Z / *COCOM Exercise Engagement and Training Transformation (CE2T2)*	**Project (Number/Name)** 769 / *Joint Knowledge Development & Distribution Capability (JKDDC)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
members significantly in transitioning to civilian life. JKO developed, converted, tested, and delivered ~120 mobile training courses, eBooks, Podcasts, job aids, and videos via the JKO Mobile App on both Apple and Android platforms. ***FY 2017 Plans:*** • Develop, test and deliver two JKO Learning Content Management System (LCMS) releases resulting in a more effective and efficient online training management application that is interoperable with DoD personnel management systems. JKO will continue to test, evaluate, and provide enhancements to ensure compliance with cybersecurity of all Joint Content Management Architecture (JCMA) components. Requirements will be derived from CCMD user feedback and DoD training priorities directed by DASD(R) for JKO to "develop content for pre-exercise training and support—as required by the Army, Marine Corps and supported GCCs—and support individual and unit training for REF/SP-MAGTF missions." JKO anticipates these enhancements will improve cybersecurity and the ease of use for the current 40,000 daily log-ins and 450,000 monthly course completions by DoD personnel. Improvements to the JKO LCMS will directly benefit thousands of individuals by easing their requirement to access, complete and retain mandatory joint individual web-based training. Additionally, this retention benefits them as a precursor to their participation in numerous CCMD exercise training events. JKO must continue to evaluate and enhance its architecture to maintain performance standards and remain on the leading edge of distant learning technology as we confront an austere fiscal environment and the tremendous demand of JKO capabilities. • Develop, test, and deliver 4 JKO Small Group Scenario Trainer (SGST) desktop modeling and simulation application releases resulting in a more effective and efficient training capability integrated within JKO Learning Content Management System (LCMS). JKO anticipates these enhancements will improve the quality of the training experience for CCMD exercise participants. The SGST will be used as part of the OSD endorsed Blended Learning Training component in approximately 8 CCMD collective training exercises to prepare individuals serving on CCMD required small functional teams and C/JTF 'battle staffs'. Individual training proficiency improvement will be measured and quantified as part of the exercise design. Additionally, SGST is expected to support enhancement of the SEJPME training by enabling synchronous and asynchronous CAPSTONE-type capability. JKO will continue to enhance functionality based on user experience and feedback. • JKO will assess, refine, and continue executing its comprehensive plan to develop mobile training device capabilities focused on JKO's entire Joint Individual Training Toolkit. Planned components include existing JKO courseware and video conversions to portable, hand-held devices, emerging FY 2017 training courseware requirements interoperable with portable, hand-held devices while leveraging of other DoD agencies, interagency, and multinational training courseware for delivery on the JKO Mobile App. JKO plans develop or convert approximately 150 training courses, eBooks, Podcasts, job aids, and videos resulting in the reduction in costs for classroom training and thousands of hours delivered onsite and on demand to DoD personnel mobile platforms worldwide. JKO will continue to enhance its mobile capability based on user experience and feedback.			
Accomplishments/Planned Programs Subtotals	3.593	3.756	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0804767D8Z / *COCOM Exercise Engagement and Training Transformation (CE2T2)*	**Project (Number/Name)** 769 / *Joint Knowledge Development & Distribution Capability (JKDDC)*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 0804768D8Z: *JKDDC O&M Funding*	6.038	5.286	-	-	-	-	-	-	-	Continuing	Continuing

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Joint Staff prescribed performance metrics include, but are not limited to; time, cost, realism, and fidelity as defined below:

• Time – Will the effort enable the Joint Force Trainer to prepare and execute training more timely than current capabilities allow?
• Cost – Will the effort enable the Joint Force Trainer to prepare and execute training at a more effective and efficient cost than current capabilities allow?
• Realism – Will the effort enable the Joint Force Trainer to create a training environment that is closer to the real world environment than current capabilities allow?
• Fidelity – Will the effort enable the Joint Force Trainer to create more detailed capabilities in the training environment than current capabilities allow?

Measures:
• Identify, develop, test and implement 15 or more cybersecurity, operational, and functional JKO LCMS requirements.
• Identify, develop, test and implement 12 or more cybersecurity, operational and functional JKO SGST requirements.
• Identify, develop, test and implement 6 or more cybersecurity, operational and functional JKO Mobile App requirements.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0804767D8Z / *COCOM Exercise Engagement and Training Transformation (CE2T2)*	Project (Number/Name) 770 / *U.S. Forces Korea Training and Exercise Support*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
770: *U.S. Forces Korea Training and Exercise Support*	33.908	0.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	33.908
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

2015 was the last year for dedicated funding of the CE2T2 project 770: U.S. Forces Korea Training and Exercise Support.

A. Mission Description and Budget Item Justification

The U.S. Forces Korea (USFK) Training & Exercise Support program developed simulations capable of satisfying all joint exercise training requirements in the Korean Theater of Operations. Interoperability with the Republic of Korea-developed Korean Simulation System (KSIMS) was a critical and unique requirement of this USFK RDT&E program. This solution is capable of interoperating in a common battle space that realistically represents the operating environment to all levels of training audiences -- tactical to strategic -- in Korean theater exercises. While supporting USFK's specific requirements, this solution contains enhancements that will benefit other combatant commander training programs that use the aging Joint, Live, Virtual, and Constructive (JLVC) simulations and the emerging JTSE (previously JLVC 2020) simulations.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: USFK Training & Exercise Support	0.000	-	-
Description: This program provided Joint Training Environment support to the 2015 stand-up of KORCOM as a sub-unified command under USPACOM. This program developed a jointly accredited, supported, and funded federation of constructive models and simulations which are capable of satisfying all joint exercise training requirements in the Korean Theater of Operations (and which is interoperable with KSIMS). While supporting U.S. Forces Korea specific training requirements, this solution was inextricably linked to the JTSE modeling and simulation capability via Cloud-Enabled Modular Services. It provided a common, interoperable simulated battlespace which realistically represents the operating environment to all levels of training audiences (tactical to strategic) in Korean theater exercises and across the Combatant Commands, Services, and coalition Partners.			
FY 2016 Accomplishments: This program provided a Joint Training Environment comprised of jointly accredited, supported, and funded federation of constructive models and simulations that are capable of satisfying all joint exercise training requirements in the Korean Theater of Operations (and which is interoperable with KSIMS).			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0804767D8Z / *COCOM Exercise Engagement and Training Transformation (CE2T2)*	**Project (Number/Name)** 770 / *U.S. Forces Korea Training and Exercise Support*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
FY2015 was the last year for dedicated funding of USFK T&E support program.			
Accomplishments/Planned Programs Subtotals	0.000	-	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 0804767D8Z: *U.S. Forces Korea Training & Exercise Proc*	0.000	0.000	0.000	-	0.000	0.000	-	-	-	0.000	0.299

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

RDT&E development efforts are evaluated based on performance metrics. This ensures the development of Joint Force Trainer capabilities synchronizes with warfighter requirements. Performance metrics include, but are not limited to; time, cost, realism, and fidelity as defined below:

• Time – Will the effort enable the Joint Force Trainer to prepare and execute training more timely than current capabilities allow?
• Cost – Will the effort enable the Joint Force Trainer to prepare and execute training at a more effective and efficient cost than current capabilities allow?
• Realism – Will the effort enable the Joint Force Trainer to create a training environment that is closer to the real world environment than current capabilities allow?
• Fidelity – Will the effort enable the Joint Force Trainer to create more detailed capabilities in the training environment than current capabilities allow?

Measures:
• Develop software for interoperability of JLVC versions along with initial integration of the Army's Multi-Resolution Federation (MRF). Additionally, provide a validated approach for Cross Domain Information Sharing technologies and Korea Battle Simulation Center (KBSC) simulations to the joint training enterprise that meets USFK technical training requirements.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0804767D8Z / *COCOM Exercise Engagement and Training Transformation (CE2T2)*	**Project (Number/Name)** 701 / *Air Force Joint National Training Capability (JNTC)*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
701: *Air Force Joint National Training Capability (JNTC)*	9.524	2.643	2.524	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

CE2T2 Project 701: Air Force Joint National Training Capability (JNTC) transfers from USD-PR PE 0804767D8Z to Joint Staff PE 0804767J in fiscal year 2018

A. Mission Description and Budget Item Justification

The Air Force JNTC funding provides a focused upgrade to develop models for space-based and cyber capabilities for integration into the Joint Live, Virtual, Constructive (JLVC) environment. The Air Force supports development of cross-domain solutions that enable the integration of systems with disparate security requirements, and significantly increases the training audience to additional joint and coalition participants.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Air Force Joint National Training Capability (JNTC)	2.643	2.524	-

Description: The Air Force JNTC assists in the engineering, development, and deployment of Joint Cross Domain Information Sharing (JCDIS) Enterprise Network Architecture which will enable joint and coalition participants to train while protecting classified information. Furthermore, the Air Force is creating cyber-contested environments in the distributed mission operations setting to challenge the joint exercise/training audience. Finally, comprehensive space effects are being integrated into the Joint, Live, Virtual and Constructive (JLVC) federation of models.

FY 2016 Accomplishments:

- Cyber Simulation: Increased fidelity to more accurately model adversary networks and Blue offensive cyber effects on those adversary networks. Effort was extended and culminated in a module that will allow full effects of blue cyber activities within ACE IOS. Developed a Cyber Simulator environment generator compatible with the DoD LVC training environment and cyber weapon systems.
- Joint CDIS Enterprise Network Architecture: completed development and certification/accreditation of robust GOTS Cross Domain Solution.
- DMO Improvement- Developed an Intelligence, Surveillance and Reconnaissance and Synthetic Aperture Radar Battle Damage Assessment tool at the DMOC for joint/coalition warfare use.
- Space Simulations: Improved the capability of the GPS Environment Generator (GEG).

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0804767D8Z / *COCOM Exercise Engagement and Training Transformation (CE2T2)*	**Project (Number/Name)** 701 / *Air Force Joint National Training Capability (JNTC)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• JLVC Improvements: Integrated a LVC training solution into joint training federation environment that provided a AAR data collection and reporting capability, monitoring of the simulated network/federation, accurately calculated the savings delivered by the simulation, and provided relevant financial information in real time showing total costs by category. ***FY 2017 Plans:*** • Cyber Simulation: Modify the ACE-IOS M&S suite to simulate adversary networks (C2, IADs communications networks, telecommunications, power grid, etc.), simulate Blue tactical offensive kinetic and cyber effects on adversary networks. • Space Simulation: Develop Virtual/Constructive infrared missile defense and special events presentation through the Space Based Infrared System (SBIRs) trainer system data. • Space Simulation: Improve the fidelity to GPS Environment Generator (GEG) by upgrading the presentation of GPS jammer signal characteristics I JNTC exercises, improving/updating receivers in model, providing GPS satellite signal status and conducting automatic precision guided weapon miss distance adjudication. • Space Simulation: Develop a Red Console Space Adversary Station, or Red Console, to create a method for live aggressors to interact with a virtual constructive environment using validated tools to replicate threats to space systems. • Space Simulation: Perform system engineering and integration with JNTC systems and networks. • OPFOR Development: Develop requirements and prototypes for advanced tactical-level threat simulators that are robust/mobile enough to maneuver in conjunction with OPFOR forces over rough terrain, capable of providing real-time shot data assessment and real-time kill removal, that replicates near-peer A2AD systems. • LVC Integration: Perform a USAF and US Army Live Virtual Constructive (LVC) interoperability study to determine the necessary steps to integrate US Army systems (simulators), such as Multiple Integrated Laser Engagement System (MILES) into Polygone's LVC architecture.			
Accomplishments/Planned Programs Subtotals	2.643	2.524	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 0804767D8Z: *Air Force JNTC O&M Funding*	10.514	9.636	-	-	-	-	-	-	-	Continuing	Continuing

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0804767D8Z / *COCOM Exercise Engagement and Training Transformation (CE2T2)*	**Project (Number/Name)** 701 / *Air Force Joint National Training Capability (JNTC)*

E. Performance Metrics

RDT&E development efforts are evaluated based on performance metrics. This ensures the development of Joint Force Trainer capabilities synchronize with warfighter requirements. Performance metrics include, but are not limited to; time, cost, realism, and fidelity as defined below:

• Time – Will the effort enable the Joint Force Trainer to prepare and execute training more timely than current capabilities allow?
• Cost – Will the effort enable the Joint Force Trainer to prepare and execute training at a more effective and efficient cost than current capabilities allow?
• Realism – Will the effort enable the Joint Force Trainer to create a training environment that is closer to the real world environment than current capabilities allow?
• Fidelity – Will the effort enable the Joint Force Trainer to create more detailed capabilities in the training environment than current capabilities allow?

