UNCLASSIFIED

Department of Defense
Fiscal Year (FY) 2011 Budget Estimates

February 2010

Research, Development, Test and Evaluation, Defense-Wide

Volume 3A
Office of the Secretary of Defense (OSD)

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Defense-Wide
FY 2011 President's Budget
Exhibit R-1 FY 2011 Base and Overseas Contingency Operations (OCO) Request
(Dollars in Thousands)

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

Date: 21 Jan 2010

Line No	Program Element Number	Item	Act	FY 2009 (Base & OCO)	FY 2010 Base & OCO Enacted	FY 2010 Supplemental Request	FY 2010 Total	FY 2011 Base	FY 2011 OCO	FY 2011 Total Request	Sec
3	0601111D8Z	Government/Industry Cosponsorship of University Research	01	4,254	4,761		4,761				U
4	0601114D8Z	Defense Experimental Program to Stimulate Competitive Research	01	14,259							U
5	0601120D8Z	National Defense Education Program	01	67,108	79,333		79,333	109,911		109,911	U
	Basic Research			85,621	84,094		84,094	109,911		109,911	
7	0602000D8Z	Joint Munitions Technology	02	14,820	18,808		18,808	22,448		22,448	U
8	0602228D8Z	Historically Black Colleges and Universities (HBCU) Science	02	4,527	66,553		66,553	15,067		15,067	U
9	0602234D8Z	Lincoln Laboratory Research Program	02	29,244	33,759		33,759	32,830		32,830	U
15	0602663D8Z	Joint Data Management Advanced Development	02					3,261		3,261	U
16	0602668D8Z	Cyber Security Research	02					10,000		10,000	U
17	0602670D8Z	Human, Social and Culture Behavior Modeling (HSCB) Applied Research	02	8,063	7,882		7,882	9,499		9,499	U
	Applied Research			56,654	127,002		127,002	93,105		93,105	
24	0603000D8Z	Joint Munitions Advanced Technology	03	9,176	13,534		13,534	20,556		20,556	U
25	0603121D8Z	SO/LIC Advanced Development	03	32,314	43,453		43,453	44,423		44,423	U

Exhibit R-1G: FY 2011 President's Budget (Published), as of January 21, 2010 at 13:40:42

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Date: 21 Jan 2010

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26	0603122D8Z	Combating Terrorism Technology Support	03	114,990	117,153		117,153	85,299		85,299	U
29	0603200D8Z	Joint Advanced Concepts	03		3,878		3,878	6,808		6,808	U
30	0603225D8Z	Joint DoD-DoE Munitions Technology Development	03	21,678	23,088		23,088	22,700		22,700	U
35	0603618D8Z	Joint Electronic Advanced Technology	03	8,757	10,751		10,751	8,386		8,386	U
36	0603648D8Z	Joint Capability Technology Demonstrations	03	196,076	168,577		168,577	206,917		206,917	U
37	0603662D8Z	Networked Communications Capabilities	03	27,826	27,984		27,984	30,035		30,035	U
38	0603663D8Z	Joint Data Management Research	03		4,895		4,895	6,289		6,289	U
39	0603665D8Z	Biometrics Science and Technology	03	9,651	10,904		10,904	11,416		11,416	U
40	0603668D8Z	Cyber Security Advanced Research	03					10,000		10,000	U
41	0603670D8Z	Human, Social and Culture Behavior Modeling (HSCB) Advanced Development	03	8,443	10,395		10,395	11,510		11,510	U
42	0603680D8Z	Defense-Wide Manufacturing Science and Technology Program	03	17,142	23,546		23,546	18,916		18,916	U
43	0603711D8Z	Joint Robotics Program/ Autonomous Systems	03	8,385	11,020		11,020	9,943		9,943	U
46	0603716D8Z	Strategic Environmental Research Program	03	63,914	67,128		67,128	68,021		68,021	U
48	0603727D8Z	Joint Warfighting Program	03	10,244	11,045		11,045	10,966		10,966	U

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50	0603745D8Z	Synthetic Aperture Radar (SAR) Coherent Change Detection (CDD)	03	7,296	4,825		4,825				U
51	0603750D8Z	Advanced Concept Technology Demonstrations	03	1,169							U
52	0603755D8Z	High Performance Computing Modernization Program	03	209,164	235,486		235,486	200,986		200,986	U
59	0603781D8Z	Software Engineering Institute	03	29,056	31,044		31,044	30,910		30,910	U
61	0603826D8Z	Quick Reaction Special Projects	03	93,802	73,583		73,583	78,244		78,244	U
62	0603828D8Z	Joint Experimentation	03	100,253	105,936		105,936	111,946		111,946	U
63	0603832D8Z	DoD Modeling and Simulation Management Office	03	30,302	34,226		34,226	38,140		38,140	U
65	0603941D8Z	Test & Evaluation Science & Technology	03	90,467	94,960		94,960	97,642		97,642	U
66	0603942D8Z	Technology Transfer	03	6,033	13,558		13,558	23,310		23,310	U
		Advanced Technology Development (ATD)		1,096,138	1,140,969		1,140,969	1,153,363		1,153,363	
70	0603161D8Z	Nuclear and Conventional Physical Security Equipment RDT&E ADC&P	04	46,786	45,805		45,805	32,132		32,132	U
71	0603527D8Z	RETRACT LARCH	04	21,368	21,542		21,542	21,592		21,592	U
72	0603709D8Z	Joint Robotics Program	04	11,086	15,279		15,279	9,878		9,878	U
73	0603714D8Z	Advanced Sensor Applications Program	04	15,912	17,627		17,627	18,060		18,060	U

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Line No	Program Element Number	Item	Act	FY 2009 (Base & OCO)	FY 2010 Base & OCO Enacted	FY 2010 Supplemental Request	FY 2010 Total	FY 2011 Base	FY 2011 OCO	FY 2011 Total Request	Sec
74	0603851D8Z	Environmental Security Technical Certification Program	04	36,616	40,780		40,780	30,419		30,419	U
99	0603920D8Z	Humanitarian Demining	04	13,993	14,568		14,568	14,735		14,735	U
100	0603923D8Z	Coalition Warfare	04	12,482	13,773		13,773	13,786		13,786	U
101	0604016D8Z	Department of Defense Corrosion Program	04	18,387	22,107		22,107	4,802		4,802	U
102	0604400D8Z	Department of Defense (DoD) Unmanned Aircraft System (UAS) Common Development	04		60,792		60,792	49,292		49,292	U
103	0604648D8Z	Joint Capability Technology Demonstrations	04	10,829	10,988		10,988				U
104	0604670D8Z	Human, Social and Culture Behavior Modeling (HSCB) Research and Engineering	04	5,392	6,950		6,950	7,459		7,459	U
105	0604787D8Z	Joint Systems Integration Command (JSIC)	04	18,083	19,585		19,585	19,413		19,413	U
106	0604828D8Z	Joint FIRES Integration and Interoperability Team	04	15,446	16,835		16,835	16,637		16,637	U
111	0605017D8Z	Reduction Of Total Ownership Cost	04	23,113	24,447		24,447	20,310		20,310	U
112	0303191D8Z	Joint Electromagnetic Technology (JET) Program	04	4,653	6,298		6,298	4,027		4,027	U
		Advanced Component Development & Prot		254,146	337,376		337,376	262,542		262,542	
113	0604051D8Z	Defense Acquisition Challenge Program (DACP)	05	26,979	28,629		28,629	24,344		24,344	U

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114	0604161D8Z	Nuclear and Conventional Physical Security Equipment RDT&E SDD	05	4,106	7,566		7,566	7,973		7,973	U
115	0604165D8Z	Prompt Global Strike Capability Development	05	69,636	165,563		165,563	239,861		239,861	U
117	0604709D8Z	Joint Robotics Program	05	5,420	5,086		5,086	4,155		4,155	U
119	0604771D8Z	Joint Tactical Information Distribution System (JTIDS)	05	19,873	20,466		20,466	20,954		20,954	U
125	0605027D8Z	OUSD(C) IT Development Initiatives	05		4,961		4,961	5,000		5,000	U
126	0605140D8Z	Trusted Foundry	05	39,464	50,808		50,808	35,512		35,512	U
127	0605648D8Z	Defense Acquisition Executive (DAE) Pilot Program	05	5,392	4,232		4,232				U
130	0807708D8Z	Wounded Ill and Injured Senior Oversight Committee (WII-SOC) Staff Office	05	15,645	1,596		1,596	1,590		1,590	U
		System Development and Demonstration		186,515	288,907		288,907	339,389		339,389	
131	0603757D8Z	Training Transformation (T2)	06	54,380							U
132	0604774D8Z	Defense Readiness Reporting System (DRRS)	06	11,300	15,247		15,247	5,113		5,113	U
133	0604875D8Z	Joint Systems Architecture Development	06	18,027	11,248		11,248	8,052		8,052	U
134	0604940D8Z	Central Test and Evaluation Investment Development (CTEIP)	06	143,612	160,959		160,959	162,286		162,286	U

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135	0604942D8Z	Assessments and Evaluations	06					2,500		2,500	U
136	0604943D8Z	Thermal Vicar	06	9,452	11,352		11,352	8,851		8,851	U
137	0605100D8Z	Joint Mission Environment Test Capability (JMETC)	06	8,286	9,379		9,379	10,287		10,287	U
138	0605104D8Z	Technical Studies, Support and Analysis	06	34,073	44,398		44,398	49,282		49,282	U
139	0605110D8Z	USD(A&T)--Critical Technology Support	06	4,151	4,874		4,874	4,743		4,743	U
140	0605117D8Z	Foreign Material Acquisition and Exploitation	06	62,348	94,152		94,152	95,520		95,520	U
142	0605128D8Z	Classified Program USD(P)	06	99,622	94,864		94,864				U
143	0605130D8Z	Foreign Comparative Testing	06	32,050	34,771		34,771	32,755		32,755	U
144	0605142D8Z	Systems Engineering	06					29,824		29,824	U
145	0605161D8Z	Nuclear Matters-Physical Security	06	4,331	6,422		6,422	6,264		6,264	U
146	0605170D8Z	Support to Networks and Information Integration	06	13,707	14,796		14,796	15,091		15,091	U
147	0605200D8Z	General Support to USD (Intelligence)	06	16,361	5,840		5,840	6,227		6,227	U
152	0605502D8Z	Small Business Innovative Research	06	52,812							U
155	0605790D8Z	Small Business Innovation Research (SBIR)/ Small Business Technology Transfer (S	06	5,568	4,645		4,645	2,189		2,189	U

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Line No	Program Element Number	Item	Act	FY 2009 (Base & OCO)	FY 2010 Base & OCO Enacted	FY 2010 Supplemental Request	FY 2010 Total	FY 2011 Base	FY 2011 OCO	FY 2011 Total Request	Sec
156	0605798D8Z	Defense Technology Analysis	06	9,503	11,710		11,710	13,858		13,858	U
157	0605799D8Z	Force Transformation Directorate	06	21,421	23,787		23,787	19,701		19,701	U
160	0605804D8Z	Development Test and Evaluation	06	22,208	23,322	6,438	29,760	18,688		18,688	U
163	0606100D8Z	Budget and Program Assessments	06	5,453	5,881		5,881	6,099		6,099	U
164	0606301D8Z	Aviation Safety Technologies	06		7,936		7,936	10,900		10,900	U
168	0303166D8Z	Support to Information Operations (IO) Capabilities	06	32,801	30,376		30,376	31,500		31,500	U
169	0303169D8Z	Information Technology Rapid Acquisition	06	4,517	4,630		4,630	5,135		5,135	U
171	0305193D8Z	Intelligence Support to Information Operations (IO)	06	17,493	20,481		20,481	21,272		21,272	U
173	0305400D8Z	Warfighting and Intelligence-Related Support	06	824	823		823	845		845	U
174	0804767D8Z	COCOM Exercise Engagement and Training Transformation (CE2T2)	06		40,375		40,375	92,253		92,253	U
		RDT&E Management Support		684,300	682,268	6,438	688,706	659,235		659,235	
183	0607828D8Z	Joint Integration and Interoperability	07	45,795	45,840		45,840	44,139		44,139	U
201	0303140D8Z	Information Systems Security Program	07	13,041	14,955		14,955	14,077		14,077	U

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209	0303260D8Z	Joint Military Deception Initiative	07		934		934	1,161		1,161	U
214	0305103D8Z	Cyber Security Initiative	07	992	985		985	501		501	U
217	0305125D8Z	Critical Infrastructure Protection (CIP)	07	15,594	16,590		16,590	10,486		10,486	U
221	0305186D8Z	Policy R&D Programs	07	8,870	6,892		6,892	9,136		9,136	U
223	0305199D8Z	Net Centricity	07	12,277	1,467		1,467	29,831		29,831	U
234	0305387D8Z	Homeland Defense Technology Transfer Program	07		2,939		2,939	2,988		2,988	U
235	0305600D8Z	International Intelligence Technology Assessment, Advancement and Integration	07		1,378		1,378	1,416		1,416	U
248	0909999D8Z	Financing for Cancelled Account Adjustments	07	4,455							U
249	1001018D8Z	NATO AGS	07	22,471	68,923		68,923	93,885		93,885	U
		Operational Systems Development		123,495	160,903		160,903	207,620		207,620	
Total Research, Development, Test & Eval, DW				2,486,869	2,821,519	6,438	2,827,957	2,825,165		2,825,165	

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Budget Activity 01: Basic Research

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04	01	0601114D8Z	Defense Experimental Program to Stimulate Competitive Research (DEPSCOR)	Volume 3 - 7
05	01	0601120D8Z	National Defense Education Program (NDEP)	Volume 3 - 13

Budget Activity 02: Applied Research

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08	02	0602228D8Z	Historically Black Colleges and Universities and Minority Institutions (HBCU/MI)	Volume 3 - 35
09	02	0602234D8Z	Lincoln Laboratory	Volume 3 - 43
15	02	0602663D8Z	Joint Data Management Research	Volume 3 - 55
16	02	0602668D8Z	Cyber Security Research	Volume 3 - 61
17	02	0602670D8Z	Human, Social and Culture Behavior (HSCB) Modeling Applied Research	Volume 3 - 65

Budget Activity 03: Advanced Technology Development (ATD)

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24	03	0603000D8Z	Joint Munitions Advanced Technology	Volume 3 - 75
25	03	0603121D8Z	SO/LIC Advanced Development	Volume 3 - 85
26	03	0603122D8Z	Combating Terrorism Technology Support	Volume 3 - 99
29	03	0603200D8Z	Joint Advanced Concepts (JAC)	Volume 3 - 127
30	03	0603225D8Z	Joint DOD/DOE Munitions Technology Development	Volume 3 - 137
35	03	0603618D8Z	Joint Electronic Advanced Technology	Volume 3 - 159
36	03	0603648D8Z	Joint Capability Technology Demonstration (JCTD)	Volume 3 - 169
37	03	0603662D8Z	Networked Communications Capability	Volume 3 - 253
38	03	0603663D8Z	Joint Data Managment Advanced Development	Volume 3 - 275
39	03	0603665D8Z	Biometrics Science and Technology	Volume 3 - 281
40	03	0603668D8Z	Cyber Security Advanced Technology Development	Volume 3 - 289
41	03	0603670D8Z	Human, Social and Culture Behavior (HSCB) Modeling Advanced Development	Volume 3 - 293
42	03	0603680D8Z	Defense Wide Manufacturing Science and Technology Program	Volume 3 - 301
43	03	0603711D8Z	Joint Robotics Program/Autonomous Systems	Volume 3 - 317
46	03	0603716D8Z	Strategic Environmental Research and Development Program (SERDP)	Volume 3 - 329
48	03	0603727D8Z	Joint Warfighting	Volume 3 - 339

Budget Activity 03: Advanced Technology Development (ATD)

Line Item	Budget Activity	Program Element Number	Program Element Title	Page
50	03	0603745D8Z	Synthetic Aperture Radar (SAR) Coherent Change Detection (CDD)	Volume 3 - 347
51	03	0603750D8Z	Advanced Concept Technology Demonstration (ACTD)	Volume 3 - 353
52	03	0603755D8Z	High Performance Computing Modernization Program	Volume 3 - 359
59	03	0603781D8Z	Software Engineering Institute (SEI)	Volume 3 - 369
61	03	0603826D8Z	Quick Reactions Special Projects (QRSP)	Volume 3 - 389
62	03	0603828D8Z	Joint Experimentation	Volume 3 - 469
63	03	0603832D8Z	DoD Modeling and Simulation Management Office	Volume 3 - 493
65	03	0603941D8Z	Test and Evaluation/Science and Technology	Volume 3 - 501
66	03	0603942D8Z	Technology Transfer and Transition	Volume 3 - 543

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Combating Terrorism Technology Support	0603122D8Z	26	03	Volume 3 - 99
Cyber Security Advanced Technology Development	0603668D8Z	40	03	Volume 3 - 289
Cyber Security Research	0602668D8Z	16	02	Volume 3 - 61
Defense Experimental Program to Stimulate Competitive Research (DEPSCOR)	0601114D8Z	04	01	Volume 3 - 7
Defense Wide Manufacturing Science and Technology Program	0603680D8Z	42	03	Volume 3 - 301
DoD Modeling and Simulation Management Office	0603832D8Z	63	03	Volume 3 - 493
Government/Industry Co-sponsorship of University Research	0601111D8Z	03	01	Volume 3 - 1
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Joint Munitions Advanced Technology	0603000D8Z	24	03	Volume 3 - 75
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Joint Robotics Program/Autonomous Systems	0603711D8Z	43	03	Volume 3 - 317
Joint Warfighting	0603727D8Z	48	03	Volume 3 - 339
Lincoln Laboratory	0602234D8Z	09	02	Volume 3 - 43
National Defense Education Program (NDEP)	0601120D8Z	05	01	Volume 3 - 13
Networked Communications Capability	0603662D8Z	37	03	Volume 3 - 253
Quick Reactions Special Projects (QRSP)	0603826D8Z	61	03	Volume 3 - 389
SO/LIC Advanced Development	0603121D8Z	25	03	Volume 3 - 85
Software Engineering Institute (SEI)	0603781D8Z	59	03	Volume 3 - 369
Strategic Environmental Research and Development Program (SERDP)	0603716D8Z	46	03	Volume 3 - 329
Synthetic Aperture Radar (SAR) Coherent Change Detection (CDD)	0603745D8Z	50	03	Volume 3 - 347
Technology Transfer and Transition	0603942D8Z	66	03	Volume 3 - 543
Test and Evaluation/Science and Technology	0603941D8Z	65	03	Volume 3 - 501

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	**R-1 ITEM NOMENCLATURE** PE 0601111D8Z: *Government/Industry Co-sponsorship of University Research*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	4.254	4.761	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
P111: *Government/Industry Co-sponsorship of University Research*	4.254	4.761	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

Note

This program consists of congressional adds.

The Department of Defense requested no funds for GICUR in fiscal year 2010 and in future budget requests.

A. Mission Description and Budget Item Justification

(U) The FY 2009 Government/Industry Co-sponsorship of University Research (GICUR) program reflects three Congressional adds, they are:

1. Research of Chemical and Biological Warfare Agents $0.800 - Sponsor Rep Rangel (NY)
2. Shock Trauma Research Center $2.000 - Sponsor Rep Cleaver (MO)
3. Integrated Cryo-cooled High Power Density Systems $1.600 - Sponsor Sen Martinez (FL)

Exhibit R-2, **RDT&E Budget Item Justification:** PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	**R-1 ITEM NOMENCLATURE** PE 0601111D8Z: *Government/Industry Co-sponsorship of University Research*

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	4.254	4.761	0.000	0.000	0.000
Total Adjustments	4.254	4.761	0.000	0.000	0.000
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.122	0.000			
• Other	-0.024	0.000	0.000	0.000	0.000
• R&D FY09: Congressional Distributed Actions	4.400	0.000	0.000	0.000	0.000
• FY10 Congressional Adjustment	0.000	4.761	0.000	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	**R-1 ITEM NOMENCLATURE** PE 0601111D8Z: *Government/Industry Co-sponsorship of University Research*	**PROJECT** P111: *Government/Industry Co-sponsorship of University Research*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
P111: *Government/Industry Co-sponsorship of University Research*	4.254	4.761	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

Note

This program consists of congressional adds.

The Department of Defense requested no funds for GICUR in fiscal year 2010 and in future budget requests.

A. Mission Description and Budget Item Justification

(U) The FY 2009 Government/Industry Co-sponsorship of University Research (GICUR) program reflects three Congressional adds, they are:

1. Research of Chemical and Biological Warfare Agents $0.800 - Sponsor Rep Rangel (NY)
2. Shock Trauma Research Center $2.000 - Sponsor Rep Cleaver (MO)
3. Integrated Cryo-cooled High Power Density Systems $1.600 - Sponsor Sen Martinez (FL)

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Research of Chemical and Biological Warfare Agents - Sponsor Rep Rangel (NY)	0.773	0.000	0.000	0.000	0.000
Chemical and biological research to characterize the molecular structures of chemical and biological warfare agents and develop effective countermeasures for military and civilian use. *FY 2009 Accomplishments:* Executed the congressional add as directed by Congress. Recipient New York Structural Biology Center					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	**R-1 ITEM NOMENCLATURE** PE 0601111D8Z: *Government/Industry Co-sponsorship of University Research*	**PROJECT** P111: *Government/Industry Co-sponsorship of University Research*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Accomplishments include: 1) Solid State Nuclear Magnetic Resonance of surface interactions; 2) Solid-state NMR spectroscopy used to analyze the formation of stable metal phosphonate complexes known to form when nerve agents degrade on aluminum-containing materials. This analysis facilitated detection and characterization; 3) Analysis of Staphylococcal Enterotoxin B: 2D and 3D NMR data used to determine the detailed molecular interactions between SEB and detection molecules; 4) Detailed molecular interactions between SEB and protective monoclonal antibodies will also be generated in an effort to design a protective vaccine. Results of this work will improve the ability to detect and protect against SEB as a biological warfare agent. Analysis of target proteins from anthrax, plague and small pox: NMR and X-ray crystallographic methodologies will be used to conduct high resolution structural characterization of molecules derived from these pathogens. This data used to develop novel structure-based inhibitors and to test the potential viability of existing FDA-approved drugs against these new targets. *FY 2011 Base Plans:* None					
Shock Trauma Research Center - Sponsor Rep Cleaver (MO) A project to create a bioactive 3-D glass scaffolds with mechanical, structural, and biological properties to integrate and support new bone formation when implanted into critical size defects in the calvaria of a rat. *FY 2009 Accomplishments:* The project will be a collaborative effort between faculty at the University of Missouri and the Army Medical Research and Materiel Command. The funds will improve the quality of life for injured soldiers as well as for other severely injured Americans. Recipient University of Missouri. The new biomaterials, biosensors, and biological therapeutics under development in the Consortium for Bone and Tissue Repair and Regeneration of traumatized bone and tissues and will result in an improved quality of life for injured soldiers as well as for other severely injured Americans.	1.938	0.000	0.000	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	**R-1 ITEM NOMENCLATURE** PE 0601111D8Z: *Government/Industry Co-sponsorship of University Research*	**PROJECT** P111: *Government/Industry Co-sponsorship of University Research*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2010 Plans: None *FY 2011 Base Plans:* None					
Integrated Cryo-cooled High Power Density Systems - Sponsor Sen Martinez (FL)	1.543	3.187	0.000	0.000	0.000
Funds are provided for the achieving cryo-cooled high power densities through systems management of heat generation and removal in the electrical system. *FY 2009 Accomplishments:* Recipient Florida State University. The systems approach begins with identifying the enabling technologies needed and then pursuing research programs to advance the enabling technologies. To accomplish research activities in several areas: 1) Systems Analysis - Extensive system modeling and simulation of the integrated electrical and thermal systems to understand dynamic performance under normal and adverse conditions to achieve a useful system; 2) Materials - Semi-conductors for use in power electronic components and Insulation materials at cryogenic temperatures to obtain the data needed to predict system performance and design components; and 3) Optimize thermal system options such as conductive heat transfer systems, fluid heat transfer systems, insulation, packaging and cooling equipment for performance, reliability, and failure modes. *FY 2010 Plans:* Funds are provided for the achieving cryo-cooled high power densities through systems management of heat generation and removal in the electrical system. *FY 2011 Base Plans:* None					
High Efficiency Solar Energy Generation and Storage	0.000	0.787	0.000	0.000	0.000

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense		**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	**R-1 ITEM NOMENCLATURE** PE 0601111D8Z: *Government/Industry Co-sponsorship of University Research*	**PROJECT** P111: *Government/Industry Co-sponsorship of University Research*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Funds are provided for the High Efficiency Solar Energy Generation and Storage Project. *FY 2010 Plans:* Funds are provided for the High Efficiency Solar Energy Generation and Storage Project.					
Center for Research on Minority Health Prostate Cancer Outreach Project Funds are provided for the Center for Research on Minority Health Prostate Cancer Outreach Project *FY 2010 Plans:* Funds are provided for the Center for Research on Minority Health Prostate Cancer Outreach Project	0.000	0.787	0.000	0.000	0.000
Accomplishments/Planned Programs Subtotals	4.254	4.761	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

None

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	**R-1 ITEM NOMENCLATURE** PE 0601114D8Z: *Defense Experimental Program to Stimulate Competitive Research (DEPSCOR)*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	14.259	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
P114: *Defense Experimental Program to Stimulate Competitive Research (DEPSCOR)*	14.259	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

Note

The Department of Defense requested no funds for DEPSCoR in fiscal year 2010 and in future year budget requests.