Measures:
• Cyber: Establish a persistent simulation environment that can be configured rapidly and accurately to reflect the desired operating environment of the training audience. Also, create an ability to reflect cyber activities against a live Integrated Air Defense system.
• Space: A fully operational GPS environment which allows space operators to actively participate in Distributed Mission Operations-Space LVC missile warning, GPS disruption and Infrared special events. Also develop space models to model Space as a contested environment to accurately portray impacts of adversary actions in the Space domain.
• OPFOR: A prototype for a next generation tactical surface to air threat simulator emulating modern fielded threats fielded with potential adversary maneuver elements.
• A plan for integrating Army ground instrumentation within the Air Force run Polygon range complex.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0804767D8Z / *COCOM Exercise Engagement and Training Transformation (CE2T2)*	Project (Number/Name) 772 / *Navy Joint National Training Capability (JNTC)*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
772: *Navy Joint National Training Capability (JNTC)*	13.859	2.514	1.593	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

CE2T2 Project 772: Navy Joint National Training Capability (JNTC) transfers from USD-PR PE 0804767D8Z to Joint Staff PE 0804767J in fiscal year 2018

A. Mission Description and Budget Item Justification

These funds enable the Navy to develop unique maritime capabilities that integrate Joint Live, Virtual, and Constructive (JLVC) elements into a seamless joint training environment. The Navy program activities include conducting research, development, test and evaluation, and cross-service architecture certification on joint-capable systems. Additionally, the program develops cross-domain architectures for U.S. and Coalition Forces and ensures sister service modeling/simulation and instrumentation efforts follow a unified standard.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Navy Joint National Training Capability (JNTC)	2.514	1.593	-
Description: Develops unique maritime capabilities that integrate Joint Live, Virtual, and Constructive (JLVC) elements into a seamless joint training environment. Using a scientific and phased approach that focuses on modeling ground, air, space, and maritime capabilities, this program researches new technology and methods that provide a crucial technology-based foundation that supports all JNTC Training Transformation (T2), JLVC Federation, and Combatant Commanders Exercise and Engagement (CE2) operations.			
FY 2016 Accomplishments: • Ensured alignment of Navy LVC training standards with JLVC training Standards. • Minor enhancements to the ballistic missile defense models in support of Aegis Ashore Team Trainer (AATT) and EUCOM/ CENTCOM exercise requirements. • Sustained with minor enhancements maritime models in support of Coalition Partner nation capabilities.			
FY 2017 Plans: • Continue alignment of Navy LVC training standards with JLVC training standards. • Conduct research and development of integrated capabilities between Navy tactical training ranges and synthetic training capabilities in support of Navy LVC efforts.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0804767D8Z / *COCOM Exercise Engagement and Training Transformation (CE2T2)*	**Project (Number/Name)** 772 / *Navy Joint National Training Capability (JNTC)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Conduct limited research and development of combat identification training simulation as an enabler for spectrum operations in support of the information warfare commander (IWC). • Minimal exploration of technologies to enable Integrated Air and Missile Defense (IAMD) and other combined warfare area and joint training with coalition partners in the Pacific Fleet (PACFLT) Area of Responsibility including Japan, Korea and Australia. • Continue collaborative development with Service and Agency partners to improve the realism and relevancy of tactical to operational level of war training capabilities.			
Accomplishments/Planned Programs Subtotals	2.514	1.593	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 0804767D8Z: *Navy JNTC O&M Funding*	7.877	7.770	-	-	-	-	-	-	-	Continuing	Continuing

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

RDT&E development efforts are evaluated based on performance metrics. This ensures the Joint Force Trainer capabilities development effort synchronizes with warfighter requirements. Performance metrics include, but are not limited to; time, money, realism, and fidelity as defined below:

• Time – Will the effort enable the Joint Force Trainer to prepare and execute training more timely than current capabilities allow?
• Cost – Will the effort enable the Joint Force Trainer to prepare and execute training at a more effective and efficient cost than current capabilities allow?
• Realism – Will the effort enable the Joint Force Trainer to create a training environment that is closer to the real world environment than current capabilities allow?
• Fidelity – Will the effort enable the Joint Force Trainer to create more detailed capabilities in the training environment than current capabilities allow?

• The Navy will produce one Navy Training Baseline (NTB) software release to include documentation; will design and implement upgrades to Joint Semi-Automated Forces (JSAF) consistent with approved requirements and CRs and document the effects of JSAF capabilities (robustness) and stability. Will design, implement, test, and integrate NTB enhancements in accordance with requirements.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0804767D8Z / *COCOM Exercise Engagement and Training Transformation (CE2T2)*	**Project (Number/Name)** 772 / *Navy Joint National Training Capability (JNTC)*

• For JSAF, Joint Simulation BUS (JBUS) reliability, scalability, and tactical control, the Navy will continuously update the Common Operational Picture (COP) during large scale JLVC exercises.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0804767D8Z / *COCOM Exercise Engagement and Training Transformation (CE2T2)*	Project (Number/Name) 079 / *USSTRATCOM SPACE CYBER*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
079: *USSTRATCOM SPACE CYBER*	0.000	2.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

CE2T2 Project 079: USSTRATCOM SPACE CYBER transfers from USD-PR PE 0804767D8Z to Joint Staff PE 0804767J in fiscal year 2018

A. Mission Description and Budget Item Justification

These funds enabled USSTRATCOM to provide funding to architecture and analysis support to Space Security and Defense Program (SSDP) and the JOINT SPACE OPERATIONS CENTER (JICSpOC) through Modeling, Simulation and Analysis (MS&A); Trade-Off Analysis; Concept Development; Scenario Development; and Military Utility Analysis.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: USSTRATCOM SPACE CYBER	2.000	-	-
Description: The USSTRATCOM CYBER funding provided architecture and analysis support to SPACE Security and Defense Program (SSDP) and the JOINT SPACE OPERATIONS CENTER (JICSpOC) through Modeling, Simulation and Analysis (MS&A); Trade-Off Analysis; Concept Development; Scenario Development; and Military Utility Analysis. ***FY 2016 Accomplishments:*** • USSTRATCOM conducted exercises which included degraded or denied space environments and included contested cyber environments and required USSTRATCOM Joint Cyber Center to synchronize actions with USCYBERCOM in order to integrate cyber lines of operations. • USSTRATCOM exercises sustained integration with interagency and international partners. • USSTRATCOM exercises provided opportunities to integrate and synchronize Joint Ballistic Missile Defense.			
Accomplishments/Planned Programs Subtotals	2.000	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0804767D8Z / *COCOM Exercise Engagement and Training Transformation (CE2T2)*	**Project (Number/Name)** 079 / *USSTRATCOM SPACE CYBER*

D. Acquisition Strategy

N/A

E. Performance Metrics

All USSTRATCOM missions were exercised during the two Global series exercises during fiscal year with a specific emphasis placed on UCP missions to include: Strategic Deterrence (including Nuclear Commend and Control processes), Space Operations, and Cyberspace Operations. Additional focus areas included USSTRATCOM supporting plans. The entire command, to include components and task forces participated with the goal to meet over 95% of exercise and training objectives.

• Complete TPAs in JTIMs IAW CJCSI 3500.01 with a goal of over 75 percent rated T.

• Insure Command readiness across all UCP-assigned missions leading up to major training events with a goal of 100 percent of B2C2WG and battle roster augmentees trained.

• All USSTRATCOM missions exercised with a specific emphasis on Nuclear Command and Control processes. Entire USSTRATCOM command, to include components and task forces, participating in two GLOBAL series exercises per FY. Goal was met in 1st and 2nd quarter.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0607210D8Z / *Industrial Base Analysis and Sustainment Support*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	23.920	21.792	16.195	10.882	-	10.882	10.461	10.511	10.608	10.723	Continuing	Continuing
819: *Industrial Base Analysis and Sustainment*	23.920	21.792	16.195	10.882	-	10.882	10.461	10.511	10.608	10.723	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Fund for Innovative Results and Execution (FIRE) combines three industrial base programs focused on innovation, urgent needs and accelerated deployment. The program element is inherited from the Title 10-directed Industrial Base Analysis and Sustainment (IBAS) program (Title 10 USC Section 2508.) The other two programs formerly existed as congressional plus-ups, the Industrial Base Innovation Fund (IBIF) and the National Security Technology Accelerator. FIRE makes investments in manufacturing research and development that address any of the following areas: 1)Urgent production requirements and diminishing defense manufacturing sources and material shortages, and a sustainable defense design team base; 2) Model-based engineering and integrated computational materials engineering; and 3) New, innovative technologies being developed through public-private partnerships. The FIRE addresses strategic shortfalls especially surge production and diminishing sources and is intended to address these specific shortcomings by applying a broad range of tools to amplify interest from non-traditional suppliers and accelerate implementation via experimentation, demonstration and rapid transition. FIRE projects will be structured with an enhanced focus on competition, timeliness, and transition to operation.

These FIRE projects will be chosen from documented industrial base issues in consultation with the Services and Agencies. Projects will address needs that span several Services and Agencies. Buy-in and planning will be critical elements in terms of attracting interest to start a project and transiting from an innovative idea to reality. Projects will require substantial pre-negotiated paths from problem identification through incorporation into a real product or system.

Congressional guidance for industrial base investment often addresses urgency. The FIRE program will pursue innovation in acquisition as well as technology. There will be a special emphasis on reaching non-traditional suppliers as sources of innovation. Non-traditional and under-utilized funding mechanisms, such as Other Transaction Authority (OTA), will be emphasized.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0607210D8Z / *Industrial Base Analysis and Sustainment Support*

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	21.792	16.195	11.105	-	11.105
Current President's Budget	21.792	16.195	10.882	-	10.882
Total Adjustments	0.000	0.000	-0.223	-	-0.223
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	0.000			
• SRRB Reductions	-	-	-0.149	-	-0.149
• DTIC Offset	-	-	-0.074	-	-0.074

Change Summary Explanation

The reduction in FY 2018 is a result of SRRB- Service Requirement Review Board and DTIC Offset - As part of the Department of Defense reform agenda, the incremental reduction accounts for consolidation and reduction of service contracts and the DTIC Offset required to help sustain that program.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 7	R-1 Program Element (Number/Name) PE 0607210D8Z / *Industrial Base Analysis and Sustainment Support*	Project (Number/Name) 819 / *Industrial Base Analysis and Sustainment*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
819: *Industrial Base Analysis and Sustainment*	23.920	21.792	16.195	10.882	-	10.882	10.461	10.511	10.608	10.723	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The IBAS program has a two-pronged approach to identify projects: 1) periodic assessments of the national technology and industrial base by the OSD Acquisition, Technology and Logistics (AT&L) office of Manufacturing and Industrial Base Policy (MIBP) as directed by 10 U.S. Code 2505, and 2) a call for projects to industry. MIBP collaborates with the services and agencies in performing assessments under the 2505 program to identify elements of the industrial base where current spending on production and research is insufficient to keep critical capabilities viable. While industrial base risks are mitigated primarily through the direct engagement of prime contractors, program managers and military departments, exceptional cases require a more direct defense-wide intervention strategy. This Defense-wide Fund for Innovative Results and Execution (FIRE) program element, directed by Title 10 USC Section 2508, provides the Department with that means.

All projects are evaluated for industrial base risk using fragility and criticality risk criteria, similar to the more familiar probability and consequence risk criteria. Fragility examines characteristics that make a specific capability likely to be disrupted. Criticality examines characteristics that make a specific capability difficult to replace if disrupted. In addition to the gating criteria of fragility and criticality, additional factors for project selection include:

- An identifiable path of transition to production with a very high probability of being needed in the short to medium term.
- The capability is unlikely to be available in the absence of the proposed support.
- Analysis showing that the project results in a positive return on investment.

FIRE investments are focused on three broad industry groupings: 1) Missiles and Munitions, 2) Space, and 3) Other industrial base niches. Priority is given to investments that cut across multiple platforms and services.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Missile and Munitions Industrial Base Sustainment	10.556	4.790	8.410
Description: With a multi-decade decline in missile program development and procurement, design and production capabilities for critical components within the missile sector industrial base are at risk. This has a significant impact on current and future missile programs, limiting the readiness and availability of superior technology to U.S. Warfighters. The missile sector sustainment will exercise the design and production skills of this critical industrial base by improving existing production processes, exploring advanced materials for higher performance, and upgrading outdated technology for missile components. A missile sector Fragility and Criticality assessment has highlighted the need for specific action to preserve industrial base capabilities for fuzes and thermal batteries.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0607210D8Z / *Industrial Base Analysis and Sustainment Support*	**Project (Number/Name)** 819 / *Industrial Base Analysis and Sustainment*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018

FY 2016 Accomplishments:

Advanced Solid Rocket Propulsion: Completed work on a project that supports future missile interceptor missions with advanced kill vehicle thrusters for high precision and long duration missions. This is a defense-unique industrial base niche. The project developed a new Solid Divert and Attitude Control Systems (SDACS) diverter valve with advanced structural insulators and high-temperature seals. The primary purpose was preservation of design team capabilities for Solid Divert and Attitude Control Systems (SDACS). Funding research to sustain DACS competition is a specifically stated Congressional concern.

Butanetriol (BT): Completed work to develop a qualified domestic source for BT, a solid rocket propellant precursor chemical, precluding the necessity of procurement from a prohibited foreign source. Since 2008, DoD's projected requirements have shrunk to levels that made it uneconomical for domestic suppliers to develop BT production capability. IBAS funded a cost-sharing project with the new supplier to retrofit an existing Dihydrofuran reactor, modify pumping, plumbing, heat management and process controls to an existing reactor, relocate existing atmospheric storage tank for waste collection and modify the discharge filtering system of an existing reactor.

Electronic Safe and Arm Device (ESAD): Because of the decline in missile production, fuzes are experiencing a decline in production, making the industrial base very fragile. Without intervention, loss of industry design and production expertise is expected for ESAD-based fuzes. ESADs are most commonly used in missile fuzing, but have applicability to some of the Department's most critical gun fired and air delivered munitions as well. To improve the industrial base capability, IBAS is funding EASD design projects for cost reduction and commonality across multiple missile and munition end-products. Phase I was initiated by contracting with three different suppliers to exercise their engineering capability, including the use of sub-tier suppliers and component technology, to develop lower cost, common architecture ESAD designs. These three suppliers form the critical core of the US Industrial Base for fuzes overall. Phase II is planned for award in FY 2017. In this phase the work from Phase I will then be applied against a post milestone C munition which can benefit the most from an upgraded fuze capability.

Low Energy Exploding Foil Initiators (LEEFI): This fuze project was initiated to develop a backup manufacturing capability for LEEFIs. LEEFIs are a critical subcomponent used in all Electronic Safe and Arm Devices ESADs. The current production facility is the sole source for LEEFI fuzes used in a wide variety of DoD missile programs. The ability to manufacture these specialized initiators at an alternate location eliminates the risk of a single point of failure that has the potential to hobble production on all missile programs simultaneously.

Thermal Batteries: Similar to the issue with fuzes, the decline in missile production has made the industrial base for thermal batteries very fragile. Production is falling below minimum sustaining rates. IBAS has initiated three projects for thermal battery technical improvements in battery materials and shelf life that will lower minimum sustaining rates: improved material composition

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0607210D8Z / *Industrial Base Analysis and Sustainment Support*	**Project (Number/Name)** 819 / *Industrial Base Analysis and Sustainment*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018

that will provide additional domestic suppliers, characterization of Thermal Battery shelf-life model to enhance production quality and sustainment (reducing costs and industrial base burden), and improved thin film production to broaden and improve the market.

FY 2017 Plans:

Electronic Safe and Arm Device (ESAD): Phase I engineering projects which will continue to develop lower cost, common architecture ESAD designs.

Low Energy Exploding Foil Initiators (LEEFI): Work will be completed on the backup manufacturing capability for LEEFI fuzes eliminating the potential single point of failure affecting all missile programs.

Thermal Batteries: Work will continue on the three projects for thermal battery technical improvements.

Solid Rocket Motors: For the purpose of sustaining at-risk critical design skills, DoD will conduct advanced propulsion system technology development, maturation and demonstration that advance the state-of-the-art in propulsion component, sub-system and system solutions that enable enhanced multi-mission capabilities. The focus will be: (1) improving and maintaining design engineering capability and knowledge base in the areas of advanced propellant formulations, case/nozzle/insulation approaches, ignition systems, energy management approaches, and safety enhancements; (2) implementation of propulsion solutions that advance state-of-the-art in mission flexibility, agility, volumetric/mass efficiency, and affordability; and (3) demonstration of a down-selected integrated flight-type propulsion solution that effectively demonstrates that the critical technological elements can function together in a relevant environment.