A. Mission Description and Budget Item Justification

The Defense Experimental Program to Stimulate Competitive Research (DEPSCoR) is a legislated program that funds research activities in science and engineering fields at institutions of higher education in selected states. DEPSCoR was intended to expand research opportunities in states that traditionally received the least funding in federal support for university research.

Participation in this program is limited to states that meet eligibility criteria as set forth in the authorizing language. The program improves the capabilities of institutions of higher education to develop, plan, and execute science and engineering research that is competitive under a peer-review system. Educational institutions in eligible DEPSCoR states are invited to compete for research/infrastructure awards in areas identified by the department in Broad Agency Announcements published by the Services.

Section 239 of the FY 2008 Authorization Conference Report directs the Secretary of Defense to utilize a defense federally funded research and development center to carry out an assessment of the DEPSCoR program. The assessment was due no later than nine months after the date of the enactment of this Act (October 2008). The Institute for Defense Analyses (IDA) conducted the DEPSCoR assessment. The report went to Congress on December 24, 2008.

FY 2009 DEPSCoR Program - 23 States Eligible to compete. The FY 2009 program eliminated the EPSCoR State Committees Review Requirements. Solicitation posted by the Army Research Office on March 6, 2009. The broad agency announcement closed on May 4, 2009. The program solicitation received 131 proposals. Based on the Orders of Merit, 28 grants were awarded in 14 DEPSCoR states. The research grants will be supported for three years and the averaged award is $504,372. The FY 2009 broad agency announcement will fund the $12.000 congressional increase. Currently, all 28 awards have been obligated.

Exhibit R-2, **RDT&E Budget Item Justification:** PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	**R-1 ITEM NOMENCLATURE** PE 0601114D8Z: *Defense Experimental Program to Stimulate Competitive Research (DEPSCOR)*

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	2.833	0.000	0.000	0.000	0.000
Current President's Budget	14.259	0.000	0.000	0.000	0.000
Total Adjustments	11.426	0.000	0.000	0.000	0.000
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	-0.161	0.000			
• SBIR/STTR Transfer	-0.413	0.000			
• R&DFY09: Congressional Distributed Actions	12.000	0.000	0.000	0.000	0.000

Change Summary Explanation

The FY 2009 DEPSCoR Program received a congressional increase in the amount of $12.0 million.

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense											**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*				**R-1 ITEM NOMENCLATURE** PE 0601114D8Z: *Defense Experimental Program to Stimulate Competitive Research (DEPSCOR)*				**PROJECT** P114: *Defense Experimental Program to Stimulate Competitive Research (DEPSCOR)*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P114: *Defense Experimental Program to Stimulate Competitive Research (DEPSCOR)*	14.259	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

Note

The Department of Defense requested no funds for DEPSCoR in fiscal year 2010 and in future year budget requests.

A. Mission Description and Budget Item Justification

(U) The Defense Experimental Program to Stimulate Competitive Research (DEPSCoR) is a legislated program that funds research activities in science and engineering fields at institutions of higher education in selected states. DEPSCoR was intended to expand research opportunities in states that traditionally received the least funding in federal support for university research.

(U) Participation in this program is limited to states that meet eligibility criteria as set forth in the authorizing language. The program improves the capabilities of institutions of higher education to develop, plan, and execute science and engineering research that is competitive under a peer-review system. Educational institutions in eligible DEPSCoR states are invited to compete for research/infrastructure awards in areas identified by the department in Broad Agency Announcements regularly published by the Services. The DEPSCoR FY 2008 BAA closed on October 26, 2007. The FY 2008 DEPSCoR News Release published on March 26, 2008 announced 24 research grants totaling $15.7 million. The Army Research Office, the Office of Naval Research, and the Air Force Office of Scientific Research will execute the awards.

(U) Section 239 of the FY 2008 Authorization Conference Report directs the Secretary of Defense to utilize a defense federally funded research and development center to carry out an assessment of the DEPSCoR program. The assessment was due no later than nine months after the date of the enactment of this Act (October 2008). The Institute for Defense Analyses (IDA) conducted the DEPSCoR assessment. The report went to Congress on December 24, 2008.

FY 2009 DEPSCoR Program - 23 States Eligible to compete. The FY 2009 program eliminated the EPSCoR State Committees Review Requirements. Solicitation posted by the Army Research Office on March 6, 2009. The broad agency announcement closed on May 4, 2009. The program solicitation received 131 proposals. Based on the Orders of Merit, 28 grants were awarded in 14 DEPSCoR states. The research grants will be supported for three years and the averaged award is $504,372. The FY 2009 broad agency announcement will fund the $12.000 congressional increase. Currently, all 28 awards have been obligated.

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense		**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	**R-1 ITEM NOMENCLATURE** PE 0601114D8Z: *Defense Experimental Program to Stimulate Competitive Research (DEPSCOR)*	**PROJECT** P114: *Defense Experimental Program to Stimulate Competitive Research (DEPSCOR)*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Defense Experimental Program to Stimulate Competitive Research (DEPSCoR)	14.259	0.000	0.000	0.000	0.000
The plan is to award $14.1 million to eligible DEPSCoR states to perform research in science and engineering. *FY 2009 Accomplishments:* The FY 2009 Broad Area Announcement (BAA) is in the review process with the Services. The FY 2009 broad agency announcement will fund the $12.M congressional increase. The program will award $14.1 million to DEPSCoR academic institutions. For the first time, principal investigators in the DEPSCoR states submitted their proposals directly to the services rather than through the state DEPSCoR Committees. Only universities with degree granting programs in science, mathematics, and/or engineering in 23 States and Territories are eligible to receive awards. DEPSCoR Committees Executive summaries from each State DEPSCoR Committee were required. One hundred and thirty one (131) proposals requesting approximately $71 million projects were submitted by the May 4, 2009 due date. The DoD News Release list of awardees is expected to be published in late August 2009 after the completion of the evaluation process conducted concurrently by ARO, ONR, and AFOSR.					
Accomplishments/Planned Programs Subtotals	14.259	0.000	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense		**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	**R-1 ITEM NOMENCLATURE** PE 0601114D8Z: *Defense Experimental Program to Stimulate Competitive Research (DEPSCOR)*	**PROJECT** P114: *Defense Experimental Program to Stimulate Competitive Research (DEPSCOR)*

E. Performance Metrics

None.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	**R-1 ITEM NOMENCLATURE** PE 0601120D8Z: *National Defense Education Program (NDEP)*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	67.108	79.333	109.911	0.000	109.911	122.947	125.068	127.441	129.874	Continuing	Continuing
P120: *National Defense Education Program (NDEP)*	67.108	79.333	109.911	0.000	109.911	122.947	125.068	127.441	129.874	Continuing	Continuing

A. Mission Description and Budget Item Justification

The National Defense Education Program (NDEP) supports science, technology, engineering and mathematics (STEM) research and education initiatives, at all educational levels, to inspire, attract and develop the next generation and the current generation of STEM talent to meet DoD's missions. Major components of NDEP include: the engagement of DoD laboratory scientists and engineers (S&Es) that play an important role in inspiring, enhancing and developing K-12 student and teacher STEM skills; supporting the education and training of undergraduate and graduate students in relevant STEM disciplines that result in DoD employment; and supporting world-class basic researchers and their students in areas of critical importance to DoD. NDEP basic researchers also are called upon to form strategic partnerships with DoD's laboratory S&Es as well as serve on DoD advisory panels. NDEP supports the inspire, develop and attract goals of the DoD-wide STEM Education and Outreach Strategic Plan completed in December, 2009.

In 2009, 260 new undergraduate and graduate students majoring in relevant STEM disciplines were supported. These students are primarily attending high to very high research universities. Approximately 75 Science, Mathematics And Research for Transformation (SMART) participants who earned a bachelor's, master's or doctoral degree transitioned into employment in a DoD laboratory or component. Ten highly distinguished university basic researchers were selected from over 500 eligible applicants. Among these researchers are members of the National Academy of Sciences, the National Academy of Engineering, and recipients of prestigious science awards.

In 2009, NDEP K-12 initiatives included four, week-long, summer teacher professional development institutes attended by 110 teachers and 35 laboratory scientists and engineers (S&Es). Science and math partnerships between laboratory S&Es and middle and high school classroom teachers are established in 20 States and respond to local needs. Three-day professional development workshops were conducted for 900 teachers and included 530 S&Es. To encourage middle school student's participation in math, DoD partnered with MATHCOUNTS to sponsor over 7,300 new mathematics clubs in schools across the U.S. reaching over 127,000 students. As a result, students from over 5,900 schools participated in a national math competition. Other student-focused informal educational activities included: “Lab TV” webisodes featuring laboratory S&E personnel demonstrating 30 different DoD technologies; 500 students participating in DoD STEM summer camps, mentoring programs and field trips to DoD laboratories.

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	**R-1 ITEM NOMENCLATURE** PE 0601120D8Z: *National Defense Education Program (NDEP)*

NDEP Historical Perspective (cumulative results): Since the program's inception in 2006, the NDEP K-12 initiatives resulted in 535 teachers trained, and the establishment of partnerships between laboratory scientists and engineers with middle and high school classroom teachers in 20 states. NDEP higher education initiatives have supported and trained nearly 570 undergraduate and graduate students. Approximately 150 SMART participants have transitioned into DoD employment since 2007. To date, 18 highly distinguished university faculty are conducting basic research crucial to enabling future applications in sensors, functional materials, surveillance, near shore navigation, communications and information security, energy independence, and force protection.

Current research and education awards will be sustained and new SMART and NSSEFF awards will be made in FY2010.

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	68.972	91.484	0.000	0.000	0.000
Current President's Budget	67.108	79.333	109.911	0.000	109.911
Total Adjustments	-1.864	-12.151	109.911	0.000	109.911
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	-0.001	0.000			
• SBIR/STTR Transfer	-1.863	0.000			
• Other Program Adjustments	-1.000	-12.151	109.911	0.000	109.911
• Departmental Adjustment to correct administrative error in Prior Year	1.000	0.000	0.000	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense											DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*				**R-1 ITEM NOMENCLATURE** PE 0601120D8Z: *National Defense Education Program (NDEP)*				**PROJECT** P120: *National Defense Education Program (NDEP)*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P120: *National Defense Education Program (NDEP)*	67.108	79.333	109.911	0.000	109.911	122.947	125.068	127.441	129.874	Continuing	Continuing

A. Mission Description and Budget Item Justification

The National Defense Education Program (NDEP) supports science, technology, engineering and mathematics (STEM) research and education initiatives, at all educational levels, to inspire, attract and develop the next generation and the current generation of STEM talent to meet DoD's missions. Major components of NDEP include: the engagement of DoD laboratory scientists and engineers (S&Es) that play an important role in inspiring, enhancing and developing K-12 student and teacher STEM skills; supporting the education and training of undergraduate and graduate students in relevant STEM disciplines that result in DoD employment; and supporting world-class basic researchers and their students in areas of critical importance to DoD. NDEP basic researchers also are called upon to form strategic partnerships with DoD's laboratory S&Es as well as serve on DoD advisory panels. NDEP supports the inspire, develop and attract goals of the DoD-wide STEM Education and Outreach Strategic Plan completed in December, 2009.

In 2009, 260 new undergraduate and graduate students majoring in relevant STEM disciplines were supported. These students are primarily attending high to very high research universities. Approximately 75 Science, Mathematics And Research for Transformation (SMART) participants who earned a bachelor's, master's or doctoral degree transitioned into employment in a DoD laboratory or component. Ten highly distinguished university basic researchers were selected from over 500 eligible applicants. Among these researchers are members of the National Academy of Sciences, the National Academy of Engineering, and recipients of prestigious science awards.

In 2009, NDEP K-12 initiatives included four, week-long, summer teacher professional development institutes attended by 110 teachers and 35 laboratory scientists and engineers (S&Es). Science and math partnerships between laboratory S&Es and middle and high school classroom teachers are established in 20 States and respond to local needs. Three-day professional development workshops were conducted for 900 teachers and included 530 S&Es. To encourage middle school student's participation in math, DoD partnered with MATHCOUNTS to sponsor over 7,300 new mathematics clubs in schools across the U.S. reaching over 127,000 students. As a result, students from over 5,900 schools participated in a national math competition. Other student-focused informal educational activities included: “Lab TV” webisodes featuring laboratory S&E personnel demonstrating 30 different DoD technologies; 500 students participating in DoD STEM summer camps, mentoring programs and field trips to DoD laboratories.

NDEP Historical Perspective (cumulative results): Since the program's inception in 2006, the NDEP K-12 initiatives resulted in 535 teachers trained, and the establishment of partnerships between laboratory scientists and engineers with middle and high school classroom teachers in 20 states. NDEP higher education initiatives have supported and trained nearly 570 undergraduate and graduate students. Approximately 150 SMART participants have transitioned into DoD

employment since 2007. To date, 18 highly distinguished university faculty are conducting basic research crucial to enabling future applications in sensors, functional materials, surveillance, near shore navigation, communications and information security, energy independence, and force protection.

Current research and education awards will be sustained and new SMART and National Security Science and Engineering Faculty Fellowship awards will be made in FY2010.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Science, Mathematics and Research for Transformation (SMART) Defense Education Program	27.108	32.676	45.567	0.000	45.567

The Science, Mathematics and Research for Transformation (SMART) Defense Education Program awards undergraduate scholarships and graduate fellowships to current and future scientists and engineers in areas of importance to DoD. Participants are required to obtain security clearances and agree to a year of DoD employment in return for each year of academic support received. Through research experiences at DoD labs, SMART scholars gain additional skills and expertise that are directly applicable to mission needs. To date, SMART has supported and trained over 570 undergraduate and graduate students earning bachelor's, master's or Ph.D degrees in science, technology, engineering and mathematics (STEM) disciplines at very high and high research universities. An additional benefit has been the resulting masters' theses and doctoral dissertations work in DoD relevant topic areas. Since the program's inception, nearly 150 students have transitioned into the DoD laboratory and components workforce. The program is expected to reach steady-state in FY 2012 when the number of new scholarships will be approximately equal to the number of SMART graduates.

FY 2009 Accomplishments:
Made 260 new STEM undergraduate and graduate scholarship-for-service awards of which Army selected 40%, Navy selected 25% and Air Force selected 35%. Additionally, of the 260 students selected, 50% will earn bachelor's degrees, 20% will earn master's degrees and 30% will earn doctoral degrees. Increased the number of DoD sites participating in SMART to slightly more than 100. Initiated new efforts to increase awareness of program among, and applications from, members of under-represented groups, veterans, and individuals separating the armed services. Conducted

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	**R-1 ITEM NOMENCLATURE** PE 0601120D8Z: *National Defense Education Program (NDEP)*	**PROJECT** P120: *National Defense Education Program (NDEP)*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
an annual program review. Conducted site visits to laboratories to visit with SMART students and mentors. Obtained feedback from transitioned SMART participants. Developed schedule for a third-party program evaluation. Transitioned approximately 75 SMART participants to the DoD workforce. Completed development of the SMART management information system (MIS) to automate key business processes and information transfers used to manage and execute the SMART program. NOTE: Actual Cost is 26.108, 1.000 added in order to correct and balance administrative error in BA 2, PE 0602228D8Z. *FY 2010 Plans:* Increase the quality and number of eligible applicants from under-represented groups, veterans, and individuals separating from the armed services. Increase the number of application reviewers from HBCU/MIs. Develop new mentoring and workforce development initiatives for current program participants. Conduct a program evaluation. Transition approximately 150 new SMART participants to the DoD workforce. Conduct a program review to include external reviewers. *FY 2011 Base Plans:* Continue to work toward goal of selecting ~200 new students to reach ~1,000 SMART scholarships awarded. Continue efforts to increase the number of eligible applications from students from under-represented groups, veterans, and individuals separating from the armed services. Continue efforts to increase the number of application reviewers from under-represented groups. Transition approximately 175 additional SMART participants to DoD workforce. Conduct a program review to include external reviewers.					
National Security Science and Engineering Faculty Fellowship (NSSEFF) NSSEFF supports innovative basic science and engineering research within academia, as well as education initiatives that seek to create and develop the next generation of high-performing scientists and engineers for the defense and national security workforce in areas of interest to DoD. It also	25.000	32.657	46.344	0.000	46.344

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	**R-1 ITEM NOMENCLATURE** PE 0601120D8Z: *National Defense Education Program (NDEP)*	**PROJECT** P120: *National Defense Education Program (NDEP)*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
seeks to foster long-term relationships between the NSSEFF Felllows, who are distinguished university researchers, their students and postdoctoral scientists and the DoD. NSSEFF Fellows conduct basic research in core science and engineering disciplines that underpin future DoD technology development. NSSEFF awards are funded up to $850K annually for up to five consecutive years. Approximately ten awards are funded each year. By FY 2012, NSSEFF will support a steady state of up to 50 researchers and engage, without additional funding, at least double that number of graduate students and post-docs. *FY 2009 Accomplishments:* Nearly 100 DoD scientists and engineers reviewed ~470 eligible white papers. Ten basic research awards funded distinguished university faculty in crucial areas enabling future applications in sensors, functional materials, surveillance, near shore navigation, communications and information security, energy independence, and force protection. NSSEFF also engages these leaders with senior DoD officials, as well as scientists and engineers in DoD laboratories. A DoD NSSEFF Conference was held in June to introduce Fellows to the DoD community. Fellows visited the Army Research Laboratory (ARL), the Naval Research Laboratory (NRL), and the Air Force Research Laboratory (AFRL). Fellows submitted progress reports and were provided opportunities to brief their progress. *FY 2010 Plans:* Conduct new competition, make additional awards to distinguished university researchers and modify the review process to include university reviewers. Invite current NSSEFF Fellows to brief the DoD scientific community on their progress. Build on NSSEFF Fellows' integration into DoD's research community and laboratory scientific and engineering engagements. Develop an internship and postdoctoral program for NSSEFF students and posdoctoral scientists at DoD laboratories for the purpose of increasing collaborations and for providing career and workforce development opportunities. Review annual progress reports and conduct a program review.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	**R-1 ITEM NOMENCLATURE** PE 0601120D8Z: *National Defense Education Program (NDEP)*	**PROJECT** P120: *National Defense Education Program (NDEP)*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: Continue to work toward steady-state goal of ~50 active NSSEFF research awards. Conduct new competition and make additional awards to distinguished university researchers. Assess Fellows integration and laboratory scientific and engineering engagements. Review annual progress reports. Conduct a program review and assess the internship and postdoctoral research experience at DoD laboratories.					
K-12	15.000	14.000	18.000	0.000	18.000
The K-12 component supports the building of STEM talent with initiatives that are designed to meet local school needs and desires. There is professional development for middle and high school teachers available at summer institutes or in a modified, three-day, format which can be delivered locally. STEM teachers receive inquiry-based training and are partnered with DoD laboratory scientists and engineers. Informal educational activities included: “Lab TV” webisodes featuring laboratory scientific and engineering personnel demonstrating DoD technologies; DoD STEM summer camps; mentoring and student field trips to DoD laboratories. *FY 2009 Accomplishments:* Increased the number of K-12 partnerships between DoD scientific and engineering laboratory personnel and local schools in defense laboratory communities in Ohio, Massachusetts, Mississippi, and Rhode Island. Supported 10 top-tier U.S. high school students through Research Science Institute summer research experience at MIT in areas of importance to DoD. Conducted four week-long summer teacher professional development institutes which were attended by 110 teachers and 35 laboratory scientists and engineers. Developed a three-day teacher professional development institute which was attended by 900 teachers and 530 scientists and engineers. Supported over 7,300 mathematics club in schools nationwide with over 127,000 students participating in the club program. Of those schools, more than 5,900 also participated in a national competition program. Supported the formation of 34 elementary/middle school teams and 13 high school robotics teams competing at					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 1: *Basic Research*	**R-1 ITEM NOMENCLATURE** PE 0601120D8Z: *National Defense Education Program (NDEP)*	**PROJECT** P120: *National Defense Education Program (NDEP)*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
the national level. Assessed K-12 learning modules and implementation approach in Harford County, Maryland. Developed 30 LabTV webisodes that feature DoD scientists and engineers demonstrating technology to stimulate interest of middle and high school audiences. Completed classroom STEM learning activities involving 1,500 teachers and almost 100,000 students. *FY 2010 Plans:* Increase K-12 partnerships between DoD scientists and engineers and local schools in defense laboratory communities in four additional States. Expand and balance partnerships with STEM stakeholders in a coordinated effort on STEM education at the middle and high school level in defense laboratory communities. Develop supplemental learning material to accompany LabTV webisodes. Contribute to DoD STEM Education and Outreach Strategic Plan goals and objectives. *FY 2011 Base Plans:* Increase K-12 partnerships between DoD scientists and engineers and local schools in defense laboratory communities. Conduct assessment of the implementation and impact with respect to the local defense community school system.					
Accomplishments/Planned Programs Subtotals	67.108	79.333	109.911	0.000	109.911

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance Metrics within the National Defense Education Program:

1) Increase the number of STEM undergraduates and graduates that are transitioned into the DoD workforce.
2) Increase the number of teachers, without math or science certification, that receive professional development training with a DoD laboratory scientist or engineer.

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602000D8Z: *Joint Munitions Technology*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	14.820	18.808	22.448	0.000	22.448	22.179	20.767	21.989	22.977	Continuing	Continuing
P000: *Insensitive Munitions*	14.820	14.990	14.615	0.000	14.615	14.786	14.971	15.241	15.529	Continuing	Continuing
P204: *Enabling Fuze Technology*	0.000	3.818	7.833	0.000	7.833	7.393	5.796	6.748	7.448	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 joint enabling technologies that can be used by the Services as they develop their specific weapon programs. The program invests in technologies from a Joint Service perspective thus ensuring the development of technology with the broadest applicability, while avoiding duplication of efforts.

Under the Joint Insensitive Munitions (IM) Technology Program (JIMTP), investments are focused on specific munition areas that have been identified by the S&T community and validated by the technology needs identified in the IM Strategic Plans submitted by the Program Executive Officers (PEOs). These five munitions areas are: 1) high performance rocket propulsion, 2) minimum signature rocket propulsion, 3) large caliber gun propulsion, 4) anti-armor warheads, and 5) blast and fragmentation warheads.

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 will be 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 Weapon Fuzing, 3) High Reliability Fuzing, 4) and Enabling Fuze Technologies and Common Architecture2.

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 five-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 IM Strategic Plans / Fuze Technology Development Plan, and 4) interfacing with other MATGs / FATGs and IM / fuze science and technology projects as appropriate. The JIMTP and JFTP will utilize a Technical Advisory Committee (TAC) (consisting of senior DoD and DOE laboratory representatives and senior Munitions PEO representatives) to provide program oversight, policy, direction and priorities during its annual meeting.

Exhibit R-2, **RDT&E Budget Item Justification:** PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602000D8Z: *Joint Munitions Technology*

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	15.254	22.669	0.000	0.000	0.000
Current President's Budget	14.820	18.808	22.448	0.000	22.448
Total Adjustments	-0.434	-3.861	22.448	0.000	22.448
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	-0.256	0.000			
• SBIR/STTR Transfer	-0.064	0.000			
• New project initiated	0.000	-3.708	22.448	0.000	22.448
• Other	-0.114	-0.153	0.000	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense											DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*				**R-1 ITEM NOMENCLATURE** PE 0602000D8Z: *Joint Munitions Technology*				**PROJECT** P000: *Insensitive Munitions*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P000: *Insensitive Munitions*	14.820	14.990	14.615	0.000	14.615	14.786	14.971	15.241	15.529	Continuing	Continuing

A. Mission Description and Budget Item Justification

This RDT&E effort is aimed at developing the enabling technologies needed to build weapons in compliance with Insensitive Munitions (IM) requirements established in statute (United States Code, Title 10, Chapter 141, Section 2389) and regulation (DoDI 5000.1 and CJCSI 3170.01F). Using technology available today, the Department has incrementally improved the IM response of our current munitions. New munitions which have fully implemented current IM technology and design practices have been able to achieve IM compliance. However, these have been the most easily solved problems. Without new technology, future variants of current weapon systems will have the same, or worse, response to IM stimuli (i.e., they will not improve with the technology available today). New weapon developments will face similar challenges.

Under the Joint Insensitive Munitions Technology Program (JIMTP), investments are focused on five Munition Areas: High Performance Rocket Propulsion, Minimum Signature Rocket Propulsion, Blast and Fragmentation Warheads, Anti-Armor Warheads, and Large Caliber Gun Propulsion. Munition Area Technology Groups (MATGs), 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. The program is structured around these five areas with clear cross-cutting tasks.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Insensitive Munitions (IM)	14.820	14.990	14.615	0.000	14.615
This RDT&E effort is aimed at developing the enabling technologies needed to build weapons in compliance with Insensitive Munitions (IM) requirements established in statute (United States Code, Title 10, Chapter 141, Section 2389) and regulation (DoDI 5000.1 and CJCSI 3170.01F). Using technology available today, the Department has incrementally improved the IM response of our current munitions. New munitions which have fully implemented current IM technology and design practices have been able to achieve IM compliance. However, these have been the most easily solved problems. Without new technology, future variants of current weapon systems will have the same, or worse,					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602000D8Z: *Joint Munitions Technology*	**PROJECT** P000: *Insensitive Munitions*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
response to IM stimuli (i.e., they will not improve with the technology available today). New weapon developments will face similar challenges. Under the Joint Insensitive Munitions Program (JIMTP), investments are focused on five Munition Areas: High Performance Rocket Propulsion, Minimum Signature Rocket Propulsion, Blast and Fragmentation Warheads, Anti-Armor Warheads, and Large Caliber Gun Propulsion. Munition Area Technology Groups (MATGs), 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. The program is structured around these five areas with clear cross-cutting tasks. *FY 2009 Accomplishments:* (1) High Performance Rocket Propulsion: - Scaled-up and evaluated less extinguishable propellant formulations in lab-scale tests. Trade space for propellant formation has been determined. Completed synthesis of perbromate salts and transitioned to batch scale-up feasibility study under 6.3 program. - New NWC-467 has been scaled to the hundred-pound batch size and mechanical properties master curve has been generated. Propellant meets MATG I propellant metrics and Tomahawk requirements. - Methods for desensitizing oxidizers have been scaled to 100g and characterization of its properties is underway. Propellants have been manufactured and are being characterized as well. - Case venting concepts have been have been tested to determine component dimensions and functionality of proposed concepts. External mitigation methods are being evaluated for application to large diameter rocket motors. (2) Minimum Signature Rocket Propulsion: Scaled-up and assessed less sensitive propellants utilizing novel co-oxidizers/ additives in laboratory tests (aging, performance, sensitivity). Prepared pint mixes of propellant formulations using ANAzF to assess hydrogen bonding affects on sensitivity. Characterization testing of formulations is ongoing. – Utilizing novel binder chemistries, formulations have been developed to reduce thermal sensitivity through energy partitioning . Began study of binding agents to improve properties and reduce sensitivity in minimum signature propellants. (3) Blast and Fragmentation Warheads: - Feasibility of multiple novel initiation methods have been demonstrated with several EIDS materials. – Three booster formulations have been developed using novel energetic materials. Characterization testing is underway. Scaled-up high energy formulation					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602000D8Z: *Joint Munitions Technology*	**PROJECT** P000: *Insensitive Munitions*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
with missile-warhead performance and significantly reduced sensitivity. Aging study on first generation of eutectic based-insensitive explosives has been completed. Material has demonstrated significant IM improvements over previous generation fills. Began development of general purpose bomb main-charge explosive formulations and assessments in laboratory environment. (4) Anti-Armor Warheads: Demonstrated improved thermal response in pressed formulations using TPE binder systems. Assessed additional emerging binder approaches for use in anti-armor IM warheads and started initial formulation development of less-sensitive combined effects explosives. (5) Large Caliber Gun Propulsion: Down-selected propellant formulation approach and began phase II evaluation of sensitivity in laboratory environment. Conducted medium caliber demonstration of concepts for reduced sensitivity primers. For large-caliber gun propulsion cook-off, conducted instrumented ballistic simulator tests and began modification of required modeling and simulation tools. (6) Multi-area: Transitioned rocket motor venting concepts to 6.3 demonstration effort. Conducted additional scale-up and synthesis studies of LLM-105 and began formulation and synthesis work for new booster ingredient, Diaminoazoxy furazan (DAAF).					
FY 2010 Plans: (1) High Performance Rocket Propulsion: Scale-up/transition energetic formulations and technologies and transition additional rocket motor venting concepts to BA6.3 activities. Continue development of extinguishable high performance rocket propellants, finishing characterization and propellant formulation down-selection. Continue binder system alternatives assessment and scaled up production to one pint size mix. Complete energetic material coating process at 500 gram level, as well as characterization and subscale evaluations to determine the coating's influence on responses to IM thermal threats. Scale up reduced smoke propellant at the one pint scale with acceptable processing, safety, mechanical and sub scale slow cook-off properties and conduct sub scale IM tests. Conduct electrochemical manufacturing feasibility study for perbromate salts, producing 100 gram sample size and develop analytical methods to determine the concentration levels of perbromate in ammonium perchlorate matrices. Conduct large rocket motor flight termination and fast cook-off mitigation system conceptual design trade and analysis, as well as propellant confinement characterization					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602000D8Z: *Joint Munitions Technology*	**PROJECT** P000: *Insensitive Munitions*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
studies to gain insight into the remaining material strength as well as mitigation system activation criteria. (2) Minimum Signature Rocket Propulsion: Synthesize novel ingredients in multi-gram quantities for hazard analysis and ingredient compatibility testing, and generate small propellant samples for testing. Synthesize and produce to 100 gram quantity new propellant formulation that enables initial characterization testing to be completed. Incorporate novel high-nitrogen ingredients, that exhibit reduced sensitivity in various propellant formulations to determine best candidate and down-select to two candidates for further study and optimization. Use modeling and simulation to predict basic molecular properties and bond types to predict molecular stability. Demonstrate several case venting designs in composite and new cases to determine feasible approaches. Produce 1.0 kg of ANAzF, evaluate material purity and assess safety, compatibility and stability with the selected propellant binder system. Synthesize and evaluate various bonding agents' mechanical properties to improve impact response and performance. (3) Blast and Fragmentation Warheads: Conduct large scale initiation experiments with insensitive materials, to successfully demonstrate the ability to initiate the materials, and confirm it is ready for transition to 6.3 program. Complete production work of LLM-105 for subscale IM tests and novel ingredient formulation development efforts. Accomplish sensitivity testing and performance testing on specially coated materials. Identify optimal processing conditions and critical factors affecting scale-up of unique formulation, enabling production of 10 pound scale batches of mixture to enable testing of safety characteristics, performance and shock sensitivity. Complete characterization studies on first generation of eutectic based-insensitive explosives. Optimize synthesis process to produce 1.2 kg batches of a melt castable explosive and complete characterization studies. Produce 10 kg quantities of ionic liquid for characterization of detonation properties. Complete development of general purpose bomb main-charge explosive formulations and sensitivity assessments in laboratory environment. Start proof of concept and manufacturing assessment for unique missile warhead explosive. Complete materials characterization work in order to quantitatively understand the interaction of a unique sensitization method with the various materials to assist in the experimental apparatus design. (4) Anti-Armor Warheads: Assess IM characteristics and demonstrate gallon size mix processability of additional emerging binder approaches for cast cured explosives for use in anti-armor IM warheads. Conduct characterization					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602000D8Z: *Joint Munitions Technology*	**PROJECT** P000: *Insensitive Munitions*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
tests and developed screening test for use on pressed explosives. Conduct scale-up and shock sensitivity testing on energetic binders enabling validation of new small scale test process to determine binder effectiveness. Continue initial formulation development of less-sensitive combined effects explosives and complete initial IM tests. Complete evaluation of pressed explosives. Start novel coating technique evaluation for explosive materials. (5) Large Caliber Gun Propulsion: Complete phase III evaluation of sensitivity in laboratory environment of novel propellant formulation less sensitive to thermal and shock stimuli. Complete phase III propellant formulation and scale-up efforts, as well as IM testing. Transition selected propellant to BA6.3 program. Complete primer design and demonstration testing. Complete small-scale characterization and propellant formulation mixes using novel propellant binder. Conduct instrumented ballistic simulator tests and begin modification of required modeling and simulation tools for fragment impact studies.					
FY 2011 Base Plans: (1) High Performance Rocket Propulsion: Complete scale up of extinguishable high performance rocket propellants to one gallon size batches and conduct IM tests on down-selected formulation. Complete binder system alternatives assessment and scaled up production to one gallon size mix for transition to 6.3 project. Scale up energetic material coating process to 1000 gram batch and conduct subscale IM tests to determine the coating's influence on various responses. Scale up reduced smoke propellant to the 1 and 5 gallon scale with acceptable processing, safety, mechanical properties to enable small-scale motor testing and IM tests. (2) Minimum Signature Rocket Propulsion: Scale up novel ingredients to one-pint scale to conduct physical properties testing and aging studies. Synthesize and characterize new propellant to 100-gram scale to support initial IM evaluation testing. Optimize and characterize propellant reactions. Demonstrate passive venting design for slow cook-off IM test. Scale up ingredient synthesis process to produce 10 lbs of propellant. Scale-up to gallon mix batches and evaluate bonding agents in impact and shock tests to determine effectiveness. Manufacture analogue motors with selected bonding agent and conduct impact testing. (3) Blast and Fragmentation Warheads: Refinement and formulation development efforts with novel ingredients. Scale up specially coated materials to 100 gram production capability in order to characterize material					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602000D8Z: *Joint Munitions Technology*	**PROJECT** P000: *Insensitive Munitions*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
and conduct variable confinement testing. Conclude proof of concept and manufacturing studies, begin weaponization study, and demonstration of IM characteristics of unique missile warhead explosive. Design and fabricate unique sensitization method application fixture. (4) Anti-Armor Warheads: Optimize processing procedure and complete characterization studies for cast cured explosives. Validate new small scale test process to determine binder effectiveness. Complete formulation down-selection for less-sensitive combined effects explosives and IM/performance tests for two candidates. Continue IM tests for novel coating technique evaluation for explosive materials. (5) Large Caliber Gun Propulsion: Complete full-scale primer design and demonstration testing. Manufacture large-scale quantities and complete characterization and propellant formulation mixes of novel propellant binder. Conduct instrumented ballistic simulator tests and complete modification of required modeling and simulation tools for slow cook-off studies.					
Accomplishments/Planned Programs Subtotals	14.820	14.990	14.615	0.000	14.615

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
• 0603000D8Z P002: *BA 3 Insensitive Munitions Advanced Technology*	9.176	13.534	16.979	0.000	16.979	21.621	23.440	23.818	24.248	Continuing	Continuing

D. Acquisition Strategy

N/A

E. Performance Metrics

1) Transitions of technologies developed by the Program are tracked and documented using DoD/NASA Technical Readiness Level (TRL) scale.
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 TAC to determine progress, transition plans, and relevance of each project.
4) Project progress toward goals and milestones is assessed at each MATG meeting.

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense		**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602000D8Z: *Joint Munitions Technology*	**PROJECT** P000: *Insensitive Munitions*

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:** PB 2011 Office of Secretary Of Defense		**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602000D8Z: *Joint Munitions Technology*	**PROJECT** P204: *Enabling Fuze Technology*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
P204: *Enabling Fuze Technology*	0.000	3.818	7.833	0.000	7.833	7.393	5.796	6.748	7.448	Continuing	Continuing

A. Mission Description and Budget Item Justification

This RDT&E effort is aimed at developing the enabling technologies needed to provide the survivable and reliable fuzing capabilities based on needs identified in the Guidance for the Development of the Force and the Secretary of Defense Memorandum, DoD Policy on Cluster Munitions and Unintended Harm to Civilians, June 19, 2008. Fuze capability through technology advancements has generally lagged the advancements made in U.S. weapons. Particularly, shortfalls have developed in the areas of: integration with advanced weapons, miniaturization, harsh environment survivability and functionality, and smart electronics and processing. Without new technology future weapon systems, as well as current weapon systems, will fail to meet the survivability and reliability needs of the warfighter.

Under the Joint Fuze Technology Program (JFTP), investments are focused in four capability areas: Hard Target Survivable Fuzing, Tailorable Effects Weapon Fuzing, High Reliability Fuzing, and Enabling Fuze Technologies and Common Architecture. Fuze Area Technology Groups (FATGs) under tri-Service leadership are developing technology roadmaps for each capability area which will be used to guide investments based on goals consistent with the strategic guidance of the Department and shortfalls in existing weapon systems.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Enabling Fuze Technology	0.000	3.818	7.833	0.000	7.833
This RDT&E effort is aimed at developing the enabling technologies needed to provide the survivable and reliable fuzing capabilities based on needs identified in the Guidance for the Development of the Force and the Secretary of Defense Memorandum, DoD Policy on Cluster Munitions and Unintended Harm to Civilians, June 19, 2008. Fuze capability through technology advancements has generally lagged the advancements made in U.S. weapons. Particularly, shortfalls have developed in the areas of: integration with advanced weapons, miniaturization, harsh environment survivability and functionality, and smart electronics and processing. Without new technology future weapon systems, as well as current weapon systems, will fail to meet the survivability and reliability needs of the warfighter.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602000D8Z: *Joint Munitions Technology*	**PROJECT** P204: *Enabling Fuze Technology*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2010 Plans: Hard Target Fuzing (Addressing fuze survivability in harsh environments ranging from gun launch to hard target penetration): Start projects on hard target penetration weapon systems based modeling and simulation tool to determine fuze response to the weapon dynamics. Initiate solid mechanics modeling and simulation technology projects to provide accurate material properties. Begin project to create a series of experimental and modeling capabilities that will form the basis of a high speed fuze survivability protocol for testing fuzes in the boosted and high speed penetration regimes. Tailorable Effects Fuze (Addressing scalable effects weapons that will optimize lethal effects on target while minimizing collateral damage): Began development of tailorable initiation technologies including a) multi-point plug-n-play, b) lower energy detonators/initiators and c) miniaturized explosive trains and d) multi-point initiation using energetic tracks, traces or deposition. Begin work in low-voltage command/arm system for distributed fuzing systems to enable tailorable High Reliability Fuzing (Addressing need for 99% fuze reliability in cluster munitions and increasing overall fuze reliability for increased weapon effectiveness and reduced unexploded remnants of war): Develop concepts for high reliability fuze architecture for cluster munitions fuzing. Begin target detection sensor and safe and arm efforts that would provide a significant increase in the overall fuze reliability. Enabling Fuze Technologies (Addressing fuze subcomponents and technologies that provide capability across the fuzing domain): Begin development for proximity fuze sensors and electronics for detecting targets, impact, voids, and media which are highly resistant to exploitation. Initiate efforts for thin film/conformal thermal batteries for fuzing which will result in cheaper, conformal, smaller, cooler thermal batteries with higher energy/power densities.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602000D8Z: *Joint Munitions Technology*	**PROJECT** P204: *Enabling Fuze Technology*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: Hard Target Fuzing (Addressing fuze survivability in harsh environments ranging from gun launch to hard target penetration): Develop and transition underlying technologies and testing methods to define the high-speed penetration environment. Begin verification of hydrocode/EPIC 22 modeling and simulation tools via hard target weapon instrumented testing. The hard target weapon community plans to integrate the testing protocol in future boosted and high speed penetrator development programs Tailorable Effects Fuze (Addressing scalable effects weapons that will optimize lethal effects on target while minimizing collateral damage): Demonstrate and transition initial miniature fire-set components for 6.3 tailorable effects initiation warhead systems. Begin development of controllable explosive sensitivity technologies that provide the ability to selectively vary the sensitivity of energetic materials. High Reliability (Addressing need for 99% fuze reliability in cluster munitions and increasing overall fuze reliability for increased weapon effectiveness and reduced unexploded remnants of war): Plan for research, development of novel technologies for unexploded ordnance (UXO) reduction features including fuze mechanisms and initiation energetics to eliminate any unexploded ordnance. Enabling Fuze Technologies (Addressing fuze subcomponents and technologies that provide capability across the fuzing domain): Develop fuze power source technology and concepts that include functionality that precludes the inadvertent release of "stored energy" such as Micro power sources and energy harvesting components.					
Accomplishments/Planned Programs Subtotals	0.000	3.818	7.833	0.000	7.833

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602000D8Z: *Joint Munitions Technology*	**PROJECT** P204: *Enabling Fuze Technology*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
• 0603000D8Z P301: *BA 3 Enabling Fuze Advanced Technology*	0.000	0.000	3.597		3.597	5.424	6.692	7.613	8.771	Continuing	Continuing

D. Acquisition Strategy

N/A

E. Performance Metrics

1) Transitions of technologies developed by the Program are tracked and documented using DoD/NASA Technical Readiness Level(TRL) scale.
2) FATG Technology Roadmaps are prepared, evaluated, and analyzed by JFTP management and technical staff.
3) Chairman's Annual Assessments for each FATG are critically reviewed by the 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.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602228D8Z: *Historically Black Colleges and Universities and Minority Institutions (HBCU/MI)*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	4.527	66.553	15.067	0.000	15.067	15.245	15.431	15.716	16.007	Continuing	Continuing
P489: *Historically Black Colleges and Universities and Minority Institutions (HBCU/MI)*	4.527	66.553	15.067	0.000	15.067	15.245	15.431	15.716	16.007	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Historically Black Colleges and Universities and Minority Institutions (HBCU/MI) program provides support for research and collaboration with DoD facilities and personnel.

Research. 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 military laboratories or other universities.

Section 242 of the FY 2009 Authorization Report directs the Secretary of Defense to carry out an independent assessment of the DoD-wide HBCU/MI Programs. The assessment is due no later than 12 months after the enactment of this Act (October 2009). The National Academy of Sciences will conduct the independent assessment.

Exhibit R-2, **RDT&E Budget Item Justification:** PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602228D8Z: *Historically Black Colleges and Universities and Minority Institutions (HBCU/MI)*

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	15.156	15.164	0.000	0.000	0.000
Current President's Budget	4.527	66.553	15.067	0.000	15.067
Total Adjustments	-10.629	51.389	15.067	0.000	15.067
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	-0.415	0.000			
• SBIR/STTR Transfer	-1.157	0.000			
• Other Program Adjustments	-34.457	-0.543	15.067	0.000	15.067
• R&DFY09: Congressional Distributed Actions	26.400	0.000	0.000	0.000	0.000
• FY10 Congressional Add	0.000	51.932	0.000	0.000	0.000
• Departmental Adjustment to correct and balance administrative error in Prior year	-1.000	0.000	0.000	0.000	0.000

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2009	FY 2010
Project: P489: *Historically Black Colleges and Universities and Minority Institutions (HBCU/MI)*		
Congressional Add: *Morehouse College, John Hopps Program*	0.827	0.000
Congressional Add: *Defense Leadership and Technology Initiative*	0.800	0.000
Congressional Add: *Instrumentation Program for Tribal Colleges*	2.400	0.000
Congressional Add Subtotals for Project: P489	4.027	0.000
Congressional Add Totals for all Projects	4.027	0.000

Exhibit R-2, **RDT&E Budget Item Justification:** PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602228D8Z: *Historically Black Colleges and Universities and Minority Institutions (HBCU/MI)*

Change Summary Explanation

On December 8, 2009 we were advised by DOD OGC that the Department of Justice said we should go ahead with the new DOD HBCU/MI program enacted by Congress as Section 252 in the FY 2010 National Defense Authorization Act as it was implemented before it was enjoined in the Rothe court decision.

The FY 2009 HBCU/MI Program received a congressional increase in the amount of $20.000 million.
On 11/4/08, the U.S. Court of Appeals for the Federal Circuit found 10 U.S.C. 2323 to be unconstitutional.
- The case stems from a 1998 Air Force contract awarded to a minority owned firm despite another firm having bid lower. The other firm sued.
- While the case relates specifically to a small business preference authorized by 10 U.S.C. 2323, the court's decision goes to 10 U.S.C. 2323 in its entirety, which also includes:
-A goal to award 5 percent of extramural DoD funding to small disadvantaged businesses, HBCUs and minority institutions (MI)
-Authorities to provide infrastructure assistance to HBCU/MI—e.g., through undergrad, graduate, and postdoctoral education programs; DoD lab partnerships with institutions for student training purposes; and equipment or laboratory renovation for defense research.
- The court decision took effect December 26th unless DoJ/DoD ask for reconsideration or file an appeal, in which case the court likely would extend that date.
- On February 26, 2009, in Rothe Development Corp. v. U.S. Department of Defense, et. al., No. SA-98-CA-1011-XR (W.D. TX), the court entered a final judgment granting Rothe's request for a complete injunction of the application of 10 U.S.C. 2323.
- On March 10, 2009 the USD(AT&L) signed a memorandum to all of DoD stating that "Accordingly, as preliminary guidance, effective February 26, 2009, any activity, which includes but is not limited to the award of contracts and orders under contracts, advance payments, and the award of grants or scholarships or the addition of funds to existing grants and scholarships, that rely exclusively on the authority of 10 U.S.C. 2323 should cease".
- On June 18, 2009 the USD(AT&L) signed a memorandum requesting information on all activities the DoD Components have relied on 10 U.S.C. 2323 as the sole authority.
- The FY 2009 DoD HBCU/MI Program was on hold until DoD hears back from Congress and the DOJ on new legislation for the program to continue.

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense											**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*				**R-1 ITEM NOMENCLATURE** PE 0602228D8Z: *Historically Black Colleges and Universities and Minority Institutions (HBCU/MI)*				**PROJECT** P489: *Historically Black Colleges and Universities and Minority Institutions (HBCU/MI)*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P489: *Historically Black Colleges and Universities and Minority Institutions (HBCU/MI)*	4.527	66.553	15.067	0.000	15.067	15.245	15.431	15.716	16.007	Continuing	Continuing

Note

The FY 2010 NDAA reauthorized the HBCU/MI Program. Meetings will take place with the PD, DDR&E, the RD, and the PD, RD in discussing implementing the new provision. The initial step, developing a memorandum for Dr. Carter's signature that would (1) make the Components aware the new authority; (2) tie back to Mr. Young's cessation memo (March 10, 2009) and ask Components to indicate activities that they deferred based on that memo they may need to take in the near future using the new authority, e.g., incremental funding; and (3) indicate that a delegation memo and more detailed guidance will be forthcoming.

The FY 2009 HBCU/MI Program received a congressional increase in the amount of $20.000 million.
On 11/4/08, the U.S. Court of Appeals for the Federal Circuit found 10 U.S.C. 2323 to be unconstitutional.
- The case stems from a 1998 Air Force contract awarded to a minority owned firm despite another firm having bid lower. The other firm sued.
- While the case relates specifically to a small business preference authorized by 10 U.S.C. 2323, the court's decision goes to 10 U.S.C. 2323 in its entirety, which also includes:
-A goal to award 5 percent of extramural DoD funding to small disadvantaged businesses, HBCUs and minority institutions (MI).
-Authorities to provide infrastructure assistance to HBCU/MI—e.g., through undergrad, graduate, and postdoctoral education programs; DoD lab partnerships with institutions for student training purposes; and equipment or laboratory renovation for defense research.
- The court decision took effect December 26th unless DoJ/DoD ask for reconsideration or file an appeal, in which case the court likely would extend that date.
- On February 26, 2009, in Rothe Development Corp. v. U.S. Department of Defense, et. al., No. SA-98-CA-1011-XR (W.D. TX), the court entered a final judgment granting Rothe's request for a complete injunction of the application of 10 U.S.C. 2323.
- On March 10, 2009 the USD(AT&L) signed a memorandum to all of DoD stating that "Accordingly, as preliminary guidance, effective February 26, 2009, any activity, which includes but is not limited to the award of contracts and orders under contracts, advance payments, and the award of grants or scholarships or the addition of funds to existing grants and scholarships, that rely exclusively on the authority of 10 U.S.C. 2323 should cease".
- On June 18, 2009 the USD(AT&L) signed a memorandum requesting information on all activities. DoD Components have relied on 10 U.S.C. 2323 as the sole authority.
- The FY 2009 DoD HBCU/MI Program is on hold until DoD hears back from Congress and the DOJ on new legislation for the program to continue.

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense		**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602228D8Z: *Historically Black Colleges and Universities and Minority Institutions (HBCU/MI)*	**PROJECT** P489: *Historically Black Colleges and Universities and Minority Institutions (HBCU/MI)*

A. Mission Description and Budget Item Justification

The Historically Black Colleges and Universities and Minority Institutions (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 military laboratories or other universities.

Section 242 of the FY 2009 Authorization Report directs the Secretary of Defense to carry out an independent assessment of the DoD-wide HBCU/MI Programs. The assessment is due no later than 12 months after the enactment this Act (October 2009). The National Academy of Sciences will conduct the independent assessment.