FY 2018 Plans:

Electronic Safe and Arm Device (ESAD): Phase II will be initiated which takes the engineering projects of phase I and performs the system integration work to retrofit the new ESADs to existing post milestone C munition which can benefit the most from an upgraded fuze capability. This will further exercise the critical fuze industrial base along with the sub-tier suppliers as pre-qualification prototype quantities will be manufactured after the design from phase I is further refined for the selected application. The end production will not only be to have successfully supported this critical industrial base, but to also pave the way for the warfighter to receive a higher quality upgraded capability from a munition system. Application of ESAD designs as common architecture to multiple missiles and munitions during this phase enables realization of the desired cost savings.

Thermal Batteries: The thermal battery industrial sector initiative will continue with a call for proposals for FY 2017 and 2018. The primary focus for FY 2017-2018 time period will be on improvements within product characteristics and production methods, and development of new technologies which enable the sustainment of the industrial base while meeting Department of Defense

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0607210D8Z / *Industrial Base Analysis and Sustainment Support*	**Project (Number/Name)** 819 / *Industrial Base Analysis and Sustainment*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
requirements. The thermal battery industrial sector will continue to be assessed to ensure existing and emerging requirements are developed to support National Security Directives. Solid Rocket Motors: Work will continue on the solid rocket motor project initiated in 2016.			
Title: Space Industrial Base Sustainment ***Description:*** Investment in key sub-tier suppliers will ensure qualified suppliers exist to support future system development efforts. ***FY 2016 Accomplishments:*** Radiation Hardened Products: A number of unique radiation hardened products from a sole source supplier highly likely to be used by a number of future programs have completed development but require final space qualification. The supplier cannot fund this at their own expense. Without funding to perform space qualification work, the products will not be ready for use when needed and the supplier is highly likely to leave the business. Work was initiated to perform final space qualification work and avoid the much higher cost of developing replacement products with an alternative supplier. National Security Space Programs: Mercury Cadmium Telluride (MCT) infrared sensors permit highest performance and highest technical and manufacturing readiness levels for tactical/strategic/space applications. Volumes for MCT wafer fab production in 2014 plummeted 60% below historical annual average for the past seven years. Forecast volumes to fall another 50% next year, far below the minimum number per year to maintain this critical technology. IBAS initiated work to identify cost drivers and develop improvements in space-based sensors. This builds upon Defense Wide Manufacturing Science and Technology (ManTech) work on material for MCT infrared focal plane arrays. ***FY 2017 Plans:*** Radiation Hardened Products: Work will be completed on the project for final space qualification work and avoid the much higher cost of developing replacement products with an alternative supplier. The critical devices and technologies to be qualified: * Planar Diodes * Photodiodes * Phototransistors * Rad Hard By Design Bipolar Junction Transistors * Optocoupler devices * Surface Mount package diodes in UM packages * Insulated Gate Bipolar Transistors (IGBT) * Rad Hard MOSFET Devices	7.000	7.000	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0607210D8Z / *Industrial Base Analysis and Sustainment Support*	**Project (Number/Name)** 819 / *Industrial Base Analysis and Sustainment*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
National Security Space Programs: Work will be completed on identifying cost drivers and develop improvements in space-based sensors that builds upon ManTech work on material for MCT infrared focal plane arrays. A new project will be initiated to preserve capability by manufacturing additional wafers targeting the performance requirements for space infrared sensors. High Performance Carbon Fiber: A number of specialized (high-strength and high modulus) carbon fibers are critical to manufacturing composite structures for all types of major U.S. space military and civilian programs (e.g., satellites, space launch vehicles, spacecraft and a wide ride range of missile systems). Key carbon fibers for these applications are unique, essential (not readily substitutable) and proprietary to a single producer/single factory in one foreign country (Japan). This foreign, single point-of-failure source of supply, of materials critical to essentially all major high priority space programs, is vulnerable to many severe and long-lasting supply disruption risks (e.g., natural disaster, industrial accidents, future Asia conflicts, foreign government controls and higher foreign commercial market priorities. Regarding the latter, U.S. program carbon fiber use typically represents a small fraction of total global demand. Carbon fibers recently developed in the U.S. and commercialized for civilian applications are promising alternatives to imports. They represent a competitive second source, a more assured supply, cost less, and reportedly perform equal to or better than imports. Historically, U.S. government programs have relied on single foreign sourced legacy materials and funding is often not available in government programs to test and qualify alternative second sources. FY 2016 IBAS funds will be used to test and qualify U.S. second sources of commercially available carbon fibers. With strong cooperation from industry primes, lower tier and material suppliers -- a significant list of promising U.S. government qualification program opportunities are identified for FY 2016 execution (e.g., multiple satellites, missiles and “other” systems). Planned IBAS projects represent low technology risks, have well defined and near-term program transition points and are low-cost relative to significant industry investments in new, domestically manufactured carbon fiber supplies.			
Title: Other Unique Industry Capabilities	4.236	4.405	2.472
Description: With an overall decline in defense budgets, the industrial base sectors and niches hit hardest are those with a combination of unique requirements and low, limited or declining production. ***FY 2016 Accomplishments:*** CounterBomber: A program to sustain a suicide bomber detection capability provided by the CounterBomber system was initiated. This IBAS implementation addressed the risk of the manufacturer leaving the market because of falling sales associated with decreased U.S. troop deployment. IBAS bridged the gap between rapid prototype and formal DoD production while facilitating additional improvements including lowering the system size, weight, power consumption and cost. Electromechanical Actuators: This project was initiated to preserve unique capabilities in the manufacture of precision Electromechanical Actuators and to establish a domestic ability to machine planetary roller screws, a component critical to the actuators’ performance. These actuators are needed to meet performance requirements for weapons and stores elevator systems			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0607210D8Z / *Industrial Base Analysis and Sustainment Support*	**Project (Number/Name)** 819 / *Industrial Base Analysis and Sustainment*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
aboard the Gerald R. Ford Class of aircraft carriers. This unique manufacturing capability was at risk due to the interval between the first and second ships' material procurements. ***FY 2017 Plans:*** CounterBomber: The program to a sustain suicide bomber detection capability provided by the CounterBomber system will continue. During the first half of FY 2016, the Size, Weight and Power (SWAP) reduction effort will completed, as well as enhancements to the core CounterBomber technology which includes limited crowd scanning capabilities providing the US Government with a smaller, lighter, more resource efficient system at a lower acquisition cost, and having significant performance improvements that greatly expand the opportunities for employing this technology both domestically and abroad; implementation of AT hardware and software guards will ensure that the system can be continue utilized as a Force Protection asset to forward deployed US Armed Forces. Electromechanical Actuators: The project to preserve Electromechanical Actuator manufacturing capability for aircraft carrier weapons and stores elevator systems will continue through FY 2016. ***FY 2018 Plans:*** Critical Energetic Materials: Critical Energetic Materials: For the purpose of maintaining an adequate North American industrial base for critical key energetic materials and their pre-cursors, DOD will develop prototype manufacturing processes for many key energetic materials and their pre-cursors. Project phasing is expected to be: Phase 1 – Analysis of current technology/capability, Phase 2 – Develop a plan for a prototype manufacturing process, Phase 3 – Build the prototype manufacturing process, and Phase 4 – Provide samples of the materials with that manufacturing process. DoD will conduct additional industrial base assessments in FY 2017 to identify weaknesses and fragile and critical capabilities for FY 2017 project development.			
Accomplishments/Planned Programs Subtotals	21.792	16.195	10.882

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Goal - Insert industrial base considerations consistently in program review:

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0607210D8Z / *Industrial Base Analysis and Sustainment Support*	**Project (Number/Name)** 819 / *Industrial Base Analysis and Sustainment*

To make informed investment and production decisions
To avoid reconstitution costs for capabilities that DoD will need again.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 7	R-1 Program Element (Number/Name) PE 0607210D8Z / *Industrial Base Analysis and Sustainment Support*	Project (Number/Name) 819 / *Industrial Base Analysis and Sustainment*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Missile and Munitions Industrial Base Projects	Various	various : various	11.500	10.227		4.456		8.410		-		8.410	-	-	-
Space Sector Projects	Various	various : various	5.721	7.000		7.000		-		-		-	-	-	-
Other Defense Industrial Base Capability Projects	Various	various : various	6.026	4.236		4.405		2.472		-		2.472	-	-	-
		Subtotal	23.247	21.463		15.861		10.882		-		10.882	-	-	-

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Industrial Base Analysis Sustainment (IBAS) Program Management Services	MIPR	RDECOM, RDCB-DE : Rock Island, IL	0.673	0.329		0.334		-		-		-	-	-	-
		Subtotal	0.673	0.329		0.334		-		-		-	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	23.920	21.792		16.195		10.882		-		10.882	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 7	R-1 Program Element (Number/Name) PE 0607210D8Z / *Industrial Base Analysis and Sustainment Support*	Project (Number/Name) 819 / *Industrial Base Analysis and Sustainment*	

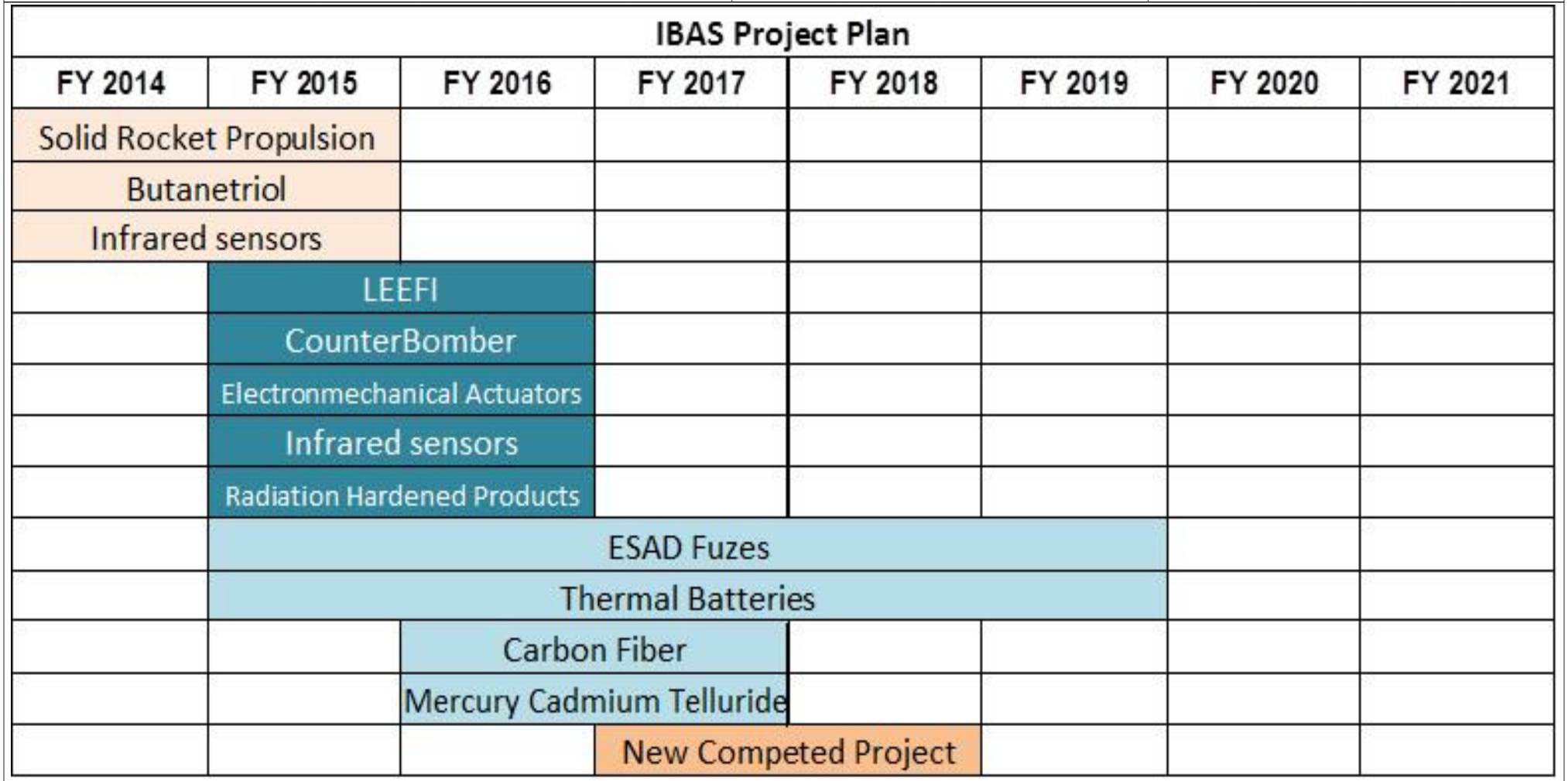

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0607210D8Z / *Industrial Base Analysis and Sustainment Support*	**Project (Number/Name)** 819 / *Industrial Base Analysis and Sustainment*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
N/A				
Infrared Sensors	3	2014	4	2015
LEEFI	1	2015	4	2016
CounterBomber	1	2015	4	2016
Electromechanical Actuators	1	2015	4	2016
Infrared Sensors II	1	2015	4	2016
Radiation Hardened Electronic Components	1	2015	4	2016
ESAD Fuzes	1	2015	4	2019
Thermal Battery	1	2015	4	2019
High Strength High Modulus Carbon Fiber	1	2016	4	2017
Mercury Cadmium Telluride	1	2016	4	2017
Solid Rocket Motors				
Solid Rocket Motors	2	2016	4	2021
Critrical Energetic Materials				
Critiical Energetic Materials	1	2017	4	2018

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0607310D8Z / *Countering Weapons of Mass Destruction (CWMD) Systems: Operational Systems Development*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	4.721	1.832	4.194	7.222	-	7.222	8.746	12.469	14.096	11.359	Continuing	Continuing
P*242: *Operational System Development*	4.721	1.832	4.194	7.222	-	7.222	8.746	12.469	14.096	11.359	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Countering Weapons of Mass Destruction (CWMD) Systems program provides funding for research, development, integration, and deployment of CWMD capabilities. Funding is allocated to a portfolio of projects and activities in response to Combatant Command needs and research initiatives.

A focal point of this program is development of CWMD situational awareness capabilities. The Joint Requirements Oversight Council approved the Information Systems Initial Capabilities Document for CWMD Situational Awareness on 23 December 2015, which identifies the need for a family of systems to mitigate capability gaps identified by the Combatant Commands. U.S. Special Operations Command, which assumed CWMD mission responsibilities in January 2017 per the Unified Command Plan, is providing focus and direction for development of CWMD situational awareness capabilities. Gaining situational awareness of weapons of mass destruction (WMD) threats and risks, as well as U.S. and international efforts to counter WMD proliferation, is time-consuming and difficult. Relevant information is spread across disconnected systems, on multiple networks, and in the open source domain, making it difficult to discover and use information to support mission needs. WMD-related situations in recent years, including the removal of chemical weapons from Syria and the response to the West African Ebola outbreak, have demonstrated the need for Combatant Commands to access and share CWMD information, collaborate on planning and operations, and have a common understanding of the operational environment with mission partners.