On December 8, 2009 we were advised by DOD OGC that the Department of Justice said we should go ahead with the new DOD HBCU/MI program enacted by Congress as Section 252 in the FY 2010 National Defense Authorization Act as it was implemented before it was enjoined in the Rothe court decision.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Historically Black Colleges and Universities and Minority Institutions (HBCU/MI)	0.500	66.553	15.067	0.000	15.067
The Historically Black Colleges and Universities and Minority Institutions (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 military laboratories or other universities. *FY 2009 Accomplishments:* Continue evaluation and funding of research and education awards made with prior year funds. Execute new funding for grants and awards following legislative and executive policy and guidance when Congress directs. Conduct an assessment of the HBCU/MI Program. The assessment will be conducted by the National Academies of Science.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602228D8Z: *Historically Black Colleges and Universities and Minority Institutions (HBCU/MI)*	**PROJECT** P489: *Historically Black Colleges and Universities and Minority Institutions (HBCU/MI)*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
The FY 2009 Tribal Colleges and Universities congressional add for $2.400 million competition will not be conducted due to the Rothe court decision. Note: Actual Cost is 1.500, -1.000 is added in order to correct and balance Prior Year error. *FY 2010 Plans:* Conduct BAAs and solicitations to execute funding for grants and awards following legislative and executive policy and guidance when Congress directs. *FY 2011 Base Plans:* Execute as directed by Congress.					
Accomplishments/Planned Programs Subtotals	0.500	66.553	15.067	0.000	15.067

	FY 2009	FY 2010
Congressional Add: Morehouse College, John Hopps Program *FY 2009 Accomplishments:* The funds provide scholarships and a strong research curriculm, coupled with one-on-one mentoring, a summer internship program at top research institutions for students who major in the science, mathematics, and engineering fields. To date the John Hopps Defense Scholars program at Morehouse College currently supports 63 students. The first class of scholars will graduate in May 2010. Collaborations include, for example, DoD laboratories, Cornell University, MIT, Georgia Tech, Harvard, John Hopkins, University of Washington, NSFand NIH.	0.827	0.000

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense		**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602228D8Z: *Historically Black Colleges and Universities and Minority Institutions (HBCU/MI)*	**PROJECT** P489: *Historically Black Colleges and Universities and Minority Institutions (HBCU/MI)*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
FY 2010 Plans: None		
Congressional Add: Defense Leadership and Technology Initiative *FY 2009 Accomplishments:* The Thurgood Marshall College Fund continues to broaden their partnership with the DoD through this congressional add. The purpose of the grant is to strengthen technology infrastructure and training and program enhancements at HBCUs; provide internship research projects and encourage defense-related career preparation and training. The program impacts more than 50,000 students, faculty, researchers, and alumni as a national initiative. The goal is to support research studies at the HBCUs to increase and support the production of minority students in the STEM areas. *FY 2010 Plans:* None	0.800	0.000
Congressional Add: Instrumentation Program for Tribal Colleges *FY 2009 Accomplishments:* The FY 2009 Tribal Colleges and Universities congressional add for $2.400 million will be competed under 10 U.S.C. 2361 (b)(1)(C). *FY 2010 Plans:* None	2.400	0.000
Congressional Adds Subtotals	4.027	0.000

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense		**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602228D8Z: *Historically Black Colleges and Universities and Minority Institutions (HBCU/MI)*	**PROJECT** P489: *Historically Black Colleges and Universities and Minority Institutions (HBCU/MI)*

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Since 2007, the following data is collected as a grant requirement:
Percent of students graduating with undergraduate degrees in Science, Mathematics, Engineering, and Technology fields.
Percent of students pursuing graduate and Ph.D. degrees.
Number of undergraduate students achieving specified GPA average.
Number of students participating in the Centers of Excellence for Research and Engineering.
Number of students working in Defense Laboratories.
This data will constitute the "Existing Baseline" for measurement and improvement in future years.

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602234D8Z: *Lincoln Laboratory*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	29.244	33.759	32.830	0.000	32.830	33.447	33.805	33.885	34.933	Continuing	Continuing
P534: *Lincoln Laboratory*	26.122	29.782	29.547	0.000	29.547	30.102	30.425	30.497	31.440	Continuing	Continuing
P535: *Technical Intelligence*	3.122	3.977	3.283	0.000	3.283	3.345	3.380	3.388	3.493	Continuing	Continuing

A. Mission Description and Budget Item Justification

(U) The Lincoln Laboratory research line program (LL 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 funds innovations that directly lead to the development of new system concepts, new technologies, and new components and materials.

(U) The LL Program currently includes seven core technologies and four technical initiatives:
(U) Advanced Electronics Technologies, with emphasis on development of materials, devices, and subsystems utilizing microelectronic, photonic, biological, and chemical technologies to enable new system approaches to DoD sensors.
(U) Advanced Optical Communications, focusing on extremely efficient, free space optical communications links.
(U) Intelligence, Surveillance, and Reconnaisssance, including the development of novel active and passive RF and electro-optic sensors useful for intelligence, surveillance, and reconnaissance applications.
(U) Netcentric Operations, with an emphasis on developing and demonstrating the key technologies that will enable composable and dynamic multi-mission net centric operations on the Global Information Grid.
(U) Decision Support, with the goal of developing and demonstrating fundamental technologies and architectures supporting real time decisions across large, dynamic, heterogeneous data sets.
(U) Homeland Protection, with the objective of developing and demonstrating an architecture and the key technologies that support homeland protection.
(U) Counter Terrorism, aimed at developing technologies useful in the war on terrorism.
(U) Technical Initiatives, including biological sciences to aid the warfighter, promote public health, and develop tools for biological research; cybersecurity technologies to develop new techniques for the protection of systems against cyber attack and exploitation; robotics technologies with the objective of developing mobile, autonomous, robotic platforms that demonstrate key capabilities needed for a wide range of defense applications; and quantum information sciences to develop basic technologies that support the storage, transport, and computation of quantum information.

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602234D8Z: *Lincoln Laboratory*

(U) Supporting these seven core technology thrusts is a work effort titled Technical Intelligence. Technical Intelligence will support detailed understanding of technology advancement in important scientific area and other scientific disciplines such as nanotechnology, directed energy and propulsion. Some details are classified, but one effort, called Global Dialogue on Emerging Science and Technology will be jointly sponsored by DOD, Department of State, and CIA This program will give very detailed insight in such topics as Software Engineering in India, Nanotechnology in South East Asia, and European Laser development, for example. This information will in turn assist in development of U.S. capabilities.

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	31.340	34.034	0.000	0.000	0.000
Current President's Budget	29.244	33.759	32.830	0.000	32.830
Total Adjustments	-2.096	-0.275	32.830	0.000	32.830
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	-0.225	0.000			
• SBIR/STTR Transfer	-0.856	0.000			
• Balance attributed to program budget review adjustments	0.000	0.000	0.000	0.000	0.000
• OMNIBUS Reprogramming	-1.015	0.000	0.000	0.000	0.000
• Undistributed Reduction	0.000	-0.275	0.000	0.000	0.000
• Other Program Adjustments	0.000	0.000	32.830	0.000	32.830

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense											DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*				**R-1 ITEM NOMENCLATURE** PE 0602234D8Z: *Lincoln Laboratory*				**PROJECT** P534: *Lincoln Laboratory*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P534: *Lincoln Laboratory*	26.122	29.782	29.547	0.000	29.547	30.102	30.425	30.497	31.440	Continuing	Continuing

A. Mission Description and Budget Item Justification

(U) The Lincoln Laboratory program (LL 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 funds advanced research activities that directly lead to the development of new system concepts, new technologies, and new components and materials, with impact in several core technologies:

(U) Advanced Electronics Technologies, with emphasis on development of materials, devices, and subsystems utilizing microelectronic, photonic, biological, and chemical technologies to enable new system approaches to DoD sensors.
(U) Advanced Optical Communications, focusing on extremely efficient, free space optical communications links.
(U) Intelligence, Surveillance, and Reconnaissance, including the development of novel active and passive RF and electro-optic sensors useful for intelligence, surveillance, and reconnaissance applications.
(U) Netcentric Operations, with an emphasis on developing and demonstrating the key technologies that will enable composable and dynamic multi-mission net centric operations on the Global Information Grid.
(U) Decision Support, with the goal of developing and demonstrating fundamental technologies and architectures supporting real time decisions across large, dynamic, heterogeneous data sets.
(U) Homeland Protection, with the objective of developing and demonstrating an architecture and the key technologies that support homeland protection.
(U) Counter Terrorism, aimed at developing technologies useful in the war on terrorism.
(U) Technical Initiatives, including biological sciences to aid the warfighter, promote public health, and develop tools for biological research; cybersecurity technologies to develop new techniques for the protection of systems against cyber attack and exploitation; robotics technologies with the objective of developing mobile, autonomous, robotic platforms that demonstrate key capabilities needed for a wide range of defense applications; and quantum information sciences to develop basic technologies that support the storage, transport, and computation of quantum information.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Advanced Electronics Technology	7.011	6.447	6.839	0.000	6.839

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602234D8Z: *Lincoln Laboratory*	**PROJECT** P534: *Lincoln Laboratory*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: (U) Advances were made in the techniques for detecting explosive residues on people and objects. Improvements in low noise, visible CCD imagers were made along with novel imager architectures that facilitate imaging through turbulence and target tracking. *FY 2010 Plans:* (U) Develop technologies for imaging focal planes that enable new approaches to electro-optical sensors. Develop unique integrated circuit designs and processes for ultra-low power electronics, high data collection rates, or operation in stressing environments. *FY 2011 Base Plans:* (U) Continue technology development for imaging focal planes through the use of an advanced set of design and fabrication tools.					
Advanced Optical Communications *FY 2009 Accomplishments:* (U) Developed arrays of superconducting, single photon counting detectors with world record detection sensitivity for advanced optical communication systems. Demonstrated a new world record in quantum key distribution rate. *FY 2010 Plans:* (U) Develop technologies to increase the data rate of ultra sensitive communications links. Develop advanced channel equalization techniques to allow wide-band optical data transmission through scattering media. *FY 2011 Base Plans:* (U) Evaluate novel optical communication schemes to further increase the operational utility of optical communications.	3.116	2.660	2.600	0.000	2.600

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense		**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602234D8Z: *Lincoln Laboratory*	**PROJECT** P534: *Lincoln Laboratory*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Intelligence, Surveillance, and Reconnaisssance	6.736	5.260	5.260	0.000	5.260
FY 2009 Accomplishments: (U) Designed, built, and field-tested a novel multiple input-multiple output (MIMO) radar architecture. Demonstrated an ultrawide-band laser radar. Continued to develop and demonstrate advanced, infrared digital focal plane array (DFPA) readout circuitry. *FY 2010 Plans:* (U) Continue to improve sensitivity and data throughput rate of infrared digital focal plane array surveillance camera. Continue to investigate MIMO radar architectures. Develop technologies for highly integrated RF front ends, including silicon-based transceivers for use in low cost and reconfigurable RF systems. Develop novel computer architectures designed specifically for rapidly processing graph data relevant to military operations. *FY 2011 Base Plans:* (U) Investigate novel radar and electro-optic sensors to improve Department of Defense ISR capabilities.					
Net-centric Operations	1.386	1.960	1.960	0.000	1.960
FY 2009 Accomplishments: (U) Automated net-centric operations (NCO) processes, including service composition. Worked on data integration techniques. Demonstrated NCO in a large scale field experiment. *FY 2010 Plans:* (U) Continue with the development of advanced, automated services and architectural features for net-centric operations. Demonstrate a second large scale field experiment incorporating additional NCO services.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602234D8Z: *Lincoln Laboratory*	**PROJECT** P534: *Lincoln Laboratory*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: (U) Continue to add advanced architectural features and services useful for NCO.					
Counter Terrorism Technologies *FY 2009 Accomplishments:* (U) Developed advanced social network graph building tools to aid in discovering terrorist networks. Developed advanced, low power, RF receivers. *FY 2010 Plans:* (U) Continue development of novel UAV sensing and wide-band communications systems. Demonstrate a system that employs a family of low cost, miniature, ground-based sensors. Evaluate automated software tools for terrorist threat network analysis and tracking. *FY 2011 Base Plans:* (U) Demonstrate sensors for miniature UAVs and increasingly sophisticated social network graph building tools.	2.266	2.660	2.660	0.000	2.660
Decision Support *FY 2009 Accomplishments:* (U) Used Intelligence, surveillance, and reconnaissance-data from a computer-generated tactical scenario and conducted an integrated laboratory decision-support experiment. *FY 2010 Plans:* (U) Demonstrate an integrated multi-source information and knowledge management architecture to provide decision support for military applications. Explore conceptual architectures for the human-machine interface.	2.871	3.380	3.380	0.000	3.380

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602234D8Z: *Lincoln Laboratory*	**PROJECT** P534: *Lincoln Laboratory*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: (U) Continue to develop and test knowledge building tools to facilitate decision support for the military.					
Homeland Protection *FY 2009 Accomplishments:* (U) Developed a sensing, communications, and control architecture that will revolutionize the response to homeland disasters. Evaluated video processing technologies to support semi-automated surveillance. *FY 2010 Plans:* (U) Complete a communications and sensor network that supports national response to homeland disasters. Develop and test advanced video technologies to provide critical infrastructure surveillance. *FY 2011 Base Plans:* (U) Expand the critical infrastructure protection effort to include multi-camera tracking and forensics.	2.736	2.365	2.365	0.000	2.365
Technical Initiatives *FY 2010 Plans:* (U) Work in biological sciences will focus on developing field diagnostics, gene synthesis, and biomarkers for depression. Efforts in cyber security technologies will concentrate on building a next-generation cyber warfare test range, developing the concept of an open architecture anti-tamper system, and creating an automated cyber mission risk assessment tool. The robotic technologies objectives include demonstrating cooperative interior mapping using two autonomous robots and initiating development of a mobile ground robot capable of acting as a convoy lead. The quantum information science goals include demonstrating long range quantum information transmission and initial development of improved quantum information storage mechanisms.	0.000	5.050	4.483	0.000	4.483

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602234D8Z: *Lincoln Laboratory*	**PROJECT** P534: *Lincoln Laboratory*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: (U) Evaluate performance of multi-analyte, field diagnostic platforms and describe the instrumentation needed to characterize whole body trauma effects on brain injury. Demonstrate advanced cyber warfare test range and cyber mission risk assessment tools. Demonstrate utility of an open architecture anti-tamper hardware. Demonstrate robot convoy leader functions and begin development of cognitive robot architecture and algorithms. Develop several quantum information science technologies with improved qubit coherence time for quantum information storage and computation.					
Accomplishments/Planned Programs Subtotals	26.122	29.782	29.547	0.000	29.547

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense											DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*				R-1 ITEM NOMENCLATURE PE 0602234D8Z: *Lincoln Laboratory*				PROJECT P535: *Technical Intelligence*			
COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
P535: *Technical Intelligence*	3.122	3.977	3.283	0.000	3.283	3.345	3.380	3.388	3.493	Continuing	Continuing

A. Mission Description and Budget Item Justification

Technical Intelligence supports five core technology thrusts that combine efforts in two areas: 1) from the university community through the JASONs (this is not an acronym) program and 2) through information on maturation and development of technology throughout the rest of the world.

(U) JASONs is a group of approximately 65 appropriately cleared experts who provide detailed independent technical assessment of the most difficult technological problems. JASON members are mostly fully tenured professors in physics, mathematics, biosciences, and engineering, and hold active SCI-level clearances. Output from JASON studies are provided across the leadership and program manager levels and their studies shape programmatic and technical decisions involving millions of dollars. JASONs were previously funded through university research programs, but their level of technology maturity is appropriate for incorporation into Applied Research.

(U) The technical intelligence program will support collaborative work with the U.S. federal intelligence community on emerging and disruptive technologies, primarily through further development of the Science and Technology Net Assessment studies, which assess a select set of technologies from both a domestic and foreign development perspective. The program will also support focused technology and regional trend studies and collaborative work with international partner nations on assessments of emerging and disruptive technology and its application. The technical intelligence program will also support development of information technology based tools that enable collaborative analysis of emerging and disruptive technologies.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Technical Intelligence	3.122	3.977	3.283	0.000	3.283
FY 2009 Accomplishments: (U) Continue to focus the JASON studies and Technical Intelligence in areas critical to national security. JASON studies will be focused depending on the area most important in the security environment at the time. For the Technical Intelligence portion; additional country specific S&T sector reports will be commissioned in by the Library of Congress Federal Research Division and					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602234D8Z: *Lincoln Laboratory*	**PROJECT** P535: *Technical Intelligence*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
finalized. In support of continued efforts to characterize technology trends and forecast the map of the future science and technology landscape, this program will continue the National Academies project to forecast future disruptive technology and will sponsor several conferences in countries and technologies of interest. This program will participate in a tri-lateral arrangement with the United Kingdom and Australia to assess emerging and disruptive technology and will contribute to generation of tri-lateral research products on technology implications. The program will continue the efforts of two National Academy of Sciences projects under the National Research Council, one called Forecasting Future Disruptive Technology to identify national security impacts of forecasted technologies, and the Board on Global Science and Technology to increase understanding of international perspectives on emerging S&T. In coordination with the National Intelligence Committee effort to Strengthen Science and Technology Analysis, this program will coordinate, and develop processes and mechanisms to integrate and coherently track defense S&T intelligence requirements and will conduct S&T net technical assessments in several areas such as energetic materials, micro-electronics, information assurance and neuroscience.					
FY 2010 Plans: (U) Continue to focus the JASON studies and Technical Intelligence in areas critical to national security. JASON studies will be focused depending on the area most important in the security environment at the time. For the Technical Intelligence portion some details are classified. The program will conduct S&T net technical assessments on global technology advancement in collaboration with the National S&T Intelligence Committee in the areas such as electronic warfare, hypersonic aeronautics and others as identified by the S&T net assessment program in FY 2009. This program will continue tri-lateral collaboration with the United Kingdom and Australia to continue assessments on emerging and disruptive technology and will contribute to an international conference. The program will continue the effort of a National Academy of Sciences project under the National Research Council called Forecasting Future Disruptive Technology to identify national security impacts of forecasted technologies, will sponsor several conferences in countries and technologies of interest, and will conducted a future technology war-game at the National Defense University, focused on the					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602234D8Z: *Lincoln Laboratory*	**PROJECT** P535: *Technical Intelligence*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
potential disruptive impact of commercially available technologies. In coordination with the National Intelligence Committee and the Defense Intelligence Community effort to Strengthen Science and Technology Analysis, this program will initiate the implementation of a structured enterprise approach to determine, prioritize, track, distribute and evaluate S&T intelligence requirement and will generate a report on the health of Defense S&T Intelligence to support the defense S&T program. Country specific reports by the Library of Congress Federal Research Division commissioned in FY 2009 will be finalized, additional reports will be commissioned and the program will initiate development of Web 2.0 based information technology solutions geared to increase global technology awareness.					
FY 2011 Base Plans: (U) Continue to focus the JASON studies and Technical Intelligence in areas critical to national security. JASON studies will be focused depending on the area most important in the security environment at the time. For the Technical Intelligence portion some details are classified. The program will conduct S&T net technical assessments on global technology advancement in collaboration with the National S&T Intelligence Committee in the areas such as electronic warfare, hypersonic aeronautics and others as identified by the S&T net assessment program in FY 2009. This program will continue tri-lateral collaboration with the United Kingdom and Australia to continue assessments on emerging and disruptive technology and will contribute to an international conference. The program will continue the effort of a National Academy of Sciences project under the National Research Council called Forecasting Future Disruptive Technology to identify national security impacts of forecasted technologies, will sponsor several conferences in countries and technologies of interest, and will conducted a future technology war-game at the National Defense University, focused on the potential disruptive impact of commercially available technologies. In coordination with the National Intelligence Committee and the Defense Intelligence Community effort to Strengthen Science and Technology Analysis, this program will initiate the implementation of a structured enterprise approach to determine, prioritize, track, distribute and evaluate S&T intelligence requirement and will generate a report on the health of Defense S&T Intelligence to support the defense S&T program. Country specific reports by the Library of Congress Federal Research Division commissioned in FY 2009 will					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602234D8Z: *Lincoln Laboratory*	**PROJECT** P535: *Technical Intelligence*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
be finalized, additional reports will be commissioned and the program will initiate development of Web 2.0 based information technology solutions geared to increase global technology awareness.					
Accomplishments/Planned Programs Subtotals	3.122	3.977	3.283	0.000	3.283

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602663D8Z: *Joint Data Management Research*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	0.000	0.000	3.261	0.000	3.261	3.640	3.060	3.342	3.432	Continuing	Continuing
P266: *Joint Data Management Research*	0.000	0.000	3.261	0.000	3.261	3.640	3.060	3.342	3.432	Continuing	Continuing

A. Mission Description and Budget Item Justification

This is a new start program.

(U) As the Department of Defense increases the capability and capacity to generate increasing amounts of data from numerous sensors in the battlespace, the issue of handling very large data sets has become more challenging. This is in part due to Department of Defense response to a changing threat environment where there is an expansion of the types of sensors deployed, new types of information collected, and different features used to classify these new threats. From a technical perspective, sensor processing speeds have outpaced the speed and ability to transport, store and process the data created. Science and technology investigation into new and novel ways to manage and exploit this data is required to more efficiently use sensor assets and effectively use information in a timely fashion.

(U) This applied research program will explore ways to apply emerging mathematics and information sciences to improve machine processing of large amounts of data beyond simple data processing and information distillation. This level of automated processing must lead to a better understanding of the information presented at higher levels of decision making. As a part of this effort, the development of challenge problems will be established to define metrics in the way data and decision problems are solved (inference, prediction, analysis). The metrics, models and methods that result from this definitional work will be validated through warfighter and analyst demonstrations and experiments. Successful results will be measured in a reduced time to access information, reduced time to effect a decision, less information handling required, and redefining operational processes.

Exhibit R-2, **RDT&E Budget Item Justification:** PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602663D8Z: *Joint Data Management Research*

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	0.000	4.940	0.000	0.000	0.000
Current President's Budget	0.000	0.000	3.261	0.000	3.261
Total Adjustments	0.000	-4.940	3.261	0.000	3.261
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Program Adjustments	0.000	-4.940	3.261	0.000	3.261

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense											DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*				R-1 ITEM NOMENCLATURE PE 0602663D8Z: *Joint Data Management Research*				PROJECT P266: *Joint Data Management Research*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P266: *Joint Data Management Research*	0.000	0.000	3.261	0.000	3.261	3.640	3.060	3.342	3.432	Continuing	Continuing

A. Mission Description and Budget Item Justification

This is a new start program.

(U) Data Shaping for Exploitation – When tracing the information processing chain from the sensor inputs to the user/analysts, the automated techniques that are known and can be applied become fewer and less mature. The simple information process chain goes from (1) data tagging to (2) pre-processing to (3) multi-source common data representation to (4) triage/identify high priority data subsets for analysis and action. Candidate research topics to be explored include pattern analysis, data classification for importance and prioritization, criticality assessment, change detection, uncertainty management and reduction, high level structures, data search and retrieval, feature extraction, automatic translation, and automated or assisted pattern recognition.

(U) Data Discovery for Exploitation – In order to better discover and exploit the growing amount of sensor data, the following areas of research are considered: object recognition in scenes and streams, discovery and exploitation at the edge, structuring knowledge for discovery, improving analytic throughput, aiding ISR functions, layered analysis and interpretation, effects prediction for decision support, and cross domain access for effective ISR.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Data Shaping for Exploitation When tracing the information processing chain from the sensor inputs to the user/analysts, the automated techniques that are known and can be applied become fewer and less mature. The simple information process chain goes from (1) data tagging to (2) pre-processing to (3) multi-source common data representation to (4) triage/identify high priority data subsets for analysis and action. Candidate research topics to be explored include pattern analysis, data classification for importance and prioritization, criticality assessment, change detection, uncertainty management and reduction, high	0.000	0.000	2.482	0.000	2.482

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602663D8Z: *Joint Data Management Research*	**PROJECT** P266: *Joint Data Management Research*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
level structures, data search and retrieval, feature extraction, automatic translation, and automated or assisted pattern recognition. Program Outputs and Efficiencies – (U) Increased awareness of the underlying assumptions and error propagation for sensor information processing pipelines. Streamline sensor data to user timelines. *FY 2011 Base Plans:* (U) Initiate applied research in candidate areas. Evaluate potential candidates for transition into experimentation and demonstration.					
Data Discovery for Exploitation In order to better to discover and exploit the growing amount of sensor data, the following areas of research are considered: Object recognition in scenes and streams, discovery and exploitation at the edge, structuring knowledge for discovery, improving analytic throughput, aiding ISR functions, layered analysis and interpretation, effects prediction for decision support and cross domain access for effective ISR. Program Outputs and Efficiencies – (U) Determine areas where activity modeling and advanced sensor cueing will accelerate user awareness of the information available. *FY 2011 Base Plans:* (U) Initiate applied research in candidate areas. Evaluate potential candidates for transition into experimentation and demonstration.	0.000	0.000	0.779	0.000	0.779
Accomplishments/Planned Programs Subtotals	0.000	0.000	3.261	0.000	3.261

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense		**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602663D8Z: *Joint Data Management Research*	**PROJECT** P266: *Joint Data Management Research*

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602668D8Z: *Cyber Security Research*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	0.000	0.000	10.000	0.000	10.000	10.000	20.000	20.000	10.000	Continuing	Continuing
P003: *Cyber Security Research*	0.000	0.000	10.000	0.000	10.000	10.000	20.000	20.000	10.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

This is a new start program.

The urgency and criticality of improving Cyber Security for the Department of Defense (DoD) and Intelligence Communities (IC) is highlighted by the release of the President's Cyberspace Policy Review. Our cyber defenses must provide mission assurance during cyber attacks on our operations throughout the world. Adversaries are increasingly sophisticated and growing in number, and the DoD and IC need more options to operate and fight in cyberspace.

This PE will conduct research and explore new and novel game-changing ideas over the full spectrum of computer network operations. Research will lead to a better understanding of the cyber threat and the mitigation of the threat; explore and exploit new concepts and ideas in cyber warfare; establish new analytical methodologies, develop models and experimental data for improving cyber security metrics; and develop technology options for improved operations in cyber space. The Cyber Security Advanced Technology Development PE will transition results of this research into demonstrations of improved capabilities to conduct full spectrum cyber operations.

Exhibit R-2, **RDT&E Budget Item Justification:** PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602668D8Z: *Cyber Security Research*

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	10.000	0.000	10.000
Total Adjustments	0.000	0.000	10.000	0.000	10.000
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Program Adjustments	0.000	0.000	10.000	0.000	10.000

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense											DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*				R-1 ITEM NOMENCLATURE PE 0602668D8Z: *Cyber Security Research*				PROJECT P003: *Cyber Security Research*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P003: *Cyber Security Research*	0.000	0.000	10.000	0.000	10.000	10.000	20.000	20.000	10.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

This is a new start program.

The urgency and criticality of improving Cyber Security for the Department of Defense (DoD) and Intelligence Communities (IC) is highlighted by the release of the President's Cyberspace Policy Review. Our cyber defenses must provide mission assurance during cyber attacks on our operations throughout the world. Adversaries are increasingly sophisticated and growing in number, and the DoD and IC need more options to operate and fight in cyberspace.

This PE will conduct research and explore new and novel game-changing ideas over the full spectrum of computer network operations. Research will lead to a better understanding of the cyber threat and the mitigation of the threat; explore and exploit new concepts and ideas in cyber warfare; establish new analytical methodologies, develop models and experimental data for improving cyber security metrics; and develop technology options for improved operations in cyber space. The Cyber Security Advanced Technology Development PE will transition results of this research into demonstrations of improved capabilities to conduct full spectrum cyber operations.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Cyber Security Research *FY 2011 Base Plans:* This is a new start program and project plans for FY 2011 and beyond will be developed by the Director, Defense Research & Engineering (DDR&E) for execution by DoD components. This process will be conducted using the established Information Assurance and Computer Security Steering Council chartered by DDR&E which has representation from DoD components conducting cyber operations research.	0.000	0.000	10.000	0.000	10.000
Accomplishments/Planned Programs Subtotals	0.000	0.000	10.000	0.000	10.000

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense		**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602668D8Z: *Cyber Security Research*	**PROJECT** P003: *Cyber Security Research*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
• PE 0603668D8Z, BA 3: *Cyber Security Advanced Technology Development*	0.000	0.000	10.000		10.000	20.000	30.000	30.000	40.000	Continuing	Continuing

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602670D8Z: *Human, Social and Culture Behavior (HSCB) Modeling Applied Research*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	8.063	7.882	9.499	0.000	9.499	15.843	17.991	18.322	18.662	Continuing	Continuing
P270: *Human, Social and Culture Behavior (HSCB) Modeling Applied Research*	8.063	7.882	9.499	0.000	9.499	15.843	17.991	18.322	18.662	Continuing	Continuing

A. Mission Description and Budget Item Justification

The HSCB Modeling Program is a vertically integrated effort to research, develop, and transition technologies, tools, and systems to programs of record and users in need. Under three integrated PEs, the Program will conduct applied research (6.2), which will then be matured and demonstrated (6.3), and the results then tested and transitioned (6.4). This HSCB line item is focused on applied research, developing an applied science base and general-use, cross-domain capabilities/tools to support the HSCB application domains of analysis, operational planning, training, and operations experimentation (wargaming). The work will focus on computational/analytical socio-cultural data collection, theory development, and application methodologies and tools. It will create software tools that will help intelligence analysts, operations analysts, operations planners, and wargamers represent, understand, and forecast socio-cultural behavior at the strategic, operational and tactical levels. It will provide: data infrastructure/frameworks that will facilitate subsequent model development and validation; human behavior based theory for DoD-relevant models; visualization infrastructures to rapidly assess the human terrain at strategic to tactical levels; and situation-relevant education and training tools for disparate user communities.

Database Infrastructure/Framework will facilitate subsequent model development and validation.

Human behavior based theory for DoD-relevant models will support development of software to help decision makers represent, understand, and forecast socio-cultural behavior at the strategic, tactical and operational levels.

Visualization Infrastructure will support rapid assessment of the human terrain at strategic to tactical levels.

Situation-relevant education and training tools will focus on computational/analytical socio-cultural data collection, theory development, and application methodologies and tools.

Exhibit R-2, **RDT&E Budget Item Justification:** PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602670D8Z: *Human, Social and Culture Behavior (HSCB) Modeling Applied Research*

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	7.685	9.446	0.000	0.000	0.000
Current President's Budget	8.063	7.882	9.499	0.000	9.499
Total Adjustments	0.378	-1.564	9.499	0.000	9.499
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	0.988	0.000			
• SBIR/STTR Transfer	-0.204	0.000			
• Other Program Adjustments	-0.406	-1.564	9.499	0.000	9.499

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense											**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*				**R-1 ITEM NOMENCLATURE** PE 0602670D8Z: *Human, Social and Culture Behavior (HSCB) Modeling Applied Research*				**PROJECT** P270: *Human, Social and Culture Behavior (HSCB) Modeling Applied Research*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P270: *Human, Social and Culture Behavior (HSCB) Modeling Applied Research*	8.063	7.882	9.499	0.000	9.499	15.843	17.991	18.322	18.662	Continuing	Continuing

A. Mission Description and Budget Item Justification

The HSCB Modeling Program is a vertically integrated effort to research, develop, and transition technologies, tools, and systems to programs of record and users in need. Under three integrated PEs, the Program will conduct applied research (6.2), which will then be matured and demonstrated (6.3), and the results then tested and transitioned (6.4). This HSCB line item is focused on applied research, developing an applied science base and general-use, cross-domain capabilities/tools to support the HSCB application domains of analysis, operational planning, training, and operations experimentation (wargaming). The work will focus on computational/analytical socio-cultural data collection, theory development, and application methodologies and tools. It will create software tools that will help intelligence analysts, operations analysts, operations planners, and wargamers represent, understand, and forecast socio-cultural behavior at the strategic, operational and tactical levels. It will provide: data infrastructure/frameworks that will facilitate subsequent model development and validation; human behavior based theory for DoD-relevant models; visualization infrastructures to rapidly assess the human terrain at strategic to tactical levels; and situation-relevant education and training tools for disparate user communities.

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Situation-relevant education and training tools will focus on computational/analytical socio-cultural data collection, theory development, and application methodologies and tools.

B. Accomplishments/Planned Program ($ in Millions)

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602670D8Z: *Human, Social and Culture Behavior (HSCB) Modeling Applied Research*	**PROJECT** P270: *Human, Social and Culture Behavior (HSCB) Modeling Applied Research*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Data Infrastructure/Framework	1.818	2.473	3.875	0.000	3.875

Generate functional architectures for managing and disseminating socio-cultural data, information and analysis products vertically and horizontally within DoD. Develop strategies to collect cultural and societal information in denied or difficult to penetrate areas. Develop hand-held/portable tools to collect cultural and societal information.

FY 2009 Accomplishments:
Developed technologies capable of collecting, storing, normalizing data and establishing semantic translation for mapping relevant data to common schema. This provides DoD with the capability to broadly disseminate socio-cultural data across operational levels (strategic to tactical) and between user communities (Intelligence, Influence Operations, Planners). Developed architecture that is model agnostic and supportive of multiple HSCB technologies working in concert.

FY 2010 Plans:
Develop technologies capable of extracting relevant data into databases for further modeling to support denied, restricted, or unavailable area socio-cultural data. Develop technologies capable of leveraging extracted data (e.g. from surveys), and processing and validating it. Develop technologies in which data can be ascribed a measure of veracity and with evidentiary value such that the data is broadly useful as it perpetuates throughout the system. Examine the use of general use metadata technologies for multipurpose/multimodal applications. Research and develop model architectures to incorporate emerging theoretic constructs and technologies.

FY 2011 Base Plans:
Continue to mature technologies capable of extracting relevant data into databases for further modeling to support denied, restricted, or unavailable area socio-cultural data. Continue development of technologies capable of leveraging extracted data (e.g. from surveys), and processing and validating it. Develop and demonstrate an integrated set of model description data (metadata), information systems, and procedures that will facilitate assessing the software engineering quality of

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602670D8Z: *Human, Social and Culture Behavior (HSCB) Modeling Applied Research*	**PROJECT** P270: *Human, Social and Culture Behavior (HSCB) Modeling Applied Research*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
socio-cultural behavior models, their theoretical foundation and the translation of theory into model constructs.					
Human Behavior Based Theory for DoD Models	2.758	3.298	3.875	0.000	3.875
Conduct the research necessary to develop and refine theoretical constructs and validate them using empirical data. Apply validation techniques across the spectrum of applications (Intelligence, Influence Operations, Planning) to quantitative models of socio-cultural factors in coalition warfare and socio-cultural factors of military significance for emerging conflicts. Develop a human behavior modeling framework that is independent of specific socio-cultural values, attitudes and beliefs. *FY 2009 Accomplishments:* Most models and forecasting tools are built upon experiences in a single region, a single coalition force, etc. and are not generalizable to other regions. In FY09, the program developed both more detailed and validated limited scope models as well as more generalizable models and tools that can be reused for other regions of interest, allowing DoD to give more consideration to human, social and cultural factors in early (Phase 0) planning. *FY 2010 Plans:* Focus on the application of hybrid modeling environments where hybrid means using a combination of the major modeling modalities (systems dynamics, game theoretic and agent). Develop the theory to support hybrid, generalizable models across the spectrum from tactical to operational to strategic. Research the effectiveness of generalizable models at the tactical, operational and strategic levels and determine the data fidelity requirements for each level of modeling. Conduct the research necessary to more fully understand the socio-cultural factors influencing model outputs. *FY 2011 Base Plans:* Continue application of hybrid modeling environments where hybrid means using a combination of the major modeling modalities (systems dynamics, game theoretic and agent). Continue to develop					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602670D8Z: *Human, Social and Culture Behavior (HSCB) Modeling Applied Research*	**PROJECT** P270: *Human, Social and Culture Behavior (HSCB) Modeling Applied Research*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
the theory to support hybrid, generalizable models across the spectrum from tactical to operational to strategic. Continue to research the effectiveness of generalizable models at the tactical, operational and strategic levels and determine the data fidelity requirements for each level of modeling.					
Situationally-Relevant Education and Training Tools	1.162	0.875	0.922	0.000	0.922
Develop prototypes capable of using flexible underlying cultural models for training at the operational/ tactical level. Training prototypes will be focused on relevant operational scenarios (e.g., negotiation with Middle-Eastern civilian and military forces). *FY 2009 Accomplishments:* Tactical to strategic level kinetic and non-kinetic actions can have a large impact on green force behaviors and beliefs. Developed technologies, models, and skills training to increase operational effectiveness through the rapid integration of socio-cultural factors into social influence tactics and information operations in current military conflicts. The goal is to accelerate the development of nontraditional, field capable technologies that enable the training/mission rehearsal of non-technical, adaptive skills related to cultural understanding, interpersonal communication, and teamwork. *FY 2010 Plans:* Tactical, Operational and Strategic level non-kinetic actions can be a large force multiplier. The work will develop technologies, models, and skills training to focus on the insertion of technologies to support COCOM and operational level training for planners who will need to integrate socio-cultural factors into operational planning (allowing for the planning, software execution, and rehearsal of certain non-kinetic operations). *FY 2011 Base Plans:* In addition to continuing to develop tools to support integration of socio-cultural factors into planning, the FY11 program will identify remaining education/training gaps and research tools and techniques					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
for filling them. Expected focus will include leveraging serious gaming techniques for virtual training and mission rehearsal.					
Visualization Infrastructure	1.178	1.236	0.827	0.000	0.827
Develop common categorization of meta-information (i.e., the data source and pedigree, what types of uncertainty are associated with it, how old is the data, etc.) in existing visualization tools/decision aiding systems. Develop methods for visually and digitally depicting the incomplete, subjective, volatile, and/or imprecise nature of cultural information to support manual and automated analysis. *FY 2009 Accomplishments:* Developed visualization methods for displaying uncertainty in common geospatial tools currently used by DoD. The dynamic complexity of human behavior, beliefs and cultures means that there will always be some level of uncertainty to forecasting and mapping the human terrain. It is vital to accurately represent this degree of uncertainty in geospatial toolsets, decision aids, etc. Developed generalizable methods/tools for displaying this uncertainty. *FY 2010 Plans:* Develop visualization tools and infrastructures that display hybrid data sources such as geospatial layers, person and group relationships, and related socio-cultural data in ways that are easy for the user to assimilate and that address how evidence is created using provided data and how uncertainty propagates throughout the system. Incorporate visualization tools into broader modeling toolkits for more effective use. *FY 2011 Base Plans:* Continue development of visualization infrastructure that displays hybrid data sources. Expected focus will include research of visualization capability that will provide end-to-end support for commanders at all levels for operational planning and effects assessment.					
Military Photomedicine	1.147	0.000	0.000	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Research and development projects focusing on Photomedicine solutions to several medical problems of wounded warriors. Projects include: Conduits for Damaged or Missing Nerve Repair; Normalization of Severe Wound Scars; and Traumatic Brain Injury - Mechanism of Treatment by Non-invasive Near-Infrared Light. *FY 2009 Accomplishments:* Conducted human studies to develop photochemical tissue bonding for specific military needs including eye, skin, tendon, and nerve damage. Continued development of nerve conduits, preclinical studies and design of a portable laser activator to be used in military medicine. Performed optimization studies on fractional laser resurfacing as a means to remodel skin tissue and clinically modify and reduce scarring. Analyzed the exposure of near-infrared light as a reduction or prevention to loss of brain neurons following traumatic head injury. Performed preclinical studies to understand and optimize its potential treatment for traumatic brain injury.					
Accomplishments/Planned Programs Subtotals	8.063	7.882	9.499	0.000	9.499

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
• PE 0603670D8Z BA 3 : *HSCB Advanced Development*	8.443	10.395	11.510		11.510	19.187	21.765	22.119	22.513	Continuing	Continuing
• PE 0604670D8Z BA 4 : *HSCB Research and Engineering*	5.392	6.950	7.459		7.459	12.206	14.759	14.983	15.206	Continuing	Continuing

D. Acquisition Strategy

N/A

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense		**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602670D8Z: *Human, Social and Culture Behavior (HSCB) Modeling Applied Research*	**PROJECT** P270: *Human, Social and Culture Behavior (HSCB) Modeling Applied Research*

E. Performance Metrics

N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603000D8Z: *Joint Munitions Advanced Technology*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	9.176	13.534	20.556	0.000	20.556	27.045	30.132	31.431	33.019	Continuing	Continuing
P002: *Insensitive Munitions Advanced Technology*	9.176	13.534	16.979	0.000	16.979	21.621	23.440	23.818	24.248	Continuing	Continuing
P301: *Enabling Fuze Advanced Technology*	0.000	0.000	3.577	0.000	3.577	5.424	6.692	7.613	8.771	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 Program Managers as they develop their specific weapon programs. The program invests in and demonstrates technologies from a Joint Service perspective, thus insuring the development of technology with the broadest applicability while avoiding duplication of efforts.

This effort will demonstrate enabling technologies needed to develop weapons in compliance with Insensitive Munitions (IM) requirements established in United States Code, Title 10, Chapter 141, Section 2389 and DoDI 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 Program Executive Office (PEO) IM Strategic Plans. In this way, promising formulations, ingredients, case technologies, liners and coatings can be integrated into a munition configuration and its ability to improve the IM response can be validated. Mature IM technology can be transitioned, thereby decreasing their program costs and schedule risk, and facilitating their spin-off into other non-compliant munitions within their portfolios.

This 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 to Civilians, and shortfalls in current weapon systems. This effort will take promising technologies demonstrated at the laboratory scale and transition them into demonstration programs utilizing generic hardware 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 a munition configuration and its ability to address required capability needs can be validated. Mature fuze technology can be transitioned, thereby decreasing program costs and schedule risk and facilitating their spin-off into other munitions within their portfolios.

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603000D8Z: *Joint Munitions Advanced Technology*

Under the Joint IM Technology Program (JIMTP), investments are focused on specific munition areas that have been identified by the S&T community and validated by the technology needs identified in the IM Strategic Plans submitted by the PEOs. These five munitions areas are: 1) high performance rocket propulsion, 2) minimum smoke rocket propulsion, 3) large caliber gun propulsion, 4) anti-armor warheads, and 5) blast and fragmentation warheads.

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 will be validated by the PEOs and the Heads of the Service S&T communities. These four capability areas are: 1) Hard Target Survivable Fuzing, 2) Tailorable Effects Weapon Fuzing, 3) High Reliability Fuzing, 4) and Enabling Fuze Technologies and Common Architecture.

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 five-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 IM Strategic Plans / Fuze Technology Development Plan, and 4) interfacing with other MATGs / FATGs and IM / fuze science and technology projects as appropriate. The JIMTP and JFTP will utilize a Technical Advisory Committee (TAC) (consisting of senior DoD and DOE laboratory representatives and senior Munitions PEO representatives) to provide program oversight, policy, direction and priorities during its annual meeting.

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	9.970	23.538	0.000	0.000	0.000
Current President's Budget	9.176	13.534	20.556	0.000	20.556
Total Adjustments	-0.794	-10.004	20.556	0.000	20.556
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		-9.894			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	-0.679	0.000			
• SBIR/STTR Transfer	-0.041	0.000			
• Program Review Adjustment	-0.074	0.000	20.556	0.000	20.556
• Other	0.000	-0.110	0.000	0.000	0.000

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense											**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				**R-1 ITEM NOMENCLATURE** PE 0603000D8Z: *Joint Munitions Advanced Technology*				**PROJECT** P002: *Insensitive Munitions Advanced Technology*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P002: *Insensitive Munitions Advanced Technology*	9.176	13.534	16.979	0.000	16.979	21.621	23.440	23.818	24.248	Continuing	Continuing

A. Mission Description and Budget Item Justification

This RDT&E effort will demonstrate enabling technologies needed to develop weapons in compliance with Insensitive Munitions (IM) requirements established in United States Code, Title 10, Chapter 141, Section 2389 and DoDI 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 Program Executive Officer (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.

Under the Joint Insensitive Munitions Program (JIMTP), investments are focused on five Munition Areas: High Performance Rocket Propulsion, Minimum Signature Rocket Propulsion, Blast and Fragmentation Warheads, Anti-Armor Warheads, and Large Caliber Gun Propulsion. Munition Area Technology Groups (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 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 Program ($ in Millions)

	FY 2009	**FY 2010**	**FY 2011 Base**	**FY 2011 OCO**	**FY 2011 Total**
Insensitive Munitions Advanced Technology Development	9.176	13.534	16.979	0.000	16.979
This RDT&E effort will demonstrate enabling technologies needed to develop weapons in compliance with Insensitive Munitions (IM) requirements established in United States Code, Title 10, Chapter 141, Section 2389 and DoDI 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 Program Executive Officer (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.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603000D8Z: *Joint Munitions Advanced Technology*	**PROJECT** P002: *Insensitive Munitions Advanced Technology*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Under the Joint Insensitive Munitions Program (JIMTP), investments are focused on five Munition Areas: High Performance Rocket Propulsion, Minimum Signature Rocket Propulsion, Blast and Fragmentation Warheads, Anti-Armor Warheads, and Large Caliber Gun Propulsion. Munition Area Technology Groups (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 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. *FY 2009 Accomplishments:* (1) High Performance/Minimum Signature Rocket Propulsion: Fabricated and performed initial structural and baseline IM tests on demonstration rocket motors for minimum signature and high-performance rocket applications. Scaled-up high-performance composite propellant (transitioned from 6.2 program), for Tomahawk class motors, to 30 gallon batch for producibility. Feasibility of including mitigation technologies has been demonstrated on Phase 1 Air-to-Air Missile Rocket Motor Case. Demonstrated high-performance composite propellant IM response and ballistic performance in sub-scale analogue motors. (2) Blast Fragment Warheads: Completed IM and performance demonstration and transitioned IM compliant TNT replacement explosive for artillery applications. Conducted full-scale 500-lb size environmental testing on the reactive liner concept. Down-selected explosive formulation and conducted sub-scale IM demonstrations showing reactive liner benefit for preventing sympathetic detonation. Demonstrated novel warhead concept to reduce response level to impact by fragments, transitioning to BA6.4. (3) Anti-Armor Warheads: Completed proof of principal IM testing for liner venting of anti-armor warhead. Testing completed to verify that liner venting did not adversely impact warhead performance. Preliminary design for fragment impact mitigation technology finalized for Javelin warhead.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2010 Plans: (1) High Performance Rocket Propulsion: Demonstrate venting technology in minimum signature and high-performance 5-10 inch class motors. Scale up high-performance composite propellant to 150-gal batch, and successfully process in redundant 30 gal quantities. Demonstrate IM improvement and ballistic performance from high-performance propellant in 20-inch analog and 70-lb motors respectively. Complete venting design and begin IM demonstration for small-diameter minimum signature rocket motors. (2) Minimum Signature Rocket Propulsion: Conduct IM baseline tests, fabricate and extrude new low-blast propellant and conduct IM tests on new propellant. Conduct rocket motor cook-off characterization studies and begin shaped memory alloy design testing. Conduct performance and IM full scale testing of two minimum signature propellant candidates in standard motor configuration for direct comparison with baseline propellant. Design, fabricate and conduct initial tests to determine viability of rocket motor thermal ring venting mechanism. (3) Blast and Fragmentation Warheads: Complete full-scale liner environmental tests and IM and performance demonstration of reactive liner in full-scale 500-lb bomb. Conduct series of full-scale environmental tests (thermal cycling, vibration, and drop tests) with the reactive liner and an inert fill. Tests will determine the effects that these types of environments have on items using liners, to ensure that the liner does not flow, shift or crack. Begin demonstration of new initiation system for very insensitive main charge explosive fills. Conduct performance and IM evaluations on castable explosives for bombs and warheads. (4) Anti-Armor Warheads: Demonstrate IM characteristic with no degradation in performance with liner venting and fragment impact mitigation sleeve technology on anti-armor missile warhead. Complete venting modeling and simulation work, for fast and slow cook-off, as well as fragment impact testing on Navy warhead. Conduct Army warhead particle impact mitigation sleeve concept design and testing, ensuring no impact on warhead effectiveness. (5) Large Caliber Gun Propulsion: Optimize propellant formulations and conduct initial IM and gun tests using new propellant formulation.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: (1) High Performance Rocket Propulsion: Conduct venting technology demonstrations in minimum signature and high-performance 10-25-inch class motors. Scale up new less-sensitive high-performance propellants for larger diameter demonstrations. (2) Minimum Signature Rocket Propulsion: Design and test modifications to the motors igniter, rocket nozzle, and blow-out plug to exploit the lessons learned in the first year. Conduct IM baseline tests, fabricate and extrude new low-blast propellant and conduct IM tests on new propellant. Demonstrate shaped memory cook-off solution for minimum signature propellant in analog motors. Conduct performance and IM full scale testing of two MSP propellant candidates in composite motor configuration for direct comparison with baseline propellant, and down-select to final propellant formulation. Conduct aging, environmental and full-scale IM tests of rocket motor thermal ring venting mechanism. (3) Blast and Fragmentation Warheads: Complete demonstration of low-sensitivity main-charge fill to prevent sympathetic detonation in 500-lb and greater bombs. Begin integrated demonstration of new initiation system with less-sensitive explosive fills. Conduct system level IM and performance demonstration on castable explosives for bombs and warheads, and conduct program risk reduction studies. Begin initiation system design validation tests, feasibility demonstration and environmental survivability testing. Perform initiation system reliability demonstrations in small scale tests, then perform system level IM and performance tests. (4) Anti-Armor Warheads: Complete vented liner demonstration for large Naval warhead. Complete integrated demonstration of venting, fragment mitigation, and less-sensitive explosive. Particle impact mitigation sleeve design concept will be finalized, and the best available materials will be integrated into a Multi-Purpose hardened anti-armor warheads and the final design will be demonstrated against a fragment impact threat. In addition, limited warhead performance tests shall be conducted to ensure that performance has not been degraded. (5) Large Caliber Gun Propulsion: Conduct propellant initial and final IM and gun testing with full scale representative articles.					
Accomplishments/Planned Programs Subtotals	9.176	13.534	16.979	0.000	16.979

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603000D8Z: *Joint Munitions Advanced Technology*	**PROJECT** P002: *Insensitive Munitions Advanced Technology*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
• 0602000D8Z P000: *BA2 Insensitive Munitions*	14.820	14.990	14.615		14.615	14.786	14.971	15.241	15.529	Continuing	Continuing

D. Acquisition Strategy

N/A

E. Performance Metrics

1) Transitions of technologies developed by the Program are tracked and documented using DoD/NASA Technical Readiness Level (TRL) scale.
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 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 Review of Projects conducted as part of Joint Army/Navy/NASA/Air Force meetings.
7) Technology Transition Agreements in place with Munition programs.

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense											DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603000D8Z: *Joint Munitions Advanced Technology*				PROJECT P301: *Enabling Fuze Advanced Technology*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P301: *Enabling Fuze Advanced Technology*	0.000	0.000	3.577	0.000	3.577	5.424	6.692	7.613	8.771	Continuing	Continuing

A. Mission Description and Budget Item Justification

This is a new project under Joint Munitions Advanced Technology.