The CWMD Systems program provides funding for two technology-enabled fusion cells at the Defense Threat Reduction Agency (DTRA) and the Defense Intelligence Agency (DIA), which utilize information systems and applications to enable CWMD situational awareness. Existing DoD information systems, networks, and applications are utilized and/or modified using CWMD Systems funding. Software development for new applications reuses software to the extent possible. The DTRA and DIA cells curate, synthesize, and contextualize CWMD information for end-users. This hybrid approach facilitates cross-organizational information sharing and collaboration, necessary for addressing the trans regional character of WMD proliferation.

The CWMD Systems program utilizes four Research, Development, Test & Evaluation (RDT&E) program elements (BA-3 / PE#0303310D8Z, BA-5 / PE#0305310D8Z, BA-6 / PE#0306310D8Z, and BA-7 / PE#0607310D8Z), as well as an Operations and Maintenance (O&M) "CWMD Sustainment" line (ORC-2531).

This Program Element (PE) funds upgrades and improvements to fielded systems or system components that are designed for the CWMD mission or can be repurposed to support it. Funding is used to integrate prototypes into existing systems or modify and enhance existing systems.

This appropriation funds travel to support the requirements of this program, and work (including manpower) performed by a government agency or by private individuals or organizations under a contractual or grant arrangement with the government who conduct research, development and test and evaluation efforts.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense					Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 7: *Operational Systems Development*		**R-1 Program Element (Number/Name)** PE 0607310D8Z *I Countering Weapons of Mass Destruction (CWMD) Systems: Operational Systems Development*			
B. Program Change Summary ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**
Previous President's Budget	1.898	4.194	7.621	-	7.621
Current President's Budget	1.832	4.194	7.222	-	7.222
Total Adjustments	-0.066	0.000	-0.399	-	-0.399
• Congressional General Reductions	0.000	-			
• Congressional Directed Reductions	0.000	-			
• Congressional Rescissions	-	-			
• Congressional Adds	0.000	-			
• Congressional Directed Transfers	0.000	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.066	-			
• Cost savings transitioning to acquisition program	-	-	-0.550	-	-0.550
• DTIC Offset Bill	-	-	-0.049	-	-0.049
• SRRB adjustment	-	-	0.200	-	0.200

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 7	R-1 Program Element (Number/Name) PE 0607310D8Z / *Countering Weapons of Mass Destruction (CWMD) Systems: Operational Systems Development*	Project (Number/Name) P*242 / *Operational System Development*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P*242: *Operational System Development*	4.721	1.832	4.194	7.222	-	7.222	8.746	12.469	14.096	11.359	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Countering Weapons of Mass Destruction (CWMD) Systems program provides funding for research, development, integration, and deployment of CWMD capabilities. Funding is allocated to a portfolio of projects and activities in response to Combatant Command needs and research initiatives.

A focal point of this program is development of CWMD situational awareness capabilities. The Joint Requirements Oversight Council approved the Information Systems Initial Capabilities Document for CWMD Situational Awareness on 23 December 2015, which identifies the need for a family of systems to mitigate capability gaps identified by the Combatant Commands. U.S. Special Operations Command, which assumed CWMD mission responsibilities in January 2017 per the Unified Command Plan, is providing focus and direction for development of CWMD situational awareness capabilities. Gaining situational awareness of weapons of mass destruction (WMD) threats and risks, as well as U.S. and international efforts to counter WMD proliferation, is time-consuming and difficult. Relevant information is spread across disconnected systems, on multiple networks, and in the open source domain, making it difficult to discover and use information to support mission needs. WMD-related situations in recent years, including the removal of chemical weapons from Syria and the response to the West African Ebola outbreak, have demonstrated the need for Combatant Commands to access and share CWMD information, collaborate on planning and operations, and have a common understanding of the operational environment with mission partners.

The CWMD Systems program provides funding for two technology-enabled fusion cells at the Defense Threat Reduction Agency (DTRA) and the Defense Intelligence Agency (DIA), which utilize information systems and applications to enable CWMD situational awareness. Existing DoD information systems, networks, and applications are utilized and/or modified using CWMD Systems funding. Software development for new applications reuses software to the extent possible. The DTRA and DIA cells curate, synthesize, and contextualize CWMD information for end-users. This hybrid approach facilitates cross-organizational information sharing and collaboration, necessary for addressing the trans regional character of WMD proliferation.

The CWMD Systems program utilizes four Research, Development, Test & Evaluation (RDT&E) program elements (BA-3 / PE#0303310D8Z, BA-5 / PE#0305310D8Z, BA-6 / PE#0306310D8Z, and BA-7 / PE#0607310D8Z), as well as an Operations and Maintenance (O&M) "CWMD Sustainment" line (ORC-2531).

This Program Element (PE) funds upgrades and improvements to fielded systems or system components that are designed for the CWMD mission or can be repurposed to support it. Funding is used to integrate prototypes into existing systems or modify and enhance existing systems.

This appropriation funds travel to support the requirements of this program, and work (including manpower) performed by a government agency or by private individuals or organizations under a contractual or grant arrangement with the government who conduct research, development and test and evaluation efforts.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0607310D8Z / *Countering Weapons of Mass Destruction (CWMD) Systems: Operational Systems Development*	**Project (Number/Name)** P*242 / *Operational System Development*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: P*242: Operational Systems Development	1.832	4.194	7.222
Description: • Funds upgrades and improvements to fielded systems or system components that are designed for the CWMD mission or can be repurposed to support it. Funding is used to integrate prototypes into existing systems or modify and enhance existing systems. • Address the prioritized capability needs of existing information systems and other platforms to augment, upgrade and enhance core CWMD capabilities. ***FY 2016 Accomplishments:*** • Improved fielded systems and system components, specifically U.S. Special Operations Command's Chimera system and supporting the transition of the FADE suite of applications to a commercial cloud service provider ***FY 2017 Plans:*** • Upgrade and enhance information systems, focusing on systems in use by U.S. Special Operations Command and other Combatant Commands for CWMD situational awareness. ***FY 2018 Plans:*** • Upgrade and enhanced information systems, focusing on systems in use by U.S. Special Operations Command and other Combatant Commands for CWMD situational awareness. Systems will be selected for enhancement in coordination with U.S. Special Operations Command and informed by the results of the independent review conducted per Section 221 of the FY17 NDAA			
Accomplishments/Planned Programs Subtotals	1.832	4.194	7.222

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Make improvements to fielded systems and identify how capabilities can be further improved through interoperability between fielded systems.

E. Performance Metrics

Success in this area is measured by compliance with various statutes and DoD directives that govern the conduct of the affairs within the Office of the Assistant Secretary of Defense for Nuclear, Chemical, and Biological Defense Programs (OASD/NCB). Maintain cost, schedule, and performance reporting, review, and adjudication. Maintain requirements traceability matrix.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0303140D8Z / *Information Systems Security Program*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	21.246	8.649	8.876	9.415	-	9.415	9.966	10.067	10.262	10.491	Continuing	Continuing
140: *Information Systems Security Program*	21.246	8.649	8.876	9.415	-	9.415	9.966	10.067	10.262	10.491	Continuing	Continuing

A. Mission Description and Budget Item Justification

The DoD CIO Information Systems Security Program (ISSP) provides for focused research, development, testing and integration of technology and technical solutions critical to the Defense Cybersecurity and Information Assurance Program to meet the requirements of 10 USC 2224 (Defense Information Assurance Program), 44 USC 3544, (Federal Information Security Management Act of 2002), OMB Circular A-130, and DoD Directives/Instructions 8500, 8510, 8520, 8530, and 8540. This program is funded under Budget activity 7, Operational System Development because it integrates technology and technical solutions to the Defense Information Assurance Program.

ISSP RDT&E funds support the DoD CIO and its mission partners on architecting, engineering, and technical matters for developing governance processes and structures; on evolving and enabling a more integrated and synchronized Joint Information Environment that will leverage a single and converged joint enterprise IT platform; on the continued development of the U.S. Government's ability to prevent and defend against adversarial and/or commercial information and communications technology supply-chain attacks on its mission critical systems, networks, and devices; on improving oversight of the life-cycle management of cybersecurity risks; and on the integration of cybersecurity standards, methods, and procedures across the DoD for a more robust and resilient cybersecurity posture.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	8.940	8.876	9.594	-	9.594
Current President's Budget	8.649	8.876	9.415	-	9.415
Total Adjustments	-0.291	0.000	-0.179	-	-0.179
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.291	-			
• SRRB Efficiency	-	-	-0.332	-	-0.332
• Program Adjustment	-	-	0.153	-	0.153

Change Summary Explanation

FY 2016: SIBR Adjustment -0.253 million, STTR Adjustment -0.038 million.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0303140D8Z / *Information Systems Security Program*

FY 2017: No change.

FY 2018: SRRB Efficiency -0.332 million, Program adjustment 0.153 million.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 7	R-1 Program Element (Number/Name) PE 0303140D8Z / *Information Systems Security Program*	Project (Number/Name) 140 / *Information Systems Security Program*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
140: *Information Systems Security Program*	21.246	8.649	8.876	9.415	-	9.415	9.966	10.067	10.262	10.491	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The DoD CIO Information Systems Security Program (ISSP) provides for focused research, development, testing and integration of technology and technical solutions critical to the Defense Cybersecurity and Information Assurance Program to meet the requirements of 10 USC 2224 (Defense Information Assurance Program), 44 USC 3544, (Federal Information Security Management Act of 2002), OMB Circular A-130, and DoD Directives/Instructions 8500, 8510, 8520, 8530, and 8540. This program is funded under Budget activity 7, Operational System Development because it integrates technology and technical solutions to the Defense Information Assurance Program.

ISSP RDT&E funds support the DoD CIO and its mission partners on architecting, engineering, and technical matters for developing governance processes and structures; on evolving and enabling a more integrated and synchronized Joint Information Environment (JIE) to provide the means for more integrated information sharing and collaboration that also endeavors to close identified gaps across all mission areas with a shared network of core enterprise services; on the continued development of the U.S. Government's ability to prevent and defend against adversarial and/or commercial information and communications technology supply-chain attacks on its mission critical systems, networks, and devices; on improving oversight of the life-cycle management of cybersecurity risks; and on the integration of cybersecurity standards, methods, and procedures across the DoD for a more robust and resilient cybersecurity posture.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Information Systems Security Program Plans and Accomplishments	8.649	8.876	9.415
FY 2016 Accomplishments: • Developed required engineering support concepts for critical architectures, to include the Joint Information Environment, C4I tactical networks, and for coalition and other mission partners. Continue to develop, refine, and implement a Joint Information Environment single security architecture strategy, and the related strategic metrics and enhanced analytical capabilities. • Developed strategies for successful defenses and operations in the event of sophisticated cyber adversaries and large-scale cyber incidents, analyses & development of metrics focused on the cybersecurity domain, on cybersecurity scorecard and automation, analyses to support policy development and refinement, oversight, and formulation of programmatic advice, and analyses to support various collaborative advisory and governance bodies. • Researched means of assessing and prioritizing supply-chain threats and responses, for training regarding threats and risks, and for program protection plans to address supply-chain risks, to help ensure implementation of consistent protection practices			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0303140D8Z / *Information Systems Security Program*	**Project (Number/Name)** 140 / *Information Systems Security Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
from supply chain exploitation and attack within/by individual procurements of materiel and services on which the DoD systems, networks, and missions depend.. • Developed paradigm of threat-based system-security-engineering, including generation of critical design artifacts (threat analyses, risk analyses, system-of- system-security architectures), and with demonstrated applications to space systems and mission partner environment (MPE). • Continued to develop a more robust governance mechanism to minimize supply chain risks across the DoD components and activities, and to develop an overarching international standard, or an improved integrated family of existing standards, for improving supply-chain-risk-management. • Continued developing the means for improved mission assurance, mitigation analyses, and vulnerability detection via hardware and software testing, and for acquisitions that are better integrated with informed threat prospects. • Developed and published supportive standards, guidance, and processes on the web-based Knowledge Service, for the continual reauthorization and cyber strengthening of information systems, and in satisfaction of requirements mandated by OMB Circular A-130. • Supported key acquisition programs-of-record (i.e., Major Automated Information Systems; Major Defense Acquisition Programs, and other special interest developmental and acquisition activities) to drive the development and implementation of more effective cybersecurity strategies, risk management plans, and processes. • Developed, published, and refined DoD mobility strategy, and processes for use of commercial Cloud providers; to develop Cloud computing security guidance that details cybersecurity guidance and procedures for use by potential commercial Cloud service providers, and continued oversight of policies and capabilities to support comprehensive cybersecurity capability for the Joint Information Environment (JIE), including the DoD Cloud and mobile device strategies and roadmaps.			
FY 2017 Plans: • Continue to develop and provide required engineering support for critical architectures, to include the Joint Information Environment, C4I tactical networks, and for coalition and other mission partners. Continue to develop, refine, and implement a Joint Information Environment single security architecture strategy, and the related strategic metrics and enhanced analytical capabilities.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0303140D8Z / *Information Systems Security Program*	**Project (Number/Name)** 140 / *Information Systems Security Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Continue to develop and implement strategies for successful defenses and operations in the event of sophisticated cyber adversaries and large-scale cyber incidents. • Continue to research to develop means of assessing and prioritizing supply-chain threats and responses, for training regarding threats and risks, and for program protection plans to address supply-chain risks, to help ensure implementation of consistent protection practices from supply chain exploitation and attack within/by individual procurements of materiel and services on which the DoD systems, networks, and missions depend.. • Continue threat-based system-security-engineering efforts and development of critical design artifacts (threat analyses, risk analyses, system-of- system-security architectures), having demonstrated applications to space systems and mission partner environment (MPE). • Continue development and implementation of a more robust governance mechanism to minimize supply chain risks across the DoD components and activities, and to develop an overarching international standard, or an improved integrated family of existing standards, for improving supply-chain-risk-management. • Continue to develop the means for improved mission assurance, mitigation analyses, and vulnerability detection via hardware and software testing, and for acquisitions that are better integrated with informed threat prospects. • Continue to develop and publish supportive standards, guidance, and processes on the web-based Knowledge Service, for the continual reauthorization and cyber strengthening of information systems, and in satisfaction of requirements mandated by OMB Circular A-130. • Continue to support key acquisition programs-of-record (i.e., Major Automated Information Systems; Major Defense Acquisition Programs, and other special interest developmental and acquisition activities) to drive the development and implementation of more effective cybersecurity strategies, risk management plans, and processes. • Continue to develop, publish, and refine DoD mobility strategy, and processes for use of commercial Cloud providers; to develop Cloud computing security guidance that details cybersecurity guidance and procedures for use by potential commercial Cloud service providers, and continued oversight of policies and capabilities to support comprehensive cybersecurity capability for the Joint Information Environment (JIE), including the DoD Cloud and mobile device strategies and roadmap ***FY 2018 Plans:***			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0303140D8Z / *Information Systems Security Program*	**Project (Number/Name)** 140 / *Information Systems Security Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Continue to develop and provide required engineering support for critical architectures, to include the Joint Information Environment, C4I tactical networks, and for coalition and other mission partners. Continue to develop, refine, and implement a Joint Information Environment single security architecture strategy, and the related strategic metrics and enhanced analytical capabilities. • Continue to develop and implement strategies for successful defenses and operations in the event of sophisticated cyber adversaries and large-scale cyber incidents. • Continue to research to develop means of assessing and prioritizing supply-chain threats and responses, for training regarding threats and risks, and for program protection plans to address supply-chain risks, to help ensure implementation of consistent protection practices from supply chain exploitation and attack within/by individual procurements of materiel and services on which the DoD systems, networks, and missions depend.. • Continue threat-based system-security-engineering efforts and development of critical design artifacts (threat analyses, risk analyses, system-of- system-security architectures), having demonstrated applications to space systems and mission partner environment (MPE). • Continue development and implementation of a more robust governance mechanism to minimize supply chain risks across the DoD components and activities, and to develop an overarching international standard, or an improved integrated family of existing standards, for improving supply-chain-risk-management. • Continue to develop the means for improved mission assurance, mitigation analyses, and vulnerability detection via hardware and software testing, and for acquisitions that are better integrated with informed threat prospects. • Continue to develop and publish supportive standards, guidance, and processes on the web-based Knowledge Service, for the continual reauthorization and cyber strengthening of information systems, and in satisfaction of requirements mandated by OMB Circular A-130. • Continue to support key acquisition programs-of-record (i.e., Major Automated Information Systems; Major Defense Acquisition Programs, and other special interest developmental and acquisition activities) to drive the development and implementation of more effective cybersecurity strategies, risk management plans, and processes. • Continue to develop, publish, and refine DoD mobility strategy, and processes for use of commercial Cloud providers; to develop Cloud computing security guidance that details cybersecurity guidance and procedures for use by potential commercial Cloud			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0303140D8Z / *Information Systems Security Program*	**Project (Number/Name)** 140 / *Information Systems Security Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
service providers, and continued oversight of policies and capabilities to support comprehensive cybersecurity capability for the Joint Information Environment (JIE), including the DoD Cloud and mobile device strategies and roadmaps.			
Accomplishments/Planned Programs Subtotals	8.649	8.876	9.415