This RDT&E 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, 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 demonstrated at the laboratory scale and transition them into demonstration programs utilizing generic hardware based on priority capabilities and technology needs identified and validated by the Program Executive Officers (PEOs) and the Heads of the Service S&T communities. Mature demonstrated fuze technology can 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 Program Executive Officers (PEOs) and Heads of the Service S&T communities. These four capability areas are: 1) Hard Target Survivable Fuzing, 2) Tailorable Effects Weapon Fuzing, 3) High Reliability Fuzing, 4) and Enabling Fuze Technologies and Common Architecture.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Enabling Fuze Advanced Technology	0.000	0.000	3.577	0.000	3.577
This RDT&E 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, 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 demonstrated at the laboratory scale and transition them into demonstration programs utilizing generic hardware based on priority capabilities and technology needs identified and validated by the Program Executive Officers					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603000D8Z: *Joint Munitions Advanced Technology*	**PROJECT** P301: *Enabling Fuze Advanced Technology*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
(PEOs) and the Heads of the Service S&T communities. Mature demonstrated fuze technology can be transitioned, thereby decreasing their program costs and schedule risk and facilitating spin-offs to other munitions within their portfolios. *FY 2011 Base Plans:* Hard Target Fuzing (Addressing fuze survivability in harsh environments ranging from gun launch to hard target penetration): Start to develop test, redesign and demonstrate recorders in high speed (2500-4000 fps). Start to develop survivable modular fuze technology for multi-role common miniature munitions with distributed/embedded fuzes. Tailorable Effects Fuze (Addressing scalable effects weapons that will optimize lethal effects on target while minimizing collateral damage): Apply initiation architecture and control concepts for development of candidate effects and yield candidate warheads. Two Army Technology Objectives (ATOs) related to tailorable effects will benefit from the 6.2 and 6.3 JFTP efforts. (Scalable Technology for Adaptable Response (STAR) ATO and the Sensor Warhead Fuze Technology for Integrated Combined Effects (SWFTICE) ATO.) High Reliability (Addressing need for 99% fuze reliability in cluster munitions and increasing overall fuze reliability for increased weapon effectiveness and reduced unexploded remnants of war): Develop and test 1st phase high reliability fuze architecture technology prototypes that satisfy reliability while maintaining safety by eliminating single-point and common-mode failures. Enabling Technologies (Addressing fuze subcomponents and technologies that provide capability across the fuzing domain): Fabricate 1st phase MEMS retard and impact sensors and conduct functional testing in simulated environments. Complete common fuze architecture concepts to provide enhance fuze modularity, common components and packaging for lower cost and manufacturing ease.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	3.577	0.000	3.577

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603000D8Z: *Joint Munitions Advanced Technology*	**PROJECT** P301: *Enabling Fuze Advanced Technology*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
• 0602000D8Z P204: *BA2 Enabling Fuze Technology*	0.000	3.818	7.833		7.833	7.393	5.796	6.748	7.448	Continuing	Continuing

D. Acquisition Strategy

N/A

E. Performance Metrics

1) Transitions of technologies developed by the Program are tracked and documented using DoD/NASA Technical Readiness Level(TRL) scale.
2) FATG Technology Roadmaps are prepared, evaluated, and analyzed by JFTP management and technical staff.
3) Chairman's Annual Assessments for each FATG are critically reviewed by the 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 in place with Munition programs.

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603121D8Z: *SO/LIC Advanced Development*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	32.314	43.453	44.423	0.000	44.423	45.089	45.947	46.407	46.918	Continuing	Continuing
206: *Explosive Ordnance Disposal/ Low-Intensity Conflict*	7.262	7.228	7.487	0.000	7.487	7.661	7.877	8.016	8.158	Continuing	Continuing
207: *Special Reconnaisance Capabilities*	20.854	19.755	20.644	0.000	20.644	20.919	21.532	21.912	22.298	Continuing	Continuing
208: *Information Dissemination Concepts*	2.846	3.052	3.161	0.000	3.161	3.235	3.326	3.384	3.444	Continuing	Continuing
209: *Irregular Warfare Support (IWS)*	1.352	13.418	13.131	0.000	13.131	13.274	13.212	13.095	13.018	Continuing	Continuing

A. Mission Description and Budget Item Justification

P206, Explosive Ordnance Disposal/Low-Intensity Conflict (EOD/LIC). The EOD/LIC Program develops and delivers advanced capabilities for military Explosive Ordnance Disposal (EOD) operators and Special Operations Forces (SOF) to meet the challenges of improvised explosive devices (IEDs), force protection, and the war on terrorism. EOD/LIC efforts focus in two areas: support to SOF to combat terrorism; and access, detection, identification, and neutralization of all types of conventional explosive ordnance and improvised explosive devices. Requirements submitted by the Joint Service EOD and Service Special Operations communities are prioritized and approved by OASD (SO/LIC &IC).

P207, Special Reconnaissance Capabilities (SRC). The SRC Program exploits, leverages, and integrates DoD's service and agency efforts to improve surveillance and reconnaissance tools (unattended sensors, tagging and tracking devices, data infiltration/exfiltration, remote delivery, and mobility/delivery of sensors), while providing risk reduction for DoD and other agency technology and development programs. The SRC Program identifies, integrates, and operationalizes the technical tools for the collection of actionable information against a variety of targets and mission requirements, including Overseas Contingency Operations (OCO) tasks, and maintains DoD's on-line catalog of tools in order to minimize crisis response time for special reconnaissance and surveillance.

P208, Information Dissemination Concepts (IDC). The IDC Program addresses technology capabilities necessary to enable sustained information dissemination campaigns in denied areas. The IDC program, working as necessary with DoD and the interagency, develops, modifies, and demonstrates concepts, mechanisms, platforms and payloads to propagate themes and messages that convince target audiences to take action favorable to the United States and its allies.

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603121D8Z: *SO/LIC Advanced Development*

P209, Irregular Warfare Support (IWS). The IWS Program (IWSP) develops adaptive and agile capabilities and methodologies to support irregular warfare in the current and evolving strategic environments. IWSP supports joint, interagency, and international partners who conduct or counter irregular warfare through indirect and asymmetric approaches, though they may employ a full range of military and other capabilities, in order to erode an adversary's power, influence, and will. Solutions include material and non-material operational analysis, concept development, field experimentation, and delivery of capabilities, to defeat the motivations, sanctuaries, and enterprises of targeted state and non-state actors.

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	32.314	43.808	0.000	0.000	0.000
Current President's Budget	32.314	43.453	44.423	0.000	44.423
Total Adjustments	0.000	-0.355	44.423	0.000	44.423
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Program Adjustments	0.000	-0.355	44.423	0.000	44.423

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense											DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				**R-1 ITEM NOMENCLATURE** PE 0603121D8Z: *SO/LIC Advanced Development*				**PROJECT** 206: *Explosive Ordnance Disposal/Low-Intensity Conflict*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
206: *Explosive Ordnance Disposal/ Low-Intensity Conflict*	7.262	7.228	7.487	0.000	7.487	7.661	7.877	8.016	8.158	Continuing	Continuing

A. Mission Description and Budget Item Justification

P206, Explosive Ordnance Disposal/Low-Intensity Conflict (EOD/LIC). The EOD/LIC program develops and delivers advanced capabilities for military EOD operators and Special Operations Forces (SOF) to meet the challenges of improvised explosive devices (IEDs), force protection, and the war on terrorism. EOD/LIC efforts focus in two areas: support to SOF to combat terrorism; and access, detection, identification, and neutralization of all types of conventional explosive ordnance and improvised explosive devices. Requirements submitted by the Joint Service EOD and Service Special Operations communities are prioritized and approved by Office of the Assistant Secretary of Defense (OASD) (SO/LIC &IC).

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Ordnance Disposal/Low-Intensity Conflict (EOD/LIC)	7.262	7.228	7.487	0.000	7.487
FY 2009 Accomplishments: Delivered unmanned aerial vehicles with improved sensors for IED detection for EOD use. Delivered modified bladderless balloons for SOF and EOD underwater missions. Evaluated the performance of unmanned surface vehicles to perform reconnaissance of waterways and littoral regions for SOF. Fielded Homemade Explosive Detection kits with an integrated training package for EOD personnel. Integrated a camera boom on to an EOD robotic platform that provides an extended viewing capability for operators. Developed a program of instruction to increase EOD capability to interdict and disable terrorist devices.					
FY 2010 Plans: Evaluate integrated sensors to detect threats through foliage and obscurants onto SOF Riverine crafts. Transition to a program of record or commercialize a bladderless lift balloon for Special Operations and EOD underwater missions. Design tools to enhance arm dexterity and reconnaissance capability					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603121D8Z: *SO/LIC Advanced Development*	**PROJECT** 206: *Explosive Ordnance Disposal/Low-Intensity Conflict*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
of robotic platforms. Develop a fast rope descender that will increase service member survivability and reduce injury while conducting fast rope insertions. Develop a replacement for existing EOD disruptors with one kit designed to reduce size and weight for equipment load-out. Investigate technologies to develop a more reliable underwater acoustic transmitter and receiver to remotely arm and fire EOD tools used for limpet mine neutralization. Validate a program of instruction to increase EOD capability to interdict and disable terrorist devices. *FY 2011 Base Plans:* Evaluate a fast rope descender that will increase service member survivability and reduce injury while conducting fast rope insertions. Test a modular EOD disruptor that duplicates the ballistic performance of existing disruptors. Evaluate an underwater acoustic transmitter and receiver to remotely arm and fire EOD tools used for limpet mine neutralization. Design tools to enhance arm dexterity and reconnaissance capability of robotic platforms.					
Accomplishments/Planned Programs Subtotals	7.262	7.228	7.487	0.000	7.487

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

Not applicable for this item.

E. Performance Metrics

SO/LIC Advanced Development - PE 0603121D8Z; Explosive Ordnance Disposal & Low-Intensity Conflict/P206; Special Reconnaissance Capabilities/P207; Information Dissemination Concepts/P208; Irregular Warfare Support/P209

Long Term Strategies: Obtain adequate funding to support critical shortfalls; prioritize proposals that are deemed acceptable and allocate funding accordingly; and establish outreach to leverage institutional knowledge and expertise.

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense		**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603121D8Z: *SO/LIC Advanced Development*	**PROJECT** 206: *Explosive Ordnance Disposal/Low-Intensity Conflict*

Performance Indicator and Rating:

FY 2010 Target:
70% of currently funded research projects are completed on time and within budget
Increase the number of project's transition to operational use
Transition scheduled projects to user communities

FY 2011 Target:
70% of currently funded research projects are completed on time and within budget
Increase the number of project's transition to operational use and reduce timelines to transition.

Basis of FY 2009 to Date Performance Rating:
Currently the number of funded research projects are on track to be completed per the target.

Verification: The SO/LIC &IC Advanced Development Program projects each track the status of their efforts. Reviews are conducted to assess project status. Oversight of the entire effort is undertaken by ASD SO/LIC &IC.

Validation: Completed research products increase the capabilities of the DoD to effectively detect, deter and defend against terrorist attacks; defeat improvised explosive devices and unexploded ordinance; enable sustained information operations in denied areas; and contribute to resolution of hostile, unconventional conflicts.

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense											DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				**R-1 ITEM NOMENCLATURE** PE 0603121D8Z: *SO/LIC Advanced Development*				**PROJECT** 207: *Special Reconnaisance Capabilities*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
207: *Special Reconnaisance Capabilities*	20.854	19.755	20.644	0.000	20.644	20.919	21.532	21.912	22.298	Continuing	Continuing

A. Mission Description and Budget Item Justification

P207, Special Reconnaissance Capabilities (SRC). The primary objective of the SRC program is to seek out and identify technical tools for the collection of actionable data and information which will assist DoD in its execution of Overseas Contingency Operations (OCO) tasks. To accomplish this objective, the program leverages emerging and existing developmental technologies from government and commercial ventures and operationalizes them to meet near term reconnaissance and surveillance operational requirements. The operational tools transition unattended sensors, tagging devices, data transfer, remote delivery, and mobility/delivery of sensors into established Programs of Record throughout the DoD. The program evaluates new and existing technical surveillance technologies and incorporates results into a reference database for future access.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
SPECIAL RECONNAISANCE CAPABILITIES	20.854	19.755	20.644	0.000	20.644

FY 2009 Accomplishments:

The SRC program continued to evaluate, test, demonstrate, and integrate operationally capable beacon and sensor prototypes to vet promising new technologies and to develop new tactics, techniques and procedures (TTPs) for operational employment. Continued with ongoing efforts to: provide advanced technology support to the Overseas Contingency Operations (OCO) to include technology evaluations and training on tagging, tracking and locating (TTL) and unattended ground sensor prototypes for persistence surveillance; engage the research and development community for technical solutions and candidate technologies to improve DoD special reconnaissance (SR) operational capabilities; evaluate and operationalize sensor and TTL capabilities through insertion of mini and micro maturing technologies; research, evaluate, and integrate enhanced tagging and sensing capabilities to extend mission life and standoff emplacement; integrate extended life mission sensors, micro optics, design and integrate advanced technology antennas for TTL applications,

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603121D8Z: *SO/LIC Advanced Development*	**PROJECT** 207: *Special Reconnaisance Capabilities*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
identify emerging precise location enabling technologies, and improved netted SR data infiltration and exfiltration capabilities; research, evaluate, and integrate emerging netted sensor technologies into remote, unattended capabilities; perform field evaluations of selected SR technologies and document results in the on-line SRC knowledge database; and support cooperative projects with the DoD and OGA Intelligence Agencies to accelerate the transition of advanced reconnaissance and surveillance (R&S) capabilities into Programs of Record.					
FY 2010 Plans: Continue to identify, evaluate, exploit, leverage, and refine promising R&S-related advanced technologies and capabilities for further development, demonstration, test, and integration. Candidate high payoff technology areas that will be researched, identified and matured include: improved audio and micro-optics, state of the art encrypted wireless technology, advanced day/night sensors, enhanced high speed data fusion, incorporation of nanotechnology/miniaturization, and the research and evaluation of enhanced TTL sub-systems. Evaluate and integrate passive power harvesting technologies into existing R&S capabilities. Also, develop, test, and transition multi-functional beacons that provide enhanced capabilities, flexible employment options, and significantly reduced size footprint and power usage over currently deployed capabilities. Evaluate innovative solutions to data infiltration and exfiltration requirements. Incorporate smaller size, lower power, and flexible technologies into recently fielded tracking systems. Continue to develop and field improvements and upgrades to integrated architecture for command and control of R&S devices. Identify, develop, and integrate advanced technologies into existing maritime sensor capabilities. Continue to refine, update, and improve the DoD on-line SRC database.					
FY 2011 Base Plans: Continue to identify, evaluate, and refine promising R&S-related advanced technologies and capabilities for further development, demonstration, and integration. High payoff potential technologies that will be researched, identified, and matured include: improved audio and optical technologies; integration of disparate technologies into a single device to improve flexibility and					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
accuracy; enhanced sensor signal processing; ultra high speed data processing and transmission; next-generation nanotechnology/miniaturization; affordable Application Specific Integrated Circuit (ASIC) technology development; low profile enhanced micro-optics; next-generation precision Hostile Forces Tagging, Tracking, and Locating capabilities; incorporation of the latest technology sensor capabilities; identification and integration of low profile; advanced material miniature antennas; improved placement and concealment of unattended ground sensors; and the integration and fusion of lower power, high bandwidth data transmission sub-systems into R&S systems.					
Accomplishments/Planned Programs Subtotals	20.854	19.755	20.644	0.000	20.644

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense											DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				**R-1 ITEM NOMENCLATURE** PE 0603121D8Z: *SO/LIC Advanced Development*				**PROJECT** 208: *Information Dissemination Concepts*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
208: *Information Dissemination Concepts*	2.846	3.052	3.161	0.000	3.161	3.235	3.326	3.384	3.444	Continuing	Continuing

A. Mission Description and Budget Item Justification

Information Dissemination Concepts (IDC). The IDC Program addresses technology capabilities necessary to enable sustained information dissemination campaigns in denied areas. The IDC Program, working as necessary with DoD and the interagency, develops, modifies, and demonstrates concepts, mechanisms, platforms and payloads to propagate themes and messages that convince target audiences to take action favorable to the United States and its allies.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
INFORMATION DISSEMINATION CONCEPTS	2.846	3.052	3.161	0.000	3.161
FY 2009 Accomplishments: USPACOM's Multimedia Alert Processing System (PACOM MAPS): Implemented prototypes into operational environments to vet technologies and develop tactics, techniques, and workflow for actionable intelligence and sentiment analysis, based on real-time media information. Initiated projects through interagency collaboration efforts addressing technology shortfalls in media monitoring. Provided technology to support the War and developed tools and techniques that assisted in the analysis and planning phase of Information Operations (IO). Investigated mechanisms, sources, platforms, and payloads to provide IO operators with multiple means of being alerted with critical information that affect the delivery of messages to a targeted audience. Initiated new languages that are in various forms of media that support understanding of foreign communications. Enhanced the development, demonstration, and performance evaluations of approaches that filter data from local sources and noisy environments. Enabled COCOM users with advanced cultural and language skills based on current and relevant media information. Developed capabilities for timely monitoring and control delivery of messages by adversaries. Performed field evaluations of selected technologies.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Supported interagency projects to accelerate the transition of advanced foreign language technology to the operational community. *FY 2010 Plans:* USPACOM's Multimedia Alert Processing System (PACOM MAPS): Coordinate additional foreign language collection tools deriving from various sources. Provide new filters for operators to quickly triage large volumes of data from different sources of media. Enhance language learning tools' capabilities for sustaining proficiency and for responding to operator mission needs. Improve the ability to search and manage information. Increase cultural and situational awareness and responsiveness using automated language tools. Conduct further field evaluations of selected technologies. Accelerate the transition of advanced foreign language technology to the operational community. *FY 2011 Base Plans:* Enhance language learning tools' capabilities. Adapt and integrate existing foreign language applications, practices, and tools into a tactical site exploitation capability. Improve the timely collection of intelligence and evidence to support follow-on targeting, effective detainee prosecution, and theater-wide exploitation of tactical intelligence. Deploy capabilities that will enrich language packet creation with a variety of media sources. Deliver a capability that supports the automated inbound and outbound integration of available video and audio sources. Develop novel approaches to query, track, and exploit multimedia from broadcast, radio, offline videos, and web sources.					
Accomplishments/Planned Programs Subtotals	2.846	3.052	3.161	0.000	3.161

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense		**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603121D8Z: *SO/LIC Advanced Development*	**PROJECT** 208: *Information Dissemination Concepts*

E. Performance Metrics

N/A

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense											**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				**R-1 ITEM NOMENCLATURE** PE 0603121D8Z: *SO/LIC Advanced Development*				**PROJECT** 209: *Irregular Warfare Support (IWS)*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
209: *Irregular Warfare Support (IWS)*	1.352	13.418	13.131	0.000	13.131	13.274	13.212	13.095	13.018	Continuing	Continuing

A. Mission Description and Budget Item Justification

P209, Irregular Warfare Support (IWS). The IWS Program (IWSP) develops adaptive and agile capabilities and methodologies to support irregular warfare in the current and evolving strategic environments. IWSP supports joint, interagency, and international partners who conduct or counter irregular warfare through indirect and asymmetric approaches, though they may employ a full range of military and other capabilities, in order to erode an adversary's power, influence, and will. Solutions include material and non-material operational analysis, concept development, field experimentation, and delivery of capabilities, to defeat the motivations, sanctuaries, and enterprises of targeted state and non-state actors.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	**FY 2010**	**FY 2011 Base**	**FY 2011 OCO**	**FY 2011 Total**
IRREGULAR WARFARE SUPPORT (IWS)	1.352	13.418	13.131	0.000	13.131

FY 2009 Accomplishments:

Developed capabilities to support the Department of Defense and Interagency Irregular Warfare (IW) mission. Developed and delivered novel capabilities that dramatically enhanced the ability of host-nation partners to collect and manage police and other elements of security information. Assessed effectiveness; integrated system solutions; conducted unique operational analysis; and developed pilot IW training and education programs for DOD and participating agencies. Developed enhanced counter-human network targeting methodology; proof-of-principle operational methodology for the use of trans-media to shape self-organizing system behaviors; and non-kinetic engagement concepts including information-age threat finance strategies.

FY 2010 Plans:

Research and develop capabilities that support the Department of Defense and Interagency Irregular Warfare mission in accordance with the Irregular Warfare Joint Operating Concept, DODD 3000.05,

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
DODD 3000.07, and NSPD-44. Continue spiral development of capabilities based on lessons learned during field experimentation and the dynamic nature of adversaries. Identify adaptation and/or transition opportunities from analysis and assessment investments. Research and develop solutions for the International Security Assistance Force (ISAF) to solve critical capability gaps to re-orient a diverse, dispersed force, during major counterinsurgency operations. Analyze and support development of solutions for a holistic counterinsurgency campaign and approach to include rapid feedback on technical counterinsurgency issues to the ISAF commanders and leaders. Research, design and field-test solutions to enhance and improve client organization efforts to erode adversaries' power, influence, and will through non-kinetic operations. Support development of new capabilities for the rapidly evolving Traditional Military Information Operations by Geographical Combatant Commanders (GCC). Develop new command and control doctrine for military intelligence forces and operational staffs for rapid operational evaluation in-theater. Develop and field-test a pilot program to assist military commands in building host-nation intelligence capacity and capability to include the feasibility of migrating to other areas of operation the unique doctrine and lessons learned during support to Operation Iraqi Freedom.					
FY 2011 Base Plans: Research and develop promising capabilities and continue project development, delivery, and transition to support the Department of Defense and Interagency Irregular Warfare mission. Projects will identify and address requirements from the following major focus areas: Effects-Based Operations Integration; Indirect Communications Support; Knowledge Management; Mission Rehearsal and Exercise; and Pursuit and Denial. Deliver tailored counterinsurgency capabilities to ISAF in order to address capability gaps realized during development of prototype solutions. After pilot experimentation in new areas of operations, deliver and transfer to specific operational customers the capability for improved host-nation police counterinsurgency capabilities. Support implementation of newly developed command and control structures, optimized for counterinsurgency and irregular warfare unit task organizations, at operational and tactical command levels. Develop capabilities; assess effectiveness of current strategies and capabilities; design solutions to integrate					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
into current systems; and develop enhanced Irregular Warfare training and education programs across participating agencies. Continue spiral development of capabilities to enhance methodologies and operational solutions. Identify adaptation and/or transition opportunities from analysis and assessment investments to include other areas of potential threat and engagement with hostile organizations and supporting structures.					
Accomplishments/Planned Programs Subtotals	1.352	13.418	13.131	0.000	13.131

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603122D8Z: *Combating Terrorism Technology Support*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	114.990	117.153	85.299	0.000	85.299	87.124	89.450	90.779	92.218	Continuing	Continuing
484: *Combating Terrorism Technology Support (CTTS)*	114.990	117.153	85.299	0.000	85.299	87.124	89.450	90.779	92.218	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Combating Terrorism Technical Support (CTTS) program develops and delivers capabilities that address needs and requirements with direct operational application in the national effort to combat terrorism. Projects are distributed among 9 mission categories: Chemical, Biological, Radiological, and Nuclear Countermeasures; Explosives Detection; Improvised Device Defeat; Investigative Support and Forensics; Personnel Protection, Physical Security; Surveillance, Collection, and Operations Support; Tactical Operations Support; and Training Technology Development. This program is a diverse, advanced technology development effort that capitalizes on interagency and international participation to demonstrate the utility or 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.

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	114.990	81.868	0.000	0.000	0.000
Current President's Budget	114.990	117.153	85.299	0.000	85.299
Total Adjustments	0.000	35.285	85.299	0.000	85.299
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		36.240			
• Congressional Directed Transfers		0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	-0.955	85.299	0.000	85.299

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603122D8Z: *Combating Terrorism Technology Support*

Congressional Add Details ($ in Millions, and Includes General Reductions)	**FY 2009**	**FY 2010**
Project: 484: *Combating Terrorism Technology Support (CTTS)*		
Congressional Add: *Full Scale Impact and Blast Loading Laboratory Testing Program*	1.600	0.000
Congressional Add: *Improved LAS Glass-Ceramic Laminated Amored Window Systems*	1.600	0.000
Congressional Add: *Machine Augmented Composite Armor*	0.800	0.000
Congressional Add: *Validation of an Enhanced Urban Air Blast Tool*	2.400	0.000
Congressional Add: *Bioterriorism Operations Policy for Public Emergency Response (BOPPER)*	1.200	1.000
Congressional Add: *Robotic Mobility Platform System*	1.200	0.000
Congressional Add: *Port and Hull Securtiy 3D, Real Time Sonar System Echoscope*	1.600	0.000
Congressional Add: *Tactical Biometric Operating and Surveillance system (TBOSS)*	1.600	0.000
Congressional Add: *Biometric Terrorist Watch-List Database Management Development*	1.600	0.000
Congressional Add: *Covert Sensing and Tagging System (CSTS)*	1.200	1.200
Congressional Add: *Document and Media Search and Discovery (DMSD)*	1.440	0.000
Congressional Add: *EDIT Technology for Counter-Tunnel Operations and Cache Detection*	0.800	0.000
Congressional Add: *Facial Recognition Technology Initiative*	2.000	0.000
Congressional Add: *Remote Sensor Network Services Platform*	2.000	0.000
Congressional Add: *Low Cost Stabilized Turret*	1.600	0.800
Congressional Add: *Roll-on Roll off Reconnassanice, Surveillance & Special Mission Palletized System*	4.000	0.000
Congressional Add: *Ultra Portable Unmanned Surveillance Helicopter*	1.000	0.000
Congressional Add: *Unmanned Aerial Vehicle Avionics Upgrade (UAVAU)*	1.200	0.000
Congressional Add: *SOF Unattended Sensor Network*	1.280	0.000
Congressional Add: *Radio Inter-Operability System (RIOS)*	0.800	1.600
Congressional Add: *CTTSO/STAR-TEC Partnership Program*	2.400	0.000

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Congressional Add Details ($ in Millions, and Includes General Reductions)	**FY 2009**	**FY 2010**
Congressional Add: *Facility Security Using Tactical Surveys*	3.000	3.600
Congressional Add: *Military/Law Enforcement Counterterrorism Test Bed*	2.400	2.400
Congressional Add: *Affordable Robust Mid-Sized Unmanned Ground Vehicle*	0.000	1.600
Congressional Add: *Comprehensive and Integrated Procedures for Risk Assessment and Resource Allocation*	0.000	2.000
Congressional Add: *Integrated Rugged Checkpoint Container*	0.000	2.000
Congressional Add: *Ultra Low Profile EARS Gunshot Localization System*	0.000	1.200
Congressional Add: *Remote VBIED Dection and Defeat System*	0.000	1.200
Congressional Add: *Dynamic Data Flow Management System*	0.000	1.600
Congressional Add: *Emergency Egress System*	0.000	1.600
Congressional Add: *Expeditionary Surveillance and Reconnaissance Program*	0.000	4.000
Congressional Add: *IdentClarity-Identity Resolution*	0.000	1.440
Congressional Add: *MARCENT Thermal Imaging Suite*	0.000	3.000
Congressional Add: *Omni Directinal Relay and Conformal Antenna*	0.000	2.500
Congressional Add: *Reconnaissance and Data Exploitation (REX) System*	0.000	3.500
Congressional Add Subtotals for Project: 484	38.720	36.240
Congressional Add Totals for all Projects	38.720	36.240

C. Accomplishments/Planned Program ($ in Millions)

	FY 2009	**FY 2010**	**FY 2011 Base**	**FY 2011 OCO**	**FY 2011 Total**
BLAST EFFECTS AND MITIGATION	4.342	0.000	0.000	0.000	0.000

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C. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: Tested and evaluated a lightweight polymer application apparatus that uses existing polymer materials for blast mitigation. Characterized terrorist homemade explosive mixtures. Tested COTS technologies for blast mitigation potential. Examined blast mitigation strategies to protect U.S. infrastructure to include electrical power sub-stations, dams, and maritime facilities. Demonstrated integrated systems to protect facilities from vehicle borne improvised explosive devices, suicide bombers on foot, and standoff weapons. Converted the enhanced blast effects database into a web-based application. Refined and provided critical blast information to military, industrial, and civil engineers by performing experiments in a configurable urban city test facility. Developed an advanced head form for measurements involving the effects of blast injury and head trauma. *FY 2010 Plans:* Moved projects to the Physical Security subgroup to provide an integrated protection package.					
CHEMICAL, BIOLOGICAL, RADIOLOGICAL AND NUCLEAR COUNTERMEASURES	6.674	6.993	7.297	0.000	7.297
FY 2009 Accomplishments: Developed a pathogen- and puncture-resistant glove for military and law enforcement tactical operations. Designed a tactical response boot with integrated chemical protection. Developed an air supply pass-through kit for Level A chemical protective ensembles. Designed a pocket-size, low-profile escape respirator to meet National Institute of Occupational Safety and Health standards. Developed a test protocol to evaluate escape hoods for special-needs populations. Designed an advanced small-room chemical and biological filtration system. Developed an advanced adsorbent material to capture gaseous chemical threat agents. Developed a software decision support tool for determination of chemical agent filter life. Evaluated alternative filters for use with the M53 tactical respiratory mask. Designed a hydration status monitor. Fielded the personal hydration system water filters for operational test and evaluation. Performed operational testing and evaluation of mass casualty evacuation bus retrofit kit. Performed beta testing on chemical instrumental library databases					

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C. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
for detection and identification of chemical threat agents. Developed a total organic carbon detector for water utility systems. Developed a standoff patient triage tool for evaluating patient viability. Evaluated a self-decontaminating, removable vehicle overlay coating. Performed method development and testing in support of bioterrorism operations and public health preparedness. *FY 2010 Plans:* Evaluate performance of a pathogen- and puncture-resistant glove for military and law enforcement tactical operations. Operationally test a tactical response boot with integrated chemical protection. Test and evaluate an air supply pass through kit for Level A chemical protective ensembles. Evaluate a pocket-size, low-profile escape respirator for operational needs and test to the National Institute of Occupational Safety and Health standards. Evaluate test protocol for special-needs populations escape hoods. Test and evaluate an advanced small-room chemical and biological filtration system. Test and evaluate an advanced adsorbent material to capture gaseous chemical threat agents. Optimize, test, and evaluate a software decision support tool for determination of chemical agent filter life. Develop tools for providing enhanced protection with the M53 tactical respiratory mask. Operationally test the hydration status monitor. Operationally test a stand-off patient triage tool for evaluating patient viability. Develop and test a three-dimensional tracking and locating tool. Develop an orthogonal detection system for identifying toxic industrial chemicals and chemical warfare agents. Test and evaluate a total organic carbon detector for water utility systems. Develop a standardized test method for the evaluating the effects of Electronic Countermeasures (ECM) on commercially available detectors. Develop a detection kit for homemade explosive precursor materials. Develop a best practices field guide for mail screening and handling. *FY 2011 Base Plans:* Evaluate new materials for protection against non-traditional agents. Design new protective garments providing percutaneous protection against evolving threats. Develop next generation systems for both					

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	DATE: February 2010
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C. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
respiratory and collective protection. Evaluate the effects of ECM on commercially available detectors. Test and evaluate a new orthogonal detection system against toxic industrial chemical challenges. Test and evaluate a detection kit for homemade explosive precursor materials. Develop tools for the decontamination of traditional and non-traditional agents from personnel and equipment. Field a best practices guidebook for mail screening and handling.					
Concept Developement Moved to Personnel Protection subgroup. *FY 2009 Accomplishments:* Moved to Personnel Protection subgroup *FY 2010 Plans:* Moved to Personnel Protection subgroup *FY 2011 Base Plans:* Moved to Personnel Protection subgroup	0.000	0.000	0.000	0.000	0.000
EXPLOSIVES DETECTION *FY 2009 Accomplishments:* Evaluated prototype X-ray system for real-time imaging of vehicles for vehicle borne improvised explosive device detection. Developed a breadboard system for standoff detection of suicide bombers, which combines ultrasound and lasers. Conducted test and evaluation of current hardened handheld explosive detection prototypes. Prototyped vehicle X-ray system for field operations. *FY 2010 Plans:* Develop active illumination upgrade to imaging and anomaly detection systems for personnel screening. Conduct a side-by-side evaluation of sensors for suicide bomber detection. Evaluate sub	6.797	7.670	8.004	0.000	8.004

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	DATE: February 2010
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C. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
millimeter wave imaging and anomaly detection technology for standoff detection. Investigate spectra of chemical compounds related to the presence of explosives or physical signatures of components for database. Test and evaluate vehicle X-ray system. Demonstrate feasibility of expeditionary wet chemical detection kits for explosive precursors. Demonstrate feasibility of a walkthrough explosive detection portal. *FY 2011 Base Plans:* Incorporate fusion and detection algorithms, synchronize electronics, and demonstrate feasibility of an active illumination upgrade to imaging and anomaly detection system. Develop breadboard sub millimeter wave imaging and anomaly detection system. Incorporate spectra of explosive signatures into existing databases. Fabricate and assess prototype expeditionary wet chemical kits for explosives precursor detection. Fabricate and test a walkthrough explosives detection portal.					
IMPROVISED DEVICE DEFEAT *FY 2009 Accomplishments:* Evaluated and transitioned to commercial off-the-shelf (COTS) the Power Hawk rescue tool integrated with explosive ordnance detection (EOD) robotic platforms for access of vehicle borne improvised explosive devices (VBIEDs). Integrated a utility-cart-carried Single Sided X-ray Imaging System with a fielded robotics platform. Developed and evaluated Eyeball R1 camera system integrated with EOD robotic platforms for increased situational awareness in the conduct of EOD operations. Conducted explosive tool characterization and testing of select improvised explosive device (IED)/ VBIED countercharges and populated the decision support Tool Characterization Guide. Integrated Joint Architecture for Unmanned Systems (JAUS) compliant Multiple IED Disruption Systems with a fielded robotics platform, and conducted field demonstrations. Integrated and demonstrated a fielded robotic system with a JAUS compliant interface for visual and X-ray targeting. Developed and evaluated an ECM System. Developed a remote operation conversion kit for currently fielded utility vehicles. Developed and tested a kit to detect microwave and infrared sensors that may be present in the construction of IEDs. Developed a Body Bomb Tool Kit.	5.584	5.688	5.901	0.000	5.901

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	DATE: February 2010
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C. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Developed delivery methods to robotically deploy select VBIED countercharges utilizing the Land Shark. Integrated a JAUS architecture and sensor array for CBRN and counter tunnel operations on the RMP400. *FY 2010 Plans:* Field, and test a robotically deployed JAUS compliant visual and x-ray targeting system. Transition the Eyeball R1 camera system to COTS and integrate with EOD robotic platforms. Conduct explosive tool characterization of select IED/VBIED countercharges and disruptors for population of the Decision Support Tool Characterization Guide. Develop a manual manipulation tool kit for IED interrogation. Upgrade, test, and evaluate currently fielded ECM systems for the neutralization of IEDs. Develop an instant IED notification system. Field-test and evaluate the Body Bomb Tool Kit. Test the robotically employed Single-Sided X-ray Imaging System. Develop advance power solutions for conducting sustained robotics operations and employment of EOD-peculiar equipment. Develop and field a camera blinding system for special operations. Develop interchangeable end effectors for use on robotic arms. Evaluate emerging remote control improvised explosive device (RCIED) threats to aid in the development, design, and testing of next generation ECM-related bomb disposal equipment. *FY 2011 Base Plans:* Design, and develop next generation ECM-related equipment. Incorporate final modifications and commercialize the robotically employed Single-Sided X-ray Imaging System. Conduct explosive tool characterization of select IED/VBIED disruption charges for population of the Tool Characterization Guide. Develop an enhanced manual entry capability for access and diagnostics of terrorist devices. Develop advance detection and diagnostic tools for support of mass transit incidents involving acts of terrorism. Field-test, and evaluate ECM tools and equipment to counter emerging RCIED threats. Develop tools and equipment for the neutralization of surface, subsurface, and underwater explosive threats. Develop a VBIED Precision Identification and Disruption Tool. Develop tools and methods to					

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	DATE: February 2010
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C. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
neutralize homemade explosives. Field-test, and evaluate the robotically deployed VBIED access tool kit.					
INFRASTRUCTURE PROTECTION *FY 2009 Accomplishments:* N/A *FY 2010 Plans:* Moved to Physical Security. *FY 2011 Base Plans:* N/A	0.000	0.000	0.000	0.000	0.000
INVESTIGATIVE SUPPORT AND FORENSICS *FY 2009 Accomplishments:* Produced a canine human scent identification sampling working protocol. Improved the protocols for remote biometric assessment. Distributed new protocols for fingerprint recovery from improvised explosive devices. Improved the performance and scientific defensibility of dog teams by improving the absorption materials used for collecting human scent and enhance operational canine technology. Distributed an upgraded system for identification of automobiles. Produced advanced interview and elicitation methods and techniques in field settings. *FY 2010 Plans:* Field improved questioned document analysis techniques for analyzing disguised handwriting. Field advance interview techniques based on cognitive load principles. Field automated credibility assessment procedures. Deliver a remote viewer for evidence manipulation and comparison for use between theater and U.S.-based labs. Expand human scent collection from forensic evidence research. Identify shortcomings within deployment, training, and training aids for military working	3.593	4.394	4.585	0.000	4.585

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C. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
dogs. Distribute an automated system for collecting hidden computer data. Field canines for detection of suicide bombers and tunnels. Produce a canine tunnel training facility. Field a thermal imaging polygraph measurement system. *FY 2011 Base Plans:* Field non-linear novel fingerprint technology. Distribute a trace explosive materials reference and pocket guide. Field protocols for forensic bomb render safe procedures. Produce advanced techniques for efficient direct interpersonal credibility assessments. Distribute advanced computer forensic technologies. Produce advanced tactical methods for military working dogs.					
PHYSICAL SECURITY	12.373	13.144	14.712	0.000	14.712
FY 2009 Accomplishments: Developed an integrated personnel-screening system with remote capability to detect metallic, non-metallic, and improvised explosive devices. Assessed and demonstrated entry point screening and force protection technology. Initiated construction on a facility to test and compare deployable and tactical prescreening and surveillance equipment that is usable by security forces in high threat urban entry control point operations. Integrated novel sensors to extend perimeter/border capabilities to increase situational awareness and provide earlier warning of potential adversary attack. Developed infrastructure dependency modeling standards and tools. Investigated potential capabilities to detect, locate, survey, and disrupt subterranean operations in semi-permissive and non-permissive environments. Improved capabilities of an underwater inspection system. *FY 2010 Plans:* Improve and develop decision aids to assist with pre-event, preventative planning. Develop test programs for novel concepts that have the potential to meet requirements for rugged, long lasting, and transportable temporary, semi-permanent or permanent facilities. Promulgate common test					

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C. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
protocols and design standards based on results from threat-based test programs. Continue test program in an urban environment to better understand impact on facades, street furniture, tunnels, and infrastructure. Characterize homemade explosive mixes. Develop deployable, tactical and integrated security system concepts. Complete construction of a facility for iterative testing of equipment and tactics, techniques, and procedures. Test and compare prescreening and surveillance equipment that is usable by security forces in high threat operations. Explore enhanced video assessment and tracking techniques. Develop a database that meets interagency and international requirements to address the adaptive threat associated with homemade explosives based on past characterization and research data. Develop capabilities to detect, locate, survey, and disrupt subterranean operations. Expand focus areas to include harbor and port security solutions *FY 2011 Base Plans:* Deploy decision aids to assist with pre-event, preventative planning. Coordinate results from test programs to determine best solutions for temporary, semi-permanent or permanent facilities. Coordinate design standards with appropriate government agencies for increased force protection. Expand test program in an urban environment to include novel explosives and effects of soft structures. Deploy deployable, tactical and integrated security system concepts. Develop enhanced video assessment and tracking techniques. Deploy a comprehensive homemade explosives database with multiple levels of access. Deploy and integrate capabilities to detect, locate, survey, and disrupt subterranean operations. Develop solutions for harbor and port security solutions					
BUSINESS OPERATIONS Formerly named Program Management. *FY 2009 Accomplishments:* Provided and continue providing program management and technical support for CTTS R&D projects including funds from other agencies and management of international cooperative R&D programs.	10.800	9.465	9.780	0.000	9.780

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603122D8Z: *Combating Terrorism Technology Support*

C. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Established goals, objectives, and immediate revisions to plans that will reinforce interagency participation for the identification and prioritization of CTTS mission area requirements. Directed the program, planning, and execution for projects and associated contracts using direct and indirect budget allocations. Reviewed and revised existing processes and execution plans for CTTS mission area management and reporting responsibilities. *FY 2010 Plans:* Provide program management oversight and technical support for CTTS R&D projects including funds from other agencies and management of international cooperative R&D programs. Establish goals, objectives, and immediate revisions to plans that will reinforce interagency participation for the identification and prioritization of CTTS mission area requirements. Direct the program, planning and execution for projects and associated contracts using direct and indirect budget allocations. Review and revise existing process and execution plans for CTTS mission area management and reporting responsibilities. *FY 2011 Base Plans:* Provide program management oversight and technical support for CTTS R&D projects including funds from other agencies and management of international cooperative R&D programs. Establish goals, objectives, and immediate revisions to plans that will reinforce interagency participation for the identification and prioritization of CTTS mission area requirements. Direct the program, planning and execution for projects and associated contracts using direct and indirect budget allocations. Review and revise existing process and execution plans for CTTS mission area management and reporting responsibilities.					
SURVEILLANCE, COLLECTION AND OPERATIONS SUPPORT *FY 2009 Accomplishments:* Enhanced open source media through new language processing technologies for degraded input sources. Improved biometric and novel technology areas for tagging, tracking, and locating.	7.624	13.986	14.595	0.000	14.595

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C. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Increased performance of facial recognition technology for long-range video surveillance and human identification at a distance. Transitioned language processing techniques including increasing support for additional languages and domains to deployable systems for use. Enhanced geolocation and targeting capabilities. Developed simulation tools for deployable units and operational efforts. Improved biometric handheld devices to enroll, identify, and verify persons of interest during operational efforts. Researched and developed various methods and tools that enhance biometric collection, verification, and identification processes and technologies. Provided light weight, low cost solutions for airborne autonomous surveillance systems. *FY 2010 Plans:* Enhance various technologies for precise geolocation of targets of interest. Improve tagging, tracking and locating infrastructure including development of smart tags that can alert preset conditions. Develop tools to assist in the tactical triage of collected Cellular exploitation micro-electronic device exploitation especially in languages of particular interest. Develop exfiltration capabilities for real-time audio and video surveillance. *FY 2011 Base Plans:* Adapt and integrate existing foreign language applications, practices, and tools into a tactical site exploitation capability. Improve the timely collection of intelligence and evidence to support follow-on targeting, effective detainee prosecution, and theater-wide exploitation of tactical intelligence. Enhance the capability to identify targets through biometric modalities. Streamline the processes of data collection, sharing, identity management, mobile identification and detection of targets of interest. Develop enhanced capabilities, force structures, and training programs to leverage Information Operations capabilities.					
TACTICAL OPERATIONS SUPPORT	6.980	7.713	8.049	0.000	8.049

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C. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: Delivered a tactical rifle-aiming device that includes infrared (IR) laser pointer/illuminator, visible red laser and white light with a common control pad. Delivered an ultra-compact amplifier and low-profile antenna for use with the Multiband Inter/Intra Team Radio (MBITR) in military and civilian vehicles. Deliver a remote physiological monitoring system for soldiers in high-exertion combat operations. Conduct target characterization and initial development of a directed energy standoff vehicle stopper system. Develop a detection system that will alert soldiers of complex optical devices. Test and deliver a next generation, submersible, high-performance tactical rope-ascending device for operational test and evaluation. Develop appliqués that enable current optical devices to receive & transmit point-to-point 'free-space' IR communication for both voice and data. Deliver a vertical image rectification system for pole camera systems. Develop a portable system of wireless infrared illuminators with motion sensors to enhance site security for tactical forces. Develop a battle dress uniform (BDU) pocket-sized communications device to interconnect disparate voice communication devices that can operate on multiple channels and differing frequencies. Develop a suppressor for the Mk-44/M134 Minigun that reduces the bright and voluminous muzzle flash, blast, and sound that degrades night vision, hearing, and situational awareness. Develop a weapon launched camera system that will affix to building structures constructed from concrete, brick, or other typical building materials and provide video images of the surrounding area. Delivered a tactical system that provides imaging through various types and thicknesses of wall construction and provides a user-friendly display that presents an unambiguous view of the tactical picture to the user. Developed and delivered tactical surveys for select high risk facilities that will enable first responders to react to a crisis with enhanced safety, speed, and effectiveness. *FY 2010 Plans:* Develop a low-profile, rugged system capable of mapping terrain, buildings and interior spaces in order to provide users with a 3D geo-referenced model of the environment. Develop a communications system for tactical teams that board maritime vessels and go below deck to conduct					

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C. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
searches. Develop an integrated, handheld device that combines a COTS GPS receiver, a standard military Blue Force Tracker and Combat Survivor/Evader Locator radio for use during evasion of enemy forces or contingency operations. Develop a device that incorporates Military Free Fall mission metrics to improve navigation for operators performing High Altitude High Opening operations. Develop an ultra-lightweight (~4.5kg) UAV payload with Cooled IR, Color CCD, Laser Pointer and 30 mJ Laser Designator for the ScanEagle UAV. Develop a persistent real-time surveillance system that will have an integrated power supply (72 hrs live streaming) and SATCOM/Cellular data-link connection. Develop and deliver a system that provides a self-healing, ad hoc mesh air-to-ground network for the transmission of real-time communications (voice and data). Deliver a detection system that will alert soldiers to the pressure of complex optical devices. Deliver a portable system of wireless infrared illuminators with motion sensors to enhance site security for tactical forces. Deliver ballistic protective eyewear that rapidly adjusts to ambient light and provides polarized glare reduction. *FY 2011 Base Plans:* Deliver a low-profile, rugged system capable of mapping terrain, buildings and interior spaces in order to provide users with a 3D geo-referenced model of the environment. Deliver a communications system for tactical teams that board maritime vessels and go below deck to conduct searches. Deliver a remote physiological monitoring system for soldiers in high-exertion combat operations that interface with new SOF-peculiar radios and CBRN equipment. Deliver an integrated, handheld device that combines a COTS GPS receiver, a standard military Blue Force Tracker and Combat Survivor/Evader Locator radio for use during evasion of enemy forces or contingency operations. Deliver a device that incorporates Military Free Fall mission metrics to improve navigation for operators performing High Altitude High Opening operations. Continue development of an ultra-lightweight (~4.5kg) UAV payload with Cooled IR, Color CCD, Laser Pointer and 30 mJ Laser Designator for the ScanEagle UAV. Develop a persistent real time surveillance system that will have an integrated power supply (72 hrs live streaming) and SATCOM/Cellular data-link connection.					
TRAINING TECHNOLOGY DEVELOPMENT	4.803	4.142	4.322	0.000	4.322

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C. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: Conducted an analysis of Irregular Warfare operations and activities within the educational domain in order to support an increased interagency and international capability. Designed and developed an instructor-led training program for improving military law enforcement activities in current operations. Delivered a system training plan for next generation canine capabilities. Designed and developed a multilingual tactical site exploitation training package that included instructor-led training, supporting publications, and evidence collection kits. *FY 2010 Plans:* Develop adaptive, artificial intelligent crowd models to train warfighters in handling crowd-related scenarios (e.g., riot control, disaster management, emergency evacuation, rescue operations, urbanized conflicts, etc.), formulate strategies, answer “what-if” scenarios, and evaluate contingency plans. Design and develop a simulator for the M134 Minigun weapon system that accurately mimics the form and functionality of the actual weapon system, and integrate the simulator into a simulated training environment with realistic scenarios. Develop a virtual live-fire simulation housed in a container that can duplicate the conditions of a long, known distance range complex and an urban environment. Design and develop a training package that includes instructor-led training and supporting publications for the squad leader/observer and his squad to access Close Air Support (CAS). *FY 2011 Base Plans:* Develop a virtual simulation that increases the fidelity of non-verbal communications to enhance cultural awareness and ethics training. Develop a user reloadable device that can be used during training scenarios to provide realistic consequences for a simulated IED or Explosively Formed Penetrator. Analyze mobile learning architectures and Web 2.0 technologies and develop job aids, content resources, and training courses for use within the military.					
Personnel Protection	6.700	7.718	8.054	0.000	8.054

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C. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Formerly named VIP Protection					
FY 2009 Accomplishments: Deployed and validated a protective services portal system for standardized operations planning and enhanced interoperability between agencies. Miniaturized a mobile video processing system that integrates with multiple camera systems for enhanced situational awareness and incident response capabilities. Developed a ruggedized version of the VIP security kit for indoor/outdoor surveillance and intrusion detection. Developed a tracking and locating device for high risk personnel that uses available cellular and satellite networks for global coverage. Researched and developed advanced methodologies and automated analytical tools to improve entity and relationship resolution, identify dynamic changes to organizational structures, and recognize terrorist activity and plans. Developed a post-event analysis tool to identify and correlate weapons used in gunfire incidents. Developed a portable MANPADS pre-launch detection system to enable early warning to aircraft. Enhanced and integrated a networked vehicle monitoring system with an existing facility security system to alert tactical response teams to motor pool sabotage attempts. Developed a tinting system that instantaneously darkens or lightens armored passenger vehicle windows to enhance information security and hinder focused VIP attacks. Improved surveillance and detection of criminals and terrorists on watch lists to significantly enhance the nation's law enforcement and counterterrorism capabilities.					
FY 2010 Plans: Test and deploy the ruggedized VIP security kit for indoor/outdoor surveillance and intrusion detection. Evaluate domestic and overseas performance of the high-risk personnel tracking and locating device. Develop a protective services portal training system for incorporation into an existing law enforcement training course and a stand-alone portal for use in the field. Demonstrate performance of the advanced methodologies and automated analytical tools on counterintelligence data sets. Test the post-event gunfire analysis tool against audio files of known weapon firings. Deploy the portable					