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 0303140D8Z O&M DW: *Information System Security Program*	11.490	11.321	11.867	-	11.867	10.474	10.590	10.809	11.033	Continuing	Continuing

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

- Annual FISMA metrics
- Evolving JIE cybersecurity metrics

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0305186D8Z / *Policy R&D Programs*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	22.469	4.131	6.204	6.526	-	6.526	6.304	6.347	6.414	6.563	Continuing	Continuing
186: *Policy R&D Programs*	22.469	4.131	6.204	6.526	-	6.526	6.304	6.347	6.414	6.563	Continuing	Continuing

A. Mission Description and Budget Item Justification

Provide analysis to overcome military security challenges. Since the global environment is dynamic, research is necessary for continued understanding military structures, foreign cultures, and ethnic issues. Examines demographic data, investigates future global security challenges, provides insights to inform critical national security decisions, explores ways to build partnership capabilities to counter organizational warfare, develop foreign military infrastructure, and deny sanctuary to extremist groups. Program blends several disciplines including surveillance, operations, policy, information management, cyber policy, training and technology.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	4.131	6.204	6.419	-	6.419
Current President's Budget	4.131	6.204	6.526	-	6.526
Total Adjustments	0.000	0.000	0.107	-	0.107
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Internal Adjustment	-	-	0.107	-	0.107

Change Summary Explanation

FY 2018 adjustment supports the Departments wargaming initiative.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 7	R-1 Program Element (Number/Name) PE 0305186D8Z / *Policy R&D Programs*	Project (Number/Name) 186 / *Policy R&D Programs*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
186: *Policy R&D Programs*	22.469	4.131	6.204	6.526	-	6.526	6.304	6.347	6.414	6.563	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Provide analysis to overcome military security challenges. Since the global environment is dynamic, research is necessary for continued understanding military structures, foreign cultures, and ethnic issues. Examines demographic data, investigates future global security challenges, provides insights to inform critical national security decisions, explores ways to build partnership capabilities to counter organizational warfare, develop foreign military infrastructure, and deny sanctuary to extremist groups. Program blends several disciplines including surveillance, operations, policy, information management, cyber policy, training and technology.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Future Security Challenges	2.365	1.833	2.111

Description: Provides program management oversight and technical support to identify current and emerging future security challenges to the Department, and for international cooperation activities with Allies and international partners to confront these challenges. Anticipates exploitation of technology, including available and advanced capabilities, and work with the international commercial sector and academia concerning adversary's application of technology. Program explores processes and policy to integrate international capabilities across the spectrum of security challenges.

FY 2016 Accomplishments:
- Performed trend analysis to develop mitigation options for addressing program risks.
- Finalized and applied risk management methodologies to identified program areas.
- Developed net-centric enterprise technologies to remove international sharing barriers identified with maritime information, intelligence, and data being collected by DoD and foreign governments
- Researched military competition among nations in the Far and Middle East and highlight potential capabilities and policies each nation may utilize in future armed conflicts
- Enhanced strategies and relationships with European nations based on the exchange of information through education opportunities and existing policies
- Researched and analyzed particular Far and Middle East countries as it relates to their decision-making process, financial position, leadership, political dynamics, technical abilities and internal social tensions and stability.
- Continued research efforts within the Services and Combatant Commands to better analyze and demonstrate enduring counterinsurgency operational capabilities.

FY 2017 Plans:
- Continue trend analysis and develop mitigation options for addressing program risks.
- Apply risk management methodologies to identified program areas.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0305186D8Z / *Policy R&D Programs*	**Project (Number/Name)** 186 / *Policy R&D Programs*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
• Develop net-centric enterprise technologies to remove international sharing barriers identified with maritime information, intelligence, and data being collected by DoD and foreign governments • Continue research into military competition among nations in the Far and Middle East and highlight potential capabilities and policies each nation may utilize in future armed conflicts • Enhance strategies and relationships with European nations based on the exchange of information through education opportunities and existing policies • Research and analyze particular Far and Middle East countries as it relates to their decision-making process, financial position, leadership, political dynamics, technical abilities and internal social tensions and stability. • Continue research efforts within the Services and Combatant Commands to better analyze and demonstrate enduring counterinsurgency operational capabilities. ***FY 2018 Plans:*** . Perform ongoing trend analysis and develop mitigation options for addressing program risks. • Develop opportunities to apply risk management methodologies to identified program areas. • Working with out international partners, develop net-centric enterprise technologies to remove international sharing barriers identified with maritime information, intelligence, and data being collected by DoD and foreign governments • Research military competition among nations in the Far and Middle East and highlight potential capabilities and policies each nation may utilize in future armed conflicts • Continue to enhance strategies and relationships with European nations based on the exchange of information through education opportunities and existing policies • Research and analyze particular Far and Middle East countries as it relates to their decision-making process, financial position, leadership, political dynamics, technical abilities and internal social tensions and stability. • Continue research efforts within the Services and Combatant Commands to better analyze and demonstrate enduring counterinsurgency operational capabilities.			
Title: Long Term Competitions (LTC) Program ***Description:*** Request supports the Long Term Competitions (LTC) program which is an analytical effort chartered to provide the DoD senior leadership with an understanding of key long-term developments and dynamics in specific areas of the global security environment, and to develop competitive strategies for their consideration as the Department seeks to address these long term challenges. The LTC Program will provide rigorously analyzed competitive strategy recommendations to these senior DoD leaders, and will require the support of organizations and experts outside of government to deliver the highest quality analysis, concepts and recommendations. Funding for the LTC program will be used to: bring outside experts into Task Force working groups and strategy review teams; contract studies; support wargaming and workshops; conduct analytical studies of key developments and dynamics, and their impact on the future security environment and U.S. military capabilities in that environment; and explore new approaches to addressing key analytical requirements.	0.905	3.686	3.715

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0305186D8Z / *Policy R&D Programs*	**Project (Number/Name)** 186 / *Policy R&D Programs*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Assessments of the ability of future forces to achieve objectives at the campaign level. These assessments include wargaming, qualitative, and quantitative analytic methods. They will both inform and be informed by the Support for Strategic Analysis (SSA) defense planning scenarios (DPS). They will identify risk and potential trade-space among force structure, capabilities, and readiness to inform senior leader decision-making. ***FY 2016 Accomplishments:*** Specific efforts are classified. ***FY 2017 Plans:*** Specific efforts are classified. ***FY 2018 Plans:*** Specific efforts are classified			
Title: Defense Planning Scenarios Activities ***Description:*** This program is classified. ***FY 2016 Accomplishments:*** Specific efforts are classified. ***FY 2017 Plans:*** Specific efforts are classified. ***FY 2018 Plans:*** Specific efforts are classified.	0.861	0.685	0.700
Accomplishments/Planned Programs Subtotals	4.131	6.204	6.526

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0305199D8Z / *Net Centricity*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	39.234	17.532	17.971	18.455	-	18.455	19.549	19.748	20.130	20.580	Continuing	Continuing
199: *GIG Evaluation Facilities (GIG-EF) and GIG Enterprise-Wide Systems Engineering Advisory Activities*	39.234	17.532	17.971	18.455	-	18.455	19.549	19.748	20.130	20.580	Continuing	Continuing

A. Mission Description and Budget Item Justification

Funds will be used to provide technical analysis, systems engineering and capability management oversight of programs, projects, initiatives and activities to maximize the Department's return on investment in information technology resources and affect a comprehensive approach for assessing and procuring critical information systems from initial design, through development to capability delivery in support of improved systems performance and military operations. Emphasis is placed on the information transport, information assurance/cyber security, network and spectrum management, command and control (C2) applications, systems and services, information sharing capabilities, commercial mobile devices (CMD), applications and infrastructure, and enterprise services activities focused on the development, integration, testing and technical assessment of capabilities and applications in joint and coalition warfighter support environments. Resources support collaborative efforts to demonstrate the interoperability and performance requirements of command, control, communication, computing network, and Information Infrastructure (C4II) capabilities and programs. This program is funded under Budget Activity 7, Operational System Development.

This project provides the resources necessary to implement net centric processes and authoritative analytic methods that provide the capability to synchronize interdependent C4II capabilities across all layers (ground, air, space, maritime, cyberspace) of the joint information environment (JIE), to forecast and achieve a balance in supply and demand for network capacity, and field effective capabilities more rapidly and efficiently as an enabler for C4II capabilities applications and services. Resources are required to transform current networks and information infrastructure into an operationally unified and architecturally diverse and secure joint information environment that will provide end-to-end communications transport layer, computing networks, and mission application capabilities that are optimized and integrated with all other joint capability areas with a focus on the tactical edge faced with disconnected, intermittent, and latency (DIL) environments. There will be technical assessments, modeling and simulation, and analysis of the Joint space communications layer, Joint aerial network layer, contested communications on the move, Position Navigation and Timing (PNT), C2 mission applications, commercial mobile devices, and information sharing capabilities. These funds provide the capability for the warfighter to manage and deconflict radio frequencies through ground, air, and space communication networks. The funds will be used to develop and synchronize information assurance capabilities with other joint information environment capabilities to provide secure access to information and services (e.g. Cryptographic Modernization Management plan).

In addition, funding will continue to be used to support the Defense Information System's Agency's (DISA) and Services' interoperable improvement efforts and processes in the development of common standards and protocols. This effort includes initiating the Joint Interoperability Enhancement Process (IEP) that allows operators, engineers, and program managers to verify capabilities and identify issues in a design with Joint /Allied units prior to system fielding, or with fielded systems to identify required systems changes for systems upgrade planning. DISA and the Joint Forces Combatant Command lead the effort to transform the current standards and interoperability management tools to a common set of Joint network-enabled standards to ensure adherence to the DoD Information Network (DODIN) enterprise-wide technical baseline and for implementation of future Tactical Data Link (TDL) capabilities. These joint standards, protocols, and processes will be used for

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0305199D8Z / *Net Centricity*

implementation and testing to ensure the TDL capabilities are synchronized with the development and integration timelines of other planned network-enabled DODIN initiatives. The threats to the networking waveforms and the Joint NC migration will also be looked at in cooperation with the Intelligence agencies.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	18.095	17.971	19.419	-	19.419
Current President's Budget	17.532	17.971	18.455	-	18.455
Total Adjustments	-0.563	0.000	-0.964	-	-0.964
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.563	-			
• SRRB Efficiency	-	-	-0.663	-	-0.663
• Program Change	-	-	-0.301	-	-0.301

Change Summary Explanation

FY 2016: SBIR Adjustment -0.490 million; STTR Adjustment -0.073 million.
FY 2017: No change.
FY 2018: SRRB Efficiency -0.663 million, Program change -0.301 million.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0305199D8Z / *Net Centricity*	**Project (Number/Name)** 199 / *GIG Evaluation Facilities (GIG-EF) and GIG Enterprise-Wide Systems Engineering Advisory Activities*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
199: *GIG Evaluation Facilities (GIG-EF) and GIG Enterprise-Wide Systems Engineering Advisory Activities*	39.234	17.532	17.971	18.455	-	18.455	19.549	19.748	20.130	20.580	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Funds will be used to provide technical analysis, systems engineering and capability management oversight of programs, projects, initiatives and activities to maximize the Department's return on investment in information technology resources and affect a comprehensive approach for assessing and procuring critical information systems from initial design, through development to capability delivery in support of improved systems performance and military operations. Emphasis is placed on the information transport, information assurance/cyber security, network and spectrum management, command and control (C2) applications, systems and services, information sharing capabilities, commercial mobile devices (CMD), applications and infrastructure, and enterprise services activities focused on the development, integration, testing and technical assessment of capabilities and applications in joint and coalition warfighter support environments. Resources support collaborative efforts to demonstrate the interoperability and performance requirements of command, control, communication, computing network, and Information Infrastructure (C4II) capabilities and programs. This program is funded under Budget Activity 7, Operational System Development.

This project provides the resources necessary to implement net centric processes and authoritative analytic methods that provide the capability to synchronize interdependent C4II capabilities across all layers (ground, air, space, maritime, cyberspace) of the joint information environment (JIE), to forecast and achieve a balance in supply and demand for network capacity, and field effective capabilities more rapidly and efficiently as an enabler for C4II capabilities applications and services. Resources are required to transform current networks and information infrastructure into an operationally unified and architecturally diverse and secure joint information environment that will provide end-to-end communications transport layer, computing networks, and mission application capabilities that are optimized and integrated with all other joint capability areas with a focus on the tactical edge faced with disconnected, intermittent, and latency (DIL) environments. There will be technical assessments, modeling and simulation, and analysis of the Joint space communications layer, Joint aerial network layer, contested communications on the move, Position Navigation and Timing (PNT), C2 mission applications, commercial mobile devices, and information sharing capabilities. These funds provide the capability for the warfighter to manage and deconflict radio frequencies through ground, air, and space communication networks. The funds will be used to develop and synchronize information assurance capabilities with other joint information environment capabilities to provide secure access to information and services (e.g. Cryptographic Modernization Management plan).
In addition, funding will continue to be used to support the Defense Information System's Agency's (DISA) and Services' interoperable improvement efforts and processes in the development of common standards and protocols. This effort includes initiating the Joint Interoperability Enhancement Process (IEP) that allows operators, engineers, and program managers to verify capabilities and identify issues in a design with Joint /Allied units prior to system fielding, or with fielded systems to identify required systems changes for systems upgrade planning. DISA and the Joint Forces Combatant Command lead the effort to transform the current standards and interoperability management tools to a common set of Joint network-enabled standards to ensure adherence to the DoD Information Network (DODIN) enterprise-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0305199D8Z / *Net Centricity*	**Project (Number/Name)** 199 / *GIG Evaluation Facilities (GIG-EF) and GIG Enterprise-Wide Systems Engineering Advisory Activities*

wide technical baseline and for implementation of future Tactical Data Link (TDL) capabilities. These joint standards, protocols, and processes will be used for implementation and testing to ensure the TDL capabilities are synchronized with the development and integration timelines of other planned network-enabled DODIN initiatives. The threats to the networking waveforms and the Joint NC migration will also be looked at in cooperation with the Intelligence agencies.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Net Centricity Plans and Accomplishments	17.532	17.971	18.455
FY 2016 Accomplishments: – Continued technical assessment/refine commercial wireless policy guidance to support CMD strategy implementation; continued assessments of the effects of cybersecurity policies. – Continued to refine CMD certification processes, Mobile Application Management (MAM)/Mobile Device Management (MDM) guidelines, and guidelines for personal user based enforcement; updated approved product matrix for CMD. – Continued implementation assessments to refine mobile application and device strategies. – Reviewed/refined mobile application approval process guides, DoD Mobile PKI guides, and procedure for the Electronic Flight Bag (EFB) – Continued technical and business case analyses for Commercial mobile devices and voice encryption. – Completed version 3 of the Radio and Communication Security modernization plan for tactical radios. Assessed Service implementation focusing on Service investment areas to support modernization and crypto compliance goals. – Continued analysis to update the CJTF Architecture to reflect Component C4II capability plans integrate the Radio and COMSEC Plan's inventory to reflect the enterprise communications capability of the CJTF Architecture that will support JIE TPNs. – Continued development of interoperable Land Mobile Radio (LMR) standards to support public safety communications and FirstNet. – Continued analysis to of LMR policy implementation; refined procedures to support LMR implementation in the DoD. – Continued analysis of Waveform Development and Management in the DoD to support enhanced re-use and portability of waveforms supporting Service and Coalition communications needs. – Continued analysis to maintain authoritative list of DoD-approved waveforms and supporting repository to maintain waveform baseline. – Continued technical analysis on methods for securing ISR data over wireless platforms and extended encryption of these devices, conducted implementation assessments through UAS encryption data calls. – Continued technical analysis and support for Protected, Wideband, Narrowband, and Commercial SATCOM. Assessed strategy alignment. – Updated SATCOM Synchronization Architectures for Protected, Wideband, Narrowband and Commercial SATCOM capabilities. – Continued compliance reviews of select programs; identified shortfalls in program bandwidth supportability planning and analysis and provided recommendations for corrective action.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0305199D8Z / *Net Centricity*	**Project (Number/Name)** 199 / *GIG Evaluation Facilities (GIG-EF) and GIG Enterprise-Wide Systems Engineering Advisory Activities*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
– Continued efforts to implement SATCOM Gateway Right-sizing approaches to optimize SATCOM gateways across the defense enterprise. – Continued technical/requirements analysis and feasibility assessments for implementing legacy narrowband solutions for MUOS payload. – Continued analysis to support implementation approaches for JIPM alternatives. – Conducted follow-on analysis in support of the Protected SATCOM AoA recommendations and preferred alternative. – Continued technical analysis to improve DoD utilization of Commercial SATCOM capabilities.. – Conducted Airborne ISR (AISR) transport analysis of alternatives based on Capability Based Analysis (CBA) results. Supported development of AISR Transport ICD to document enterprise wide requirements. Updated AISR transport reference architecture and requirements documents to support implementation. – Continued technical analysis of Coalition C2 and MNIS, analyze Coalition C2 functional requirements, strategic policy development and capability strategies to guide Mission Partner Environment (MPE) development. – Continued technical analysis of selected joint and Service C2 programs/initiatives to promote enterprise approaches for data and services consistent with JIE objectives. – Continued technical analysis for the implementation of Common Mission Network Transport (CMNT) capability. – Continued technical analysis of MNIS programs and initiatives, related acquisition strategies, and functional requirements. – Continued analysis to refine the joint C2 technical and architectural artifacts and inform an evaluation of alternatives for the GCCS Family of Systems. – Conducted analysis of capability needs to enable command and control across the JIE. Evaluated Enterprise Operations Center architectures, and information requirements to support investment decisions in JIE C2 capabilities. – Continued analyses to address adoption and evolution of mission services as candidate enterprise services for the JIE. – Continued analysis of requirements, capability gaps and integrated priority lists of all joint requirements for C4II capabilities to support DoD CIO engagement in the C4/Cyber Functional Capability Board. – Continued wireless architecture and advanced technologies analysis to inform Department-wide policies and implementation of mobility solutions. – Continued technical analysis to support compliance oversight of waveform policies and technical profile specifications. – Continued efforts to refine communications policies and analysis technologies applicable to commercial mobile devices. – Continued DoD Commercial Mobility implementation and systems engineering analysis Defense Mobile Unclassified and Classified Capabilities (DMUC/DMCC). – Continued analysis to support DMUC derived credentials implementation. – Continued analysis of LTE technology for DoD tactical use. – Continued technical analysis for Network Management (NM) interoperability, architecture and data artifacts.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0305199D8Z / *Net Centricity*	**Project (Number/Name)** 199 / *GIG Evaluation Facilities (GIG-EF) and GIG Enterprise-Wide Systems Engineering Advisory Activities*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
– Continued systems engineering and architecture analysis for JIE tactical processing nodes (TPNs). Continued technical analysis of tactical cloud computing approaches as a means to enhance TPN solutions. – Continued analysis to address implementation of TSVSIC for tactical radios. – Continued efforts to determine strengths, weaknesses, and uses of waveforms and network management capabilities; identified gaps; assessed new technologies in support of waveform and network management efforts. – Continued technical analysis to support implementation of the network management strategy and roadmap. – Continued development of data ontologies and NIEM compliant IEPDs for network management. – Continued technical analysis in support of C4II policies, plans, studies, roadmaps, and capability assessments. – Continued end-to-end analysis of the SATCOM environment; supported technical evaluations of end-to-end capabilities. – Continued studies and analysis in support of the DoD CIO's Mobile Device Strategy and Mobile Device Security Efforts. – Continued technical analysis/studies related to the migration of current applications and services to DoD Core Data Centers and support rationalization of applications for the JIE. – Continued technical analysis to support implementation of JIE capability upgrades and technical planning. – Continued studies and analysis to progress of JIE technical implementation actions. – Continued technical analysis and studies related to SDN as an approach to network normalization and security. – Continued follow-on JALN analysis with Joint Service JALN Council, overseeing Service implementation efforts. – Conducted Joint IEP analysis for Link 16 and work on adding Variable Message Format (VMF), Link 11/22, Multifunction Advanced Data Link (MADL), and Common Data Link (CDL) through the FYDP. – Continued technical and policy assessments to enable TDL migration. – Continued efforts to finalize Joint MIL-SPEC for CDL and initiate documentation for MADL in coordination with JSF team. – Continued support for Allied and Coalition interoperability efforts including NATO migration plan, JSF partner interoperability, US/Swedish MIEA, and integration of US and foreign communications and C2 systems. – Analyzed available Gateway technology alternatives to address joint aerial layer networking capabilities in the evolving threat environment with both physical (e.g. jamming) and cyber-attacks. – Assessed developing waveform technologies for improving the robustness and scalability of current TDL networks Continue efforts to refine gateway right sizing options, propose RF terminal solutions and baseband equipment suites including the number and types of equipment needed to meet the future needs of the war fighter. Coordinated and facilitated Teleport Program Office oversight initiatives. – Continued analysis to evolve SATCOM networks toward EOIP modem architecture. Continued support of video dissemination and two-way GBS capabilities to inform follow on implementation across the Department. – Continued analysis for the SATCOM International Standards Committee (SISC). Participated in the development of US lead Standardized Agreements (STANAGS) and provide a technical review of other nation's STANAG's for accuracy, completeness, and feasibility.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0305199D8Z / *Net Centricity*	**Project (Number/Name)** 199 / *GIG Evaluation Facilities (GIG-EF) and GIG Enterprise-Wide Systems Engineering Advisory Activities*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
– Continued efforts to develop acquisition strategy for U.S. support to NATO SATCOM post 2019. – Continued technical analysis and facilitate execution of the SATCOM Systems Engineering Group (SSEG). – Continued efforts to review, assess, and process DISN Tech Refresh plans for CIO approval. – Coordinated, facilitated and recorded DISN reviews to assessed progress and issues in transport and network infrastructure, unified capabilities and network management. – Continued efforts to maintain JIE Infrastructure Framework and synchronization roadmap to track infrastructure deployment or implementation. – Continued to maintain and expand the JIE single security architecture through analysis and implementation of the Joint Regional Security Stacks (JRSS) and associated cyber capabilities. – Continued acquisition like review of JIE objectives, plans, technical approaches, schedules and cost factors to support technical reviews of JIE implementation. – Supported the development of business case activities as required. – Continued analysis of release of waveforms to foreign governments, as identified by the Arms Transfer and Technology Release Senior Steering Group (ATTR SSG). – Continued to analyze interoperable, secure, and affordable waveforms and wireless communications in support of Service, Multi-Service and Coalition forces. – Continued analysis process and recommend standards conduct compliance and certification assessments in accordance with DoD policies, and reviewed content of a DoD Waveform Information Repository (IR). – Analyzed TSVCIS implementation and COMSEC modernization compliance guidance and CJCSI 6510 requirements. – Provided technical analysis of SATURN ability to provide improved anti-jam communications and support Multi-Partner communications needs. – Determined which edition of TSVCIS and SATURN standards are integrated into radio acquisition programs. – Conducted trade studies to determine if they TSVCIS and SATURN can be integrated easily and are cost effective. – Conducted Network capabilities review (NCR) an effort to examine the capabilities programmed in the Mission Command portfolio to look for alternate strategies for a more efficient set of capabilities. – Conducted analysis in coordination with the Director, National Security Agency/Chief, Central Security Service (DIRNSA/CHCSS), advance the state of the art in assurance tools, techniques, and methods for creating and identifying non-cryptologic software and hardware that is free from exploitable vulnerabilities and malicious intent for tactical communications.			
FY 2017 Plans: – Continue technical assessment/refine commercial wireless policy guidance to support CMD strategy implementation; continue assessments of the effects of cybersecurity policies.			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
– Continue to refine CMD certification processes, Mobile Application Management (MAM)/Mobile Device Management (MDM) guidelines, and guidelines for personal user based enforcement; update approved product matrix for CMD. – Continue implementation assessments to refine mobile application and device strategies. – Review/refine mobile application approval process guides, DoD Mobile PKI guides, and procedure for the Electronic Flight Bag (EFB). – Continue technical and business case analyses for Commercial mobile devices and voice encryption. – Update the Radio and Communication Security modernization plan for tactical radios. Assess Service implementation. – Continue analysis to update the CJTF Architecture to reflect Component C4II capability plans. – Continue development of interoperable Land Mobile Radio (LMR) standards to support public safety communications. – Continue analysis to of LMR policy implementation; refine procedures to support LMR implementation in the DoD. – Continue analysis of Waveform Development and Management in the DoD. – Continue analysis to maintain authoritative list of DoD-approved waveforms and supporting repository to maintain waveform baseline. – Continue technical analysis on methods for securing ISR data over wireless platforms and extended encryption of these devices, conduct implementation assessments through UAS encryption data calls. – Continue technical analysis and support for Protected, Wideband, Narrowband, and Commercial SATCOM. Assess strategy alignment. – Update SATCOM Synchronization Architectures for Protected, Wideband, Narrowband and Commercial SATCOM capabilities. – Continue compliance reviews of select programs; identify shortfalls in program bandwidth supportability planning and analysis and provide recommendations for corrective action. – Continue efforts to implement SATCOM Gateway Right-sizing approaches to optimize SATCOM gateways across the defense enterprise. – Continue technical/requirements analysis and feasibility assessments for implementing legacy narrowband solutions for MUOS payload. – Continue analysis to support implementation approaches for JIPM alternatives. – Conduct follow-on analysis in support of the Protected SATCOM AoA recommendations and preferred alternative. – Continue technical analysis to improve DoD utilization of Commercial SATCOM capabilities. – Conduct Airborne ISR (AISR) transport analysis of alternatives follow on analysis based on AoA recommendations and preferred alternatives. Update AISR transport reference and solution architecture artifacts to support implementation. – Continue technical analysis of Coalition C2 and MNIS, analyze Coalition C2 functional requirements, strategic policy development and capability strategies to guide Mission Partner Environment (MPE) development. – Continue technical analysis of selected joint and Service C2 programs/initiatives to promote enterprise approaches for data and services.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0305199D8Z / *Net Centricity*	**Project (Number/Name)** 199 / *GIG Evaluation Facilities (GIG-EF) and GIG Enterprise-Wide Systems Engineering Advisory Activities*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
– Continue technical analysis for the implementation of Common Mission Network Transport (CMNT) capability. – Continue technical analysis of MNIS programs and initiatives, related acquisition strategies, and functional requirements. – Continue analyses to address adoption and evolution of mission services as candidate enterprise services for the JIE. – Conduct follow-on analysis to inform implementation of the EoA recommendations for the GCCS Family of Systems. – Continue analysis of capability needs to enable command and control across the JIE. Evaluate Enterprise Operations Center architectures, and information requirements to support investment decisions in JIE C2 capabilities. – Continue analysis of requirements, capability gaps and integrated priority lists of all joint requirements for C4II capabilities to support DoD CIO engagement in the C4/Cyber Functional Capability Board. – Continue wireless architecture and advanced technologies analysis to inform Department-wide policies and implementation of mobility solutions. – Continue technical analysis to support compliance oversight of waveform policies and technical profile specifications. – Continue efforts to refine communications policies and analysis technologies applicable to commercial mobile devices. – Continue DoD Commercial Mobility implementation and systems engineering analysis Defense Mobile Unclassified and Classified Capabilities (DMUC/DMCC). – Continue analysis to support DMUC derived credentials implementation. – Continue analysis of LTE technology for DoD tactical use. – Continue technical analysis for Network Management (NM) interoperability, architecture and data artifacts. – Continue systems engineering and architecture analysis for JIE tactical processing nodes (TPNs). – Continue analysis to address implementation of TSVSIC for tactical radios. – Continue efforts to determine strengths, weaknesses, and uses of waveforms and network management capabilities; identified gaps; assesse new technologies in support of waveform and network management efforts. – Continue technical analysis to support implementation of the network management strategy and roadmap. – Continue development of data ontologies and NIEM compliant IEPDs for network management. – Continue technical analysis in support of C4II policies, plans, studies, roadmaps, and capability assessments. – Continue end-to-end analysis of the SATCOM environment; support technical evaluations of end-to-end capabilities. – Continue studies and analysis in support of the DoD CIO's Mobile Device Strategy and Mobile Device Security Efforts. – Continue technical analysis/studies related to the migration of current applications and services to DoD Core Data Centers and support rationalization of applications for the JIE. – Continue technical analysis to support implementation of JIE capability upgrades and technical planning. – Continue studies and analysis to progress of JIE technical implementation actions. – Continue technical analysis and studies related to SDN as an approach to network normalization and security. – Continue Joint IEP analysis for Link 16 and work on adding Variable Message Format (VMF), Link 11/22, Multifunction Advanced Data Link (MADL), and Common Data Link (CDL) through the FYDP.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0305199D8Z / *Net Centricity*	**Project (Number/Name)** 199 / *GIG Evaluation Facilities (GIG-EF) and GIG Enterprise-Wide Systems Engineering Advisory Activities*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
– Continue technical and policy assessments to enable TDL migration. – Continue efforts to finalize Joint MIL-SPEC for CDL and initiate documentation for MADL in coordination with JSF team. – Continue support for Allied and Coalition interoperability efforts including NATO migration plan, JSF partner interoperability, US/ Swedish MIEA, and integration of US and foreign communications and C2 systems. – Assess developing waveform technologies for improving the robustness and scalability of current TDL networks. – Continue efforts to refine and implement gateway right sizing options; evaluate RF terminal solutions and baseband equipment suites including the number and types of equipment needed to meet the future needs of the war fighter. Coordinate and facilitate Teleport Program Office oversight initiatives. – Continue analysis to evolve SATCOM networks toward EOIP modem architecture. Continue support of video dissemination and two-way GBS capabilities to inform follow on implementation across the Department. – Continue analysis for the SATCOM International Standards Committee (SISC). Participate in the development of US lead Standardized Agreements (STANAGS) and provide a technical review of other nation's STANAG's for accuracy, completeness, and feasibility. – Continue efforts to evaluate and implement acquisition strategies for U.S. support to NATO SATCOM post 2019. – Continue technical analysis and facilitate execution of the SATCOM Systems Engineering Group (SSEG). – Continue efforts to review, assess, and process DISN Tech Refresh plans for CIO approval. – Coordinate, facilitate, and record DISN Quarterly reviews to assessed progress and issues in transport and network infrastructure, unified capabilities and network management. – Continue efforts to maintain JIE Infrastructure Framework and synchronization roadmap to track infrastructure deployment or implementation. – Continue acquisition like review of JIE objectives, plans, technical approaches, schedules and cost factors to support technical reviews of JIE implementation. – Support the development of business case activities as required. – Develop guidance (e.g., information system security engineering guidance) and programming recommendations to ensure the integration of Trusted Systems Networks concepts and processes into the acquisition and maintenance of DoD information systems, enclaves, and services, including the purchase and integration of tactical communication commodities.			
FY 2018 Plans: – Continue technical assessment/refine commercial wireless policy guidance to support CMD strategy implementation; continue assessments of the effects of cybersecurity policies. – Continue to refine CMD certification processes, Mobile Application Management (MAM)/Mobile Device Management (MDM) guidelines, and guidelines for personal user based enforcement; update approved product matrix for CMD. – Continue implementation assessments to refine mobile application and device strategies.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0305199D8Z / *Net Centricity*	**Project (Number/Name)** 199 / *GIG Evaluation Facilities (GIG-EF) and GIG Enterprise-Wide Systems Engineering Advisory Activities*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
– Review/refine mobile application approval process guides, DoD Mobile PKI guides, and procedure for the Electronic Flight Bag (EFB). – Continue technical and business case analyses for Commercial mobile devices and voice encryption. – Update the Radio and Communication Security modernization plan for tactical radios. Assess Service implementation. – Continue analysis to update the CJTF Architecture to reflect Component C4II capability plans. – Continue development of interoperable Land Mobile Radio (LMR) standards to support public safety communications. – Continue analysis to of LMR policy implementation; refine procedures to support LMR implementation in the DoD. – Continue analysis of Waveform Development and Management in the DoD. – Continue analysis to maintain authoritative list of DoD-approved waveforms and supporting repository to maintain waveform baseline. – Continue technical analysis on methods for securing ISR data over wireless platforms and extended encryption of these devices, conduct implementation assessments through UAS encryption data calls. – Continue technical analysis and support for Protected, Wideband, Narrowband, and Commercial SATCOM. Assess strategy alignment. – Update SATCOM Synchronization Architectures for Protected, Wideband, Narrowband and Commercial SATCOM capabilities. – Continue compliance reviews of select programs; identify shortfalls in program bandwidth supportability planning and analysis and provide recommendations for corrective action. – Continue efforts to implement SATCOM Gateway Right-sizing approaches to optimize SATCOM gateways across the defense enterprise. – Continue technical/requirements analysis and feasibility assessments for implementing legacy narrowband solutions for MUOS payload. – Continue analysis to support implementation approaches for JIPM alternatives. – Conduct follow-on analysis in support of the Protected SATCOM AoA recommendations and preferred alternative. – Continue technical analysis to improve DoD utilization of Commercial SATCOM capabilities. – Conduct Airborne ISR (AISR) transport analysis of alternatives follow on analysis based on AoA recommendations and preferred alternatives. Update AISR transport reference and solution architecture artifacts to support implementation. – Continue technical analysis of Coalition C2 and MNIS, analyze Coalition C2 functional requirements, strategic policy development and capability strategies to guide Mission Partner Environment (MPE) development. – Continue technical analysis of selected joint and Service C2 programs/initiatives to promote enterprise approaches for data and services. – Continue technical analysis for the implementation of Common Mission Network Transport (CMNT) capability. – Continue technical analysis of MNIS programs and initiatives, related acquisition strategies, and functional requirements. – Continue analyses to address adoption and evolution of mission services as candidate enterprise services for the JIE.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0305199D8Z / *Net Centricity*	**Project (Number/Name)** 199 / *GIG Evaluation Facilities (GIG-EF) and GIG Enterprise-Wide Systems Engineering Advisory Activities*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
– Conduct follow-on analysis to inform implementation of the EoA recommendations for the GCCS Family of Systems. – Continue analysis of capability needs to enable command and control across the JIE. Evaluate Enterprise Operations Center architectures, and information requirements to support investment decisions in JIE C2 capabilities. – Continue analysis of requirements, capability gaps and integrated priority lists of all joint requirements for C4II capabilities to support DoD CIO engagement in the C4/Cyber Functional Capability Board. – Continue wireless architecture and advanced technologies analysis to inform Department-wide policies and implementation of mobility solutions. – Continue technical analysis to support compliance oversight of waveform policies and technical profile specifications. – Continue efforts to refine communications policies and analysis technologies applicable to commercial mobile devices. – Continue DoD Commercial Mobility implementation and systems engineering analysis Defense Mobile Unclassified and Classified Capabilities (DMUC/DMCC). – Continue analysis to support DMUC derived credentials implementation. – Continue analysis of LTE technology for DoD tactical use. – Continue technical analysis for Network Management (NM) interoperability, architecture and data artifacts. – Continue systems engineering and architecture analysis for JIE tactical processing nodes (TPNs). – Continue analysis to address implementation of TSVSIC for tactical radios. – Continue efforts to determine strengths, weaknesses, and uses of waveforms and network management capabilities; identified gaps; assesse new technologies in support of waveform and network management efforts. – Continue technical analysis to support implementation of the network management strategy and roadmap. – Continue development of data ontologies and NIEM compliant IEPDs for network management. – Continue technical analysis in support of C4II policies, plans, studies, roadmaps, and capability assessments. – Continue end-to-end analysis of the SATCOM environment; support technical evaluations of end-to-end capabilities. – Continue studies and analysis in support of the DoD CIO's Mobile Device Strategy and Mobile Device Security Efforts. – Continue Hub-Based HF Communications Concept to provide protected high rate communications needed for long range connectivity in satellite-denied environments. – Continue Wideband SATCOM AoA user demand projections, develop planning decks and scenario guidance with Joint Staff/J6 coordinated scenarios description paper allowing CAPE concurrence. – Continue oversight of Positioning, Navigation and Timing efforts and capability development through PNT Oversight Council and associated working groups. – Continue Space-Based Positioning, Navigation, and Timing (PNT) EXCOM collaboration on path forward to develop formal CPNT system requirements to support U.S. Critical Infrastructure. – Continue support for Interagency PNT efforts, including outreach, advocacy, and education. – Continue to lead development efforts of the annual Federal Radionavigation Plan (FRP).			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0305199D8Z / *Net Centricity*	**Project (Number/Name)** 199 / *GIG Evaluation Facilities (GIG-EF) and GIG Enterprise-Wide Systems Engineering Advisory Activities*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
– Continue to provide secretariat support for the PNT Oversight Council, PNT Executive Management Board, and to lead associated PNT and navigation warfare working groups. – Continue to provide secretariat support to the C5 Leadership Board. – Continue PNT Trilateral MOA development (DoD, DOT, DHS) efforts. – Continue precise time dissemination Trilateral MOA (DoD, DoC, DHS) efforts. – Continue development of the roadmap for fielding Modernized GPS User equipment (MGUE). – Continue oversight and direction of efforts to develop and field resilient software assurance measures for MGUE. – Continue support for Multi-GNSS policy development. – Continue support and leadership role in NATO CaP2 efforts. – Continue to support secure voice interoperability and desires to drive planning for UHF anti-jam (SATURN) planning through NATO channels. – Continue technical analysis/studies related to the migration of current applications and services to DoD Core Data Centers and support rationalization of applications for the JIE. – Continue technical analysis to support implementation of JIE capability upgrades and technical planning. – Continue studies and analysis to progress of JIE technical implementation actions. – Continue technical analysis and studies related to SDN as an approach to network normalization and security. – Continue Joint IEP analysis for Link 16 and work on adding Variable Message Format (VMF), Link 11/22, Multifunction Advanced Data Link (MADL), and Common Data Link (CDL) through the FYDP. – Continue technical and policy assessments to enable TDL migration. – Continue efforts to finalize Joint MIL-SPEC for CDL and initiate documentation for MADL in coordination with JSF team. – Continue support for Allied and Coalition interoperability efforts including NATO migration plan, JSF partner interoperability, US/Swedish MIEA, and integration of US and foreign communications and C2 systems. – Assess developing waveform technologies for improving the robustness and scalability of current TDL networks. – Continue efforts to refine and implement gateway right sizing options; evaluate RF terminal solutions and baseband equipment suites including the number and types of equipment needed to meet the future needs of the war fighter. Coordinate and facilitate Teleport Program Office oversight initiatives. – Continue analysis to evolve SATCOM networks toward EOIP modem architecture. Continue support of video dissemination and two-way GBS capabilities to inform follow on implementation across the Department. – Continue analysis for the SATCOM International Standards Committee (SISC). Participate in the development of US lead Standardized Agreements (STANAGS) and provide a technical review of other nation's STANAG's for accuracy, completeness, and feasibility. – Continue efforts to evaluate and implement acquisition strategies for U.S. support to NATO SATCOM post 2019. – Continue technical analysis and facilitate execution of the SATCOM Systems Engineering Group (SSEG).			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0305199D8Z / *Net Centricity*	**Project (Number/Name)** 199 / *GIG Evaluation Facilities (GIG-EF) and GIG Enterprise-Wide Systems Engineering Advisory Activities*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
– Continue efforts to review, assess, and process DISN Tech Refresh plans for CIO approval. – Coordinate, facilitate, and record DISN Quarterly reviews to assessed progress and issues in transport and network infrastructure, unified capabilities and network management. – Continue efforts to maintain JIE Infrastructure Framework and synchronization roadmap to track infrastructure deployment or implementation. – Continue acquisition like review of JIE objectives, plans, technical approaches, schedules and cost factors to support technical reviews of JIE implementation. – Support the development of business case activities as required. – Develop guidance (e.g., information system security engineering guidance) and programming recommendations to ensure the integration of Trusted Systems Networks concepts and processes into the acquisition and maintenance of DoD information systems, enclaves, and services, including the purchase and integration of tactical communication commodities.			
Accomplishments/Planned Programs Subtotals	17.532	17.971	18.455

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

– PPBE related issue development and approval
– Successful technical development and analysis of the CIO and DCIO C4IIC portfolio of programs and activities
– Develop comprehensive risk assessment and mitigation approaches of the CIO and DCIO C4IIC portfolio of programs and activities

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0305199D8Z / *Net Centricity*	**Project (Number/Name)** 199 / *GIG Evaluation Facilities (GIG-EF) and GIG Enterprise-Wide Systems Engineering Advisory Activities*

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Studies and Analysis	Various	Various : Various	2.159	0.967	Jul 2016	0.992	Jul 2017	0.992	Jul 2018	-		0.992	Continuing	Continuing	Continuing
Technical Engineering Services	Various	Various : Various	24.821	10.730	Jul 2016	10.958	Jul 2017	11.442		-		11.442	Continuing	Continuing	Continuing
		Subtotal	26.980	11.697		11.950		12.434		-		12.434	-	-	-

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	Various	Various : Various	7.481	3.799	Jul 2016	3.897	Jul 2017	3.897	Jul 2018	-		3.897	Continuing	Continuing	Continuing
Program Support	FFRDC	Various : Various	0.188	0.084	Jul 2016	0.086	Jul 2017	0.086	Jul 2018	-		0.086	Continuing	Continuing	Continuing
Engineering Support	FFRDC	Various : Various	0.376	0.134	Jul 2016	0.173	Jul 2017	0.173	Jul 2018	-		0.173	Continuing	Continuing	Continuing
R&D Support	Various	Various : Various	4.209	1.818	Jul 2016	1.865	Jul 2017	1.865	Jul 2018	-		1.865	Continuing	Continuing	Continuing
		Subtotal	12.254	5.835		6.021		6.021		-		6.021	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	39.234	17.532		17.971		18.455		-		18.455	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0305199D8Z / *Net Centricity*	**Project (Number/Name)** 199 / *GIG Evaluation Facilities (GIG-EF) and GIG Enterprise-Wide Systems Engineering Advisory Activities*

R4

PE 0305199D8Z/ Net Centricity

SATCOM, JIE, NC3 and Related Engineering Analysis

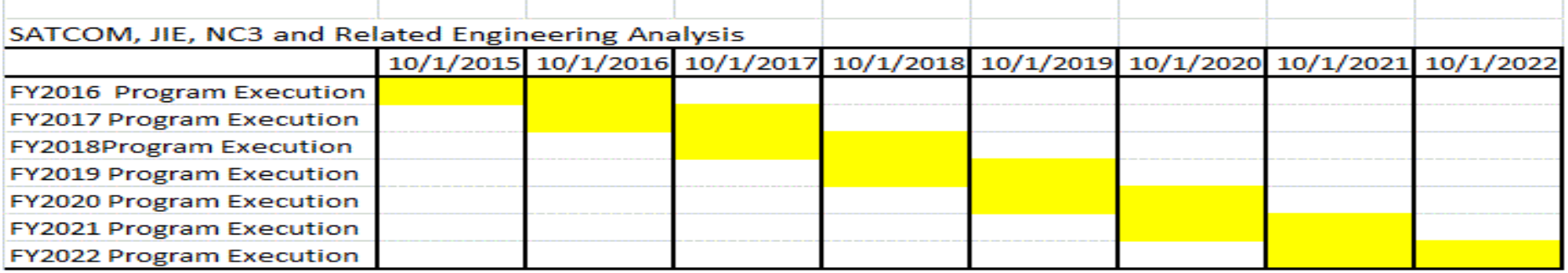

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0305199D8Z / *Net Centricity*	**Project (Number/Name)** 199 / *GIG Evaluation Facilities (GIG-EF) and GIG Enterprise-Wide Systems Engineering Advisory Activities*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
*** ***SUBPROJECT TITLE*** ***				
FY17 Projected Execution	1	2017	4	2018
FY18 Projected Execution	1	2018	4	2019
FY19 Projected Execution	1	2019	4	2020
FY20 Projected Execution	1	2020	4	2021
FY21 Projected Execution	1	2021	4	2022
FY22 Projected Execution	1	2022	4	2022

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0305387D8Z / *Homeland Defense Technology Transfer Program*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	9.184	2.116	2.037	2.071	-	2.071	2.213	2.238	2.290	2.394	Continuing	Continuing
387: *Homeland Defense Technology Transfer Program*	9.184	2.116	2.037	2.071	-	2.071	2.213	2.238	2.290	2.394	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In conjunction with Congressionally directed (Sec. 1401, P.L. 107-314) Homeland Defense Technology Transfer program, ensures a successful and balanced transfer of dual-use technology equipment and information to first responders without impeding military readiness. Accelerates dual-use tech transfer to first responders, increases effectiveness of equipment transfers to first responders, and transfers technology through a transitional effort that has dual utility to improve homeland security and enhance public safety without degrading military readiness. Meets the Congressional intent of Sec 1401, FY 2003 National Defense Authorization Act (P.L. 107-314).

A. Mission Description and Budget Item Justification

Continues Congressionally directed (Sec. 1401, P.L. 107-314) Technology Transfer Program to consolidate and coordinate various military endeavors that pass technology and equipment to first responders. Works with a variety of DoD activities, interagency partners, and first responder organizations to ensure that dual-use military technology is expedited into the commercial sector for use by law enforcement, fire, and emergency medical service personnel. Works with the Military Departments and Defense Logistics Agency to ensure that appropriate excess military equipment is made available to the first responder community on an expedited basis. Fulfills Congressional intent to help improve public safety and enhance public security.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	2.116	2.037	2.071	-	2.071
Current President's Budget	2.116	2.037	2.071	-	2.071
Total Adjustments	0.000	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			

Change Summary Explanation

FY 2018 adjustment made to support slighter higher projected costs.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0305387D8Z / *Homeland Defense Technology Transfer Program*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Homeland Defense Technology Transfer Program	2.116	2.037	2.071
Description: Provided outreach through coordination and cooperation with inter-agency partners to provide dual-use technology and equipment to first responders. Ensured DoD components conducted Technology Transfer programs that are appropriate for the respective component. Provided information to stakeholders on equipment and technology use and availability. ***FY 2016 Accomplishments:*** - Continued efforts to implement efficiencies. - Used a consortium of subject matter experts/governance councils to prioritize technology transfer requirements and expedite DoD dual-use technologies. - Continued program outreach activities and prioritized outreach to reflect efficiencies. - Enhanced and expedited excess equipment transfer capabilities from service level divestiture efforts and overseas contingency operations. ***FY 2017 Plans:*** - Continue to implement efficiencies. - Through a consortium of subject matter experts/governance councils prioritize technology transfer requirements and expedite DoD dual-use technologies. - Maintain program outreach activities and prioritize outreach to reflect efficiencies. - Enhance and expedite excess equipment transfer capabilities from service level divestiture efforts and overseas contingency operations. ***FY 2018 Plans:*** - Continue to implement efficiencies. - Use a consortium of subject matter experts/governance councils to prioritize technology transfer requirements and expedite DoD dual-use technologies. - Continue program outreach activities and prioritize outreach to reflect efficiencies. - Enhance and expedite excess equipment transfer capabilities from service level divestiture efforts and overseas contingency operations.			
Accomplishments/Planned Programs Subtotals	2.116	2.037	2.071

D. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0305387D8Z *I Homeland Defense Technology Transfer Program*

E. Acquisition Strategy

N/A

F. Performance Metrics

As stated.

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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0307577D8Z / *Intelligence Mission Data (IMD)*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	0.000	0.000	13.800	13.111	-	13.111	12.944	12.940	12.938	13.200	Continuing	Continuing
0307577D8Z: *Intelligence Mission Data*	0.000	0.000	13.800	13.111	-	13.111	12.944	12.940	12.938	13.200	Continuing	Continuing

A. Mission Description and Budget Item Justification

IMD project supports the Department's governance process for balancing IMD supply and demand and addressing how to modernize IMD generation. IMD is all source intelligence derived data necessary to do the following: for weapon systems to identify and counter constantly improving threat weapons and radar systems; to optimize sensor design and validate sensor functionality; and to support system test, evaluation and deployment. Modern weapon systems are reliant upon increasingly voluminous and precise IMD to meet performance requirements. This demand signal for mission support data is increasing due to requirements for both analyst-evaluated, precise data and machine-processed data to be used by weapons and control systems with increasing autonomy. This increasing requirement is highlighting the need to have a big data/data autonomy environment to support advanced weapon systems. In order for the community to meet modern weapons system requirements, there needs to be a measured shift with balance and attention paid to legacy and new capability needs. There are unacceptable gaps, compounded by non-assessed program office needs and requirements that may not be obtainable; therefore, balancing supply and demand is urgently needed.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	0.000	13.800	13.800	-	13.800
Current President's Budget	0.000	13.800	13.111	-	13.111
Total Adjustments	0.000	0.000	-0.689	-	-0.689
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Service Requirements Review Board Directed Decrease	-	-	-0.689	-	-0.689

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 7	R-1 Program Element (Number/Name) PE 0307577D8Z / *Intelligence Mission Data (IMD)*	Project (Number/Name) 0307577D8Z / *Intelligence Mission Data*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
0307577D8Z: *Intelligence Mission Data*	0.000	0.000	13.800	13.111	-	13.111	12.944	12.940	12.938	13.200	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Intelligence Mission Data (IMD) project supports the Department's governance process for balancing IMD supply and demand and addressing how to modernize IMD generation. Modern weapon systems are reliant upon increasingly voluminous and precise IMD to meet performance requirements, causing IMD shortfalls. The Department resolved to correct IMD problems by chartering a temporary task force. The Acquisition, Intelligence, Requirements Task Force (AIRTF) has continued to enforce discipline, bridge long standing policy, cultural and financial divides among these three communities, and seeks innovative approaches to solutions. The AIRTF has synchronized IMD production, recommended policy changes, created momentum in curbing the IMD appetite, and pushed for the need to conduct IMD sufficiency determination, as well as advocated for future IMD architectures that can support advanced warfighting concepts.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Intelligence Mission Data	0.000	13.800	13.111

Description: IMD project supports the Department's governance process for balancing IMD supply and demand and addressing how to modernize IMD generation. Modern weapon systems are reliant upon increasingly voluminous and precise IMD to meet performance requirements, causing IMD shortfalls. The Department resolved to correct IMD problems by chartering a temporary task force. The Acquisition, Intelligence, Requirements Task Force (AIRTF) has continued to enforce discipline, bridge long standing policy, cultural and financial divides among these three communities, and seeks innovative approaches to solutions.

FY 2016 Accomplishments:
N/A

FY 2017 Plans:
- Develop Cost vs. Capability Analysis modeling and simulation tools to assist the enterprise in determining IMD sufficiency and refining IMD requirements for advanced weapon systems.
- Facilitate and accelerated cross-service support for conducting blue vs. red simulation using the Joint Simulation Environment in evaluating the least IMD quantity and fidelity needed for maximum system performance and threat identification.
- Assess tools for IMD users to directly access threat information via next-generation electronic warfare database and advanced intelligence models and convert to data/signals useable in analyses, simulations, hardware-in-the-loop facilities, reprogramming labs, and test ranges.
- Develop an enterprise-wide IMD dashboard to better visualize cross-Departmental IMD requirements and availability, balancing IMD supply and demand.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0307577D8Z / *Intelligence Mission Data (IMD)*	**Project (Number/Name)** 0307577D8Z / *Intelligence Mission Data*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Continue to standardize data formats and to consolidate multi-Service IMD databases in different formats to three to improve standardization and discoverability. - Upgrade IMD production software that benefitted the enterprise by increasing production efficiency. - Continue to develop IMD architecture to support the Department's Third Offset by creating advanced IMD. ***FY 2018 Plans:*** - Will evaluate with Department's outreach element to industry on state of the art automation tools, big data options, and data autonomy environments to directly connect nodal IMD users with data suppliers. - Will develop data algorithms and models for use by the Intelligence Community and operational forces on weapon systems and platform sensors to collect, generate, and utilize IMD autonomously. - Will continue the development and evaluation of a holistic IMD architecture supporting the Department's Third Offset effort and 5th Generation warfighting concepts. - Will modernize the current architecture to increase efficiency for IMD reprogrammers to access, analyze, and produce mission data files for operational forces to support legacy and future machine-centric production. - Will build better program plans for IMD demands by integrating full scale Cost vs. Capability Analysis with blue and red modeling and simulation modules to form a force-on-force campaign analysis capability to focus and prioritize IMD demands. - Will increase efficiency and production balance for IMD supply by continuing the enterprise-wide dashboard tool to monitor IMD supply, demand, and workflow management. - Will improve enterprise-wide access to IMD sources by continuing data and database standardization, increase data discoverability, and user access.			
Accomplishments/Planned Programs Subtotals	0.000	13.800	13.111

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 0307577D8Z: *Intelligence Mission Data*	-	0.977	0.938	-	0.938	0.938	0.938	0.938	0.938	Continuing	Continuing

Remarks

D. Acquisition Strategy

The acquisition, management, and contracting strategy involves the following:

• Adhere to guidance outlined in the DoD 5000, Directive 7, Federal Acquisition Regulations (FAR), and FAR Supplement Policies and Procedures.

• Acquire and sustain IMD capabilities, systems, tools, products, and services through a disciplined, yet agile, process that ensures information related capabilities are available for DoD components.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0307577D8Z / *Intelligence Mission Data (IMD)*	**Project (Number/Name)** 0307577D8Z / *Intelligence Mission Data*

• Sustain an acquisition process that is responsive and responsible to internal and external customers and stakeholders.
• Support advanced weapons programs need for intelligence at the earliest point in the acquisition of the program.

E. Performance Metrics

The acquisition, management, and contracting strategy involves the following:
• Adhere to guidance outlined in the DoD 5000, Directive 7, Federal Acquisition Regulations (FAR), and FAR Supplement Policies and Procedures.
• Acquire and sustain IMD capabilities, systems, tools, products, and services through a disciplined, yet agile, process that ensures information related capabilities are available for DoD components.
• Sustain an acquisition process that is responsive and responsible to internal and external customers and stakeholders.
• Support advanced weapons programs need for intelligence at the earliest point in the acquisition of the program.

RDTE performance metrics are used to assess the progress toward integrating intelligence mission data into the acquisition cycle. The following metrics focus on the return of investment of RDTE activities and assess the degree to meeting mission goals:
• Measure percent of funds that are used to improve advanced weapons platforms intelligence integration. Goal is 100%.
• Measure percent of advanced weapons systems platforms that have a complete IMD requirements and IMD production baseline.
• Identify crucial points in the acquisition timeline in which IMD requirements are identified and incorporated.
• Reduce the number of weapons programs without fully supported IMD requirements.
• Reduce the timeline to incorporate IMD studies into weapons programs.
• Increase the ROI of studies performed.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0307577D8Z / *Intelligence Mission Data (IMD)*	**Project (Number/Name)** 0307577D8Z / *Intelligence Mission Data*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Intelligence Mission Data	Various	Various : Various	0.000	0.000		13.800		13.111		-		13.111	Continuing	Continuing	-
		Subtotal	0.000	0.000		13.800		13.111		-		13.111	-	-	-

	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		13.800		13.111		-		13.111	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0307577D8Z / *Intelligence Mission Data (IMD)*	**Project (Number/Name)** 0307577D8Z / *Intelligence Mission Data*

	FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Various																												

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0307577D8Z / *Intelligence Mission Data (IMD)*	**Project (Number/Name)** 0307577D8Z / *Intelligence Mission Data*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Various	1	2017	4	2022

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