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C. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
MANPADS pre-launch detection for operational evaluation. Install the networked vehicle anti-tamper system on a variety of tactical response vehicles and evaluate monitoring and alerting capabilities. Install the window tinting system in an armored passenger vehicle and assess improvements in information security and reduction in focused attack accuracy. Develop a personal security vulnerability assessment (PSVA) software tool to facilitate PSVA development aiding in determining need, scope and size of required protection. Research and develop behind armor blunt trauma injury thresholds using the canine physiology, apply the developed criteria to develop an armor solution for working canines. Develop a tool to assess total body deformation during a low rate loading event. Develop a novel multi-threat concealable body armor system. *FY 2011 Base Plans:* Deploy the protective services portal training system at federal law enforcement training centers and deploy the standalone protective services portal. Deploy the PSVA tool on a government sponsored site for use by all government protective details. Test and certify the canine armor system for use by military working dogs. Incorporate the total body deformation tool and analysis in the development of protective solutions for vehicles, ships, and buildings. Design and fabricate a portable quiet room utilizing novel materials to mitigate passive eavesdropping on sensitive discussions.					
Accomplishments/Planned Programs Subtotals	76.270	80.913	85.299	0.000	85.299

	FY 2009	FY 2010
Congressional Add: Full Scale Impact and Blast Loading Laboratory Testing Program *FY 2009 Accomplishments:* Conducted testing of blast mitigation concepts and technologies for DoD agencies as well as other federal, state, and local users, test data provided to end users.	1.600	0.000
	1.600	0.000

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C. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
Congressional Add: Improved LAS Glass-Ceramic Laminated Amored Window Systems *FY 2009 Accomplishments:* Integrated system into the Dyna Systems 7 meter protective tower structure. Developed a test plan for evaluating the system under threat weight blast loads to determine resiliency to withstand blast and continue to function as the only protective glass that does not prohibit the employment of Infrared Sensors and Optics.		
Congressional Add: Machine Augmented Composite Armor *FY 2009 Accomplishments:* Contract not yet awarded. Business clearance currently being worked. Anticipated award date 15 March 2010.	0.800	0.000
Congressional Add: Validation of an Enhanced Urban Air Blast Tool *FY 2009 Accomplishments:* Constructed and populated the Urban Airblast tool with empirical data from the Urban Canyon test series. Developed testing plans that provide 1/2 scale city scape blast data that is unique and not available from any other source.	2.400	0.000
Congressional Add: Bioterriorism Operations Policy for Public Emergency Response (BOPPER) *FY 2009 Accomplishments:* Performed method development and testing in support of bioterrorism operations and public health preparedness.	1.200	1.000

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C. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
FY 2010 Plans: Continued effort in method development and testing in support of bioterrorism operations and public health preparedness.		
Congressional Add: Robotic Mobility Platform System *FY 2009 Accomplishments:* Developed delivery methods to robotically deploy select VBIED countercharges utilizing the LandShark. Integrated a JAUS architecture and sensor array for CBRN and counter tunnel operations on the RMP400.	1.200	0.000
Congressional Add: Port and Hull Securtiy 3D, Real Time Sonar System Echoscope *FY 2009 Accomplishments:* Improved capabilities of an underwater inspection system.	1.600	0.000
Congressional Add: Tactical Biometric Operating and Surveillance system (TBOSS) *FY 2009 Accomplishments:* Contract not yet awarded. Refined operational requirements. Contract is in final negotiations, anticipate award January 2010.	1.600	0.000
Congressional Add: Biometric Terrorist Watch-List Database Management Development *FY 2009 Accomplishments:* Improved the ease and efficiency of data collection, sharing, identity management, mobile identification and detection of targets of interest, and manage watch lists.	1.600	0.000

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C. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
Congressional Add: Covert Sensing and Tagging System (CSTS) *FY 2009 Accomplishments:* Developed data fusion algorithms to improve detection automation and classification performance for tagging system. *FY 2010 Plans:* Continued effort to developed data fusion algorithms to improve detection automation and classification performance for tagging system.	1.200	1.200
Congressional Add: Document and Media Search and Discovery (DMSD) *FY 2009 Accomplishments:* Developed searching capability to extract Arabic dialect from blogs	1.440	0.000
Congressional Add: EDIT Technology for Counter-Tunnel Operations and Cache Detection *FY 2009 Accomplishments:* Refined operational requirements to detect, locate, survey, and disrupt subterranean operations in semi-permissive and non-permissive environments.	0.800	0.000
Congressional Add: Facial Recognition Technology Initiative *FY 2009 Accomplishments:* Researched and developed various methods and tools that enhance biometric collection, verification, and identification processes and technologies.	2.000	0.000
Congressional Add: Remote Sensor Network Services Platform	2.000	0.000

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C. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
FY 2009 Accomplishments: Developed Lineage Service Network platform and surveying proposed sensor surveillance hardware for future integration.		
Congressional Add: Low Cost Stabilized Turret *FY 2009 Accomplishments:* Provided light weight, low cost solutions for airborne autonomous surveillance systems. *FY 2010 Plans:* Continued effort to provide light weight, low cost solutions for airborne autonomous surveillance systems.	1.600	0.800
Congressional Add: Roll-on Roll off Reconnassanice, Surveillance & Special Mission Palletized System *FY 2009 Accomplishments:* Completed the production design and working prototype, obtaining flight certification for the roll-on, roll-off reconnaissance, surveillance palletized system.	4.000	0.000
Congressional Add: Ultra Portable Unmanned Surveillance Helicopter *FY 2009 Accomplishments:* Developed airframe fabrication plan and continued avionics\guidance system development.	1.000	0.000
Congressional Add: Unmanned Aerial Vehicle Avionics Upgrade (UAVAU)	1.200	0.000

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C. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
FY 2009 Accomplishments: Developed air vehicle aerodynamic and propulsion/power system improvements needed to extend effective ranges and accommodate special payloads needed by the warfighter.		
Congressional Add: SOF Unattended Sensor Network *FY 2009 Accomplishments:* Designed a network node suited for extended deployment in support of R&S mission areas.	1.280	0.000
Congressional Add: Radio Inter-Operability System (RIOS) *FY 2009 Accomplishments:* Developed a capability to provide radio gateways between military and civilian communications centers. *FY 2010 Plans:* Continued effort to developed a capability to provide radio gateways between military and civilian communications centers.	0.800	1.600
Congressional Add: CTTSO/STAR-TEC Partnership Program *FY 2009 Accomplishments:* Contract awarded 12/17/09.	2.400	0.000
Congressional Add: Facility Security Using Tactical Surveys	3.000	3.600

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C. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
FY 2009 Accomplishments: Developed and delivered tactical surveys for select high risk facilities that will enable first responders to react to a crisis with enhanced safety, speed, and effectiveness. *FY 2010 Plans:* Continued Developed and delivered tactical surveys for select high risk facilities that will enable first responders to react to a crisis with enhanced safety, speed, and effectiveness.		
Congressional Add: Military/Law Enforcement Counterterrorism Test Bed *FY 2009 Accomplishments:* Improved surveillance, detection, and use of Law Enforcement Capabilities to enhance the nation's law enforcement and military and counterterrorism capabilities. *FY 2010 Plans:* Continued efforts in improved surveillance, detection, and use of Law Enforcement Capabilities to enhance the nation's law enforcement and military and counterterrorism capabilities	2.400	2.400
Congressional Add: Affordable Robust Mid-Sized Unmanned Ground Vehicle *FY 2010 Plans:* New program that is being developed in the Improvided Device Defeat Sub-group	0.000	1.600
Congressional Add: Comprehensive and Integrated Procedures for Risk Assessment and Resource Allocation *FY 2010 Plans:* New program that is being is just being developed for execution in late FY 2010.	0.000	2.000

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C. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
Congressional Add: Integrated Rugged Checkpoint Container *FY 2010 Plans:* New program that is being developed in the Tactical Operations Support Sub-group	0.000	2.000
Congressional Add: Ultra Low Profile EARS Gunshot Localization System *FY 2010 Plans:* New program that is being developed in the Tactical Operations Support Sub-group	0.000	1.200
Congressional Add: Remote VBIED Dection and Defeat System *FY 2010 Plans:* New program that is being developed in the Improvided Device Defeat Sub-group	0.000	1.200
Congressional Add: Dynamic Data Flow Management System *FY 2010 Plans:* New program that is being developed in the Surveillance, Collection and Operations Support Sub-group.	0.000	1.600
Congressional Add: Emergency Egress System *FY 2010 Plans:* New program that is being developed in the Personnel Protection Sub-Group	0.000	1.600
Congressional Add: Expeditionary Surveillance and Reconnaissance Program	0.000	4.000

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C. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
FY 2010 Plans: New program that is being developed in the Surveillance, Collection and Operations Support Sub-group.		
Congressional Add: IdentClarity-Identity Resolution *FY 2010 Plans:* New program that is being developed in the Surveillance, Collection and Operations Support Sub-group.	0.000	1.440
Congressional Add: MARCENT Thermal Imaging Suite *FY 2010 Plans:* New program that is being developed in the Surveillance, Collection and Operations Support Sub-group.	0.000	3.000
Congressional Add: Omni Directinal Relay and Conformal Antenna *FY 2010 Plans:* New program that is being developed in the Surveillance, Collection and Operations Support Sub-group.	0.000	2.500
Congressional Add: Reconnaissance and Data Exploitation (REX) System *FY 2010 Plans:* New program that is being developed in the Surveillance, Collection and Operations Support Sub-group.	0.000	3.500

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C. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
Congressional Adds Subtotals	38.720	36.240

D. Other Program Funding Summary ($ in Millions)

N/A

E. Acquisition Strategy

Not applicable for this item.

F. Performance Metrics

Long Term Strategies: Obtain adequate funding to support critical shortfalls; prioritize proposals that are deemed acceptable and allocate funding accordingly; establish outreach programs with the interagency to leverage institutional knowledge and expertise; utilize cooperative research and development (R&D) agreements with the United Kingdom, Canada, Israel, Singapore, and Australia to leverage technology investments.

Performance Indicator and Rating:

FY 2009 Target:
70% of currently funded research projects are completed on time
5% increase in the number of projects transitioning to operational use
Continue full R&D programs with existing and new foreign partners

Verification: The CTTS Program utilizes a database to track the status of the projects. Quarterly program reviews are conducted to assess project status. In addition, an annual report is produced that assesses the status of current projects and the ability to accept new projects.

Validation: Completed research products increase the capabilities of the DoD to effectively detect, deter, and defend against terrorist attacks; thus the Departments personnel and interests at home and abroad are safer from terrorism.

FY 2010 Target:
70% of currently funded research projects are completed on time
5% increase in the number of projects transitioning to operational use

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Continue full R&D programs with five existing foreign partners

Verification: The CTTS Program utilizes a database to track the status of the projects. Quarterly program reviews are conducted to assess project status. In addition, an annual report is produced that assesses the status of current projects and the ability to accept new projects.

Validation: Completed research products increase the capabilities of the DoD to effectively detect, deter, and defend against terrorist attacks; thus the Departments personnel and interests at home and abroad are safer from terrorism.

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COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	0.000	3.878	6.808	0.000	6.808	6.901	7.156	7.319	7.921	Continuing	Continuing
P202: *Joint Advanced Concepts*	0.000	2.662	2.287	0.000	2.287	2.317	2.501	2.594	2.770	Continuing	Continuing
P203: *Joint Electronic Warfare*	0.000	1.216	2.033	0.000	2.033	2.098	2.172	2.247	2.678	Continuing	Continuing
P208: *Joint Interoperability*	0.000	0.000	2.488	0.000	2.488	2.486	2.483	2.478	2.473	Continuing	Continuing

A. Mission Description and Budget Item Justification

Acquisition reform initiatives call for top down, national security strategy-driven capabilities-based planning. The Joint Advanced Concepts (JAC) program supports acquisition reform initiatives and early capabilities based strategic investment decisions that ensure joint, integrated, interoperable, system-of-system combat capability to the warfighter. Through a systematic and thorough process, including comprehensive technology assessments, net technical assessments that engage in comparative analysis of U.S. versus non-U.S. capabilities, the program will better inform early shaping of acquisition programs, to include Special Access Programs, from a capabilities portfolio management perspective to deliver improved capabilities to the current and future joint warfighter. This shaping is supported through capability-based assessments, requirements analysis, joint capability area assessments, integrated roadmap development, and the development/integration of risk-based collaborative tools to conduct capability-based assessments.

Provides funding for Joint Electronic Warfare (EW) initiatives and EW assessments. The EW Joint Analysis Team (established in November 2007) fills a void identified by the Combatant Commanders for a group to coordinate the disparate EW activities across the Department. Provides funding to the EW JAT for establishing the Joint Electronic Warfare Center (JEWC) as the executive agent for coordination between Combatant Commanders, Services, Office of Secretary of Defense, Joint Staff, Weapon Schools, Technology Centers, Academia and DT&E organizations. Provides for EW exploitation analysis of the inter-relational effects of combined-systems evaluations in mission area needs in such domains as Integrated Air and Missile Defense, Blue Force Identification, Netted-sensors and Command and Control. The program will further work with the Joint Staff in developing a comprehensive, holistic EW architecture.

In FY 2011, a new Project Code--within this Program Element--will be addressed separately for Director, Joint Interoperability efforts; reference P208.

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603200D8Z: *Joint Advanced Concepts (JAC)*

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	0.000	7.817	0.000	0.000	0.000
Current President's Budget	0.000	3.878	6.808	0.000	6.808
Total Adjustments	0.000	-3.939	6.808	0.000	6.808
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Program Adjustments	0.000	-3.939	6.808	0.000	6.808

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense											**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				**R-1 ITEM NOMENCLATURE** PE 0603200D8Z: *Joint Advanced Concepts (JAC)*				**PROJECT** P202: *Joint Advanced Concepts*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P202: *Joint Advanced Concepts*	0.000	2.662	2.287	0.000	2.287	2.317	2.501	2.594	2.770	Continuing	Continuing

A. Mission Description and Budget Item Justification

Acquisition reform initiatives call for top down, national security strategy-driven capabilities-based planning. The Joint Advanced Concepts (JAC) program supports acquisition reform initiatives and early capabilities based strategic investment decisions that ensure joint, integrated, interoperable, system-of-system combat capability to the warfighter. Through a systematic and thorough process, including comprehensive technology assessments, net technical assessments that engage in comparative analysis of U.S. versus non-U.S. capabilities, the program will better inform early shaping of acquisition programs, to include Special Access Programs, from a capabilities portfolio management perspective to deliver improved capabilities to the current and future joint warfighter. This shaping is supported through capability-based assessments, requirements analysis, joint capability area assessments, integrated roadmap development, and the development/integration of risk-based collaborative tools to conduct capability-based assessments. These efforts were previously funded under PE0604875D8Z, Joint Systems Architecture Development.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	**FY 2010**	**FY 2011 Base**	**FY 2011 OCO**	**FY 2011 Total**
Joint Advanced Concepts	0.000	2.662	2.287	0.000	2.287
FY 2009 Accomplishments: N/A					
FY 2010 Plans: This project supports focus areas in portfolio management and activities associated with our program evaluation responsibilities providing for early shaping of Pre-Milestone A programs. Provide early shaping of Department-wide portfolio based investment decisions, development, coordination and institutionalization of enterprise wide Business Rules and procedures for investment strategies and resource balancing, integration of the requirements process with the acquisition process to bridge our military and civilian areas of responsibility with all Combatant Commands (COCOMS), Services and Agencies. Provides the Deputy Secretary of Defense and DoD Components advice on how					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603200D8Z: *Joint Advanced Concepts (JAC)*	**PROJECT** P202: *Joint Advanced Concepts*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
to maximize capability investment to meet warfighter needs. Leads the development of integrated capability roadmaps, and supports acquisition program reviews and Guidance for Development of the Force. Represents Acquisition, Technology & Logistics (AT&L) interests in requirements for future acquisition systems. Develops and updates capability roadmaps to inform decision makers for portfolio investment decisions, DoD Requirements and POM decisions. Beginning in FY 20110, Director, Joint Interoperabilty efforts will be transferred to a new Project (P208) within this Program Element. *FY 2011 Base Plans:* This project supports focus areas in portfolio management and activities associated with our program evaluation responsibilities providing for early shaping of Pre-Milestone A programs. Provide early shaping of Department-wide portfolio based investment decisions, development, coordination and institutionalization of enterprise wide Business Rules and procedures for investment strategies and resource balancing, integration of the requirements process with the acquisition process to bridge our military and civilian areas of responsibility with all COCOMS, Services and Agencies. Provides Deputy Secretayr of Defense and DoD Components advice on how to maximize capability investment to meet warfighter needs. Leads the development of integrated capability roadmaps, and supports acquisition program reviews and Guidance for Development of the Force. Represents A&T interests in requirements for future acquisition systems. Develops and updates capability roadmaps to inform decision makers for portfolio investment decisions, DoD Requirements and Program Objective Memorandum (POM) decisions.					
Accomplishments/Planned Programs Subtotals	0.000	2.662	2.287	0.000	2.287

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603200D8Z: *Joint Advanced Concepts (JAC)*	**PROJECT** P202: *Joint Advanced Concepts*

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense											DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				**R-1 ITEM NOMENCLATURE** PE 0603200D8Z: *Joint Advanced Concepts (JAC)*				**PROJECT** P203: *Joint Electronic Warfare*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P203: *Joint Electronic Warfare*	0.000	1.216	2.033	0.000	2.033	2.098	2.172	2.247	2.678	Continuing	Continuing

A. Mission Description and Budget Item Justification

Provides funding for Joint Electronic Warfare (EW) initiatives and EW assessments. The EW Joint Analysis Team (JAT) (established in November 2007) fills a void identified by the Combatant Commanders for a group to coordinate the disparate EW activities across the Department. Provides funding to the EW JAT for establishing the Joint Electronic Warfare Center (JEWC) as the executive agent for coordination between Combatant Commanders, Services, Office of Secretary of Defense, Joint Staff, Weapon Schools, Technology Centers, Academia and Developmental Test and Evaluation (DT&E) organizations. Provides for EW exploitation analysis of the inter-relational effects of combined-systems evaluations in mission area needs in such domains as Integrated Air and Missile Defense, Blue Force Identification, Netted-sensors and Command and Control. The program will further work with the Joint Staff in developing a comprehensive, holistic EW architecture.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Joint Electronic Warfare	0.000	1.216	2.033	0.000	2.033
FY 2009 Accomplishments: N/A					
FY 2010 Plans: This project supports Joint Electronic Warfare Center Support to the Electronic Warfare Joint Analysis Team as the conduit between Combatant Commanders, who determine EW Requirements, and the EW JATs analytical team. Perform comparative analysis to determine blue force operations throughout the Electro-Magnetic Spectrum, determine adversary technology trends, provide modeling, analysis, and simulation expertise for concept testing and validation, and provide objective oversight of field testing to ensure real world dynamics are considered. This analysis will assess asymmetric strengths and weaknesses, as well as how EW interacts with other warfighting areas. It will draw upon combined-systems evaluation events geared to mission area needs in such domains as Integrated					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603200D8Z: *Joint Advanced Concepts (JAC)*	**PROJECT** P203: *Joint Electronic Warfare*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Air and Missile Defense, Blue Force Identification, Netted-sensors and Command and Control. The project will also support the Joint Staff effort to develop a comprehensive, holistic plan for EW. *FY 2011 Base Plans:* See above.					
Accomplishments/Planned Programs Subtotals	0.000	1.216	2.033	0.000	2.033

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

Not applicable.

E. Performance Metrics

Not applicable.

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense											**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				**R-1 ITEM NOMENCLATURE** PE 0603200D8Z: *Joint Advanced Concepts (JAC)*				**PROJECT** P208: *Joint Interoperability*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P208: *Joint Interoperability*	0.000	0.000	2.488	0.000	2.488	2.486	2.483	2.478	2.473	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Director, Joint Interoperability provides oversight and guidance to initiatives and programs that support the joint tactical warfighter to enable reduced fratricide, increased force effectiveness, and decreased taxpayer cost through fully interoperable weapons systems, down to the tactical level of engagement. Joint interoperability is a force multiplier that will enable our warfighters to fight jointly, be more efficient and effective in the battle space, allow warfighters to fight the battle and not the tactical C2 displays, and reduce fratricide. Sharing of systems and information across Services, and with coalition and non-DoD partners, has the benefit of a more rapid and better coordinated response to an ever more agile adversary. It also enables the full exploitation of our costly (legacy and future) weapon systems at full kinematic range and makes full use of the assets in theater. The taxpayers also benefit from reducing the cost of weapon system procurement by paying once vs. many times for weapons systems that are used by multiple Services in the battlespace.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	**FY 2010**	**FY 2011 Base**	**FY 2011 OCO**	**FY 2011 Total**
Joint Interoperability	0.000	0.000	2.488	0.000	2.488
FY 2011 Base Plans: • Chair the Combat Identification (CID) Defense Support Team. • Identify Friend or Foe (IFF) M5 Technology Synchronization. • IFF M5 North Atlantic Treaty Organization (NATO) Interoperability and technology export. • Joint Cooperative Target Identification–Ground (JCTI-G). • Personnel Recovery – DAMA-C lead w/Defense Information Systems Agency (DISA), Services, & Joint Staff; Interoperability of radios and interrogators. • Sensor Signatures Oversight. • Blue Force Tracking – Device Interoperability, Single Card Solution. • Interoperability Commission (IOC). – US Chair for CID bilateral w/United Kingdom (UK). – US Chair for Joint Fires bilateral w/UK.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603200D8Z: *Joint Advanced Concepts (JAC)*	**PROJECT** P208: *Joint Interoperability*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
• Digital Joint Close Air Support – Lead for AT&L – interoperability technology. • Net Centric (NC), Battlespace Awareness (BA), and Command & Control (C2) FCB and Working Group support. • Address policies and procedures used to ensure net-centric joint interoperability. • Program Support Reviews (PSR) technical support to Systems Engineering. • Application of advanced mathematics to DoD battlefield interoperability technologies. • Model Driven Architecture exploitation in DoD. • Net-enabled Interoperability Technologies. • All Domain Tactical Picture.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	2.488	0.000	2.488

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

Not applicable for this item.

E. Performance Metrics

Not applicable for this item

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Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603225D8Z: *Joint DOD/DOE Munitions Technology Development*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	21.678	23.088	22.700	0.000	22.700	22.926	23.189	23.565	23.987	Continuing	Continuing
P225: *Joint DOD/DOE Munitions*	21.678	23.088	22.700	0.000	22.700	22.926	23.189	23.565	23.987	Continuing	Continuing

A. Mission Description and Budget Item Justification

The mission of the Joint Department of Defense (DoD)/Department of Energy (DOE) Munitions Technology Development Program (JMP) is to develop advanced technologies needed to meet warfighting needs and bring about major improvements in non-nuclear munitions. A Memorandum of Understanding (MOU) between DoD and DOE provides the basis for the long-term commitment to this effort. Under the auspices of the JMP, the fusion of DOE technologies with Joint Services needs has provided major advances in warfighting capabilities for many years and continues to play a crucial role in the exploration, development, and transition of new technologies needed by the Services. The JMP is aligned with Department strategic plans such as the key capability gaps and COCOM needs consistent with the Research and Engineering (R&E) Metrics for Force Development and is developing needed munitions capabilities and modeling tools for urban combat and counter-terrorism efforts. The JMP provides a proven and successful mechanism for the collaboration of DoD and DOE scientists and engineers so they can develop technologies of interest to both Departments, within a structured framework of technical reviews and scheduled milestones. The JMP has strong support from the Services through the leadership by DoD lab managers and technical experts of JMP technical activities and in collaborations on the transition of new capabilities to industry. This interdepartmental cooperation makes use of the substantial historic investment in scientific resources by the DOE, and the budgeted JMP funds represented in this justification are supplemented by matching DOE funds.

Endorsements from DoD labs indicate a strong history of JMP accomplishments and significant Return on Investment (ROI). The Army's Picatinny Arsenal has stated that modeling and simulation (M&S) tools developed by the JMP are now routinely used to design all new warheads, and the use of these tools has reduced the number of validation tests required for each new warhead from about 5 to 1, resulting in substantial savings. The Army Research Laboratory has demonstrated unprecedented times to deploying new armor solutions to Iraq Theater of Operation (ITO) employing M&S tools developed by the JMP. Compared to recent JMP investments in these M&S tools, an ROI of about 3 can be estimated for these warheads alone, and the tools continue to be used.

Over the last several years, there has been increased emphasis on developing technologies of value to counter-terrorism efforts and Military Operations in Urban Terrain (MOUT). Initial successes have already emerged from this JMP focus, with some products already in the field. A new and rapidly emerging JMP technology which employs Multiphase Blast Explosives (MBX) will enable the use of precision lethality munitions in urban settings with minimal collateral damage. Based on modeling and technologies developed by the JMP, preliminary tests of MBX integrated in a composite case successfully demonstrated minimum collateral damage. In a related activity, the Air Force and the Navy are pursued a Joint Capability Technology Demonstration Program (JCTD) to incorporate MBX technology into the Small

Diameter Bomb (SDB) Focused Lethality Munition. Boeing delivered initial weapons based on these technologies originating from the JMP for operational assessment in FY 2008 and residual assets were delivered to ITO in FY09.

Other JMP transitions include several diverse transitions of the mini Synthetic-aperture radar (SAR)/Microsystems Enabled Scalable Array SAR (MESASAR)-based technologies from defense to science. Two specific DoD transitions include a Unmanned Aerial Vehicle (UAV)-based application and a demo/study for a version of miniSAR being used as a gunship radar upgrade. Cheetah, an advanced themochemical predictive code, developed with JMP funds, reached a milestone with the recent release of version five. This code is used by over 400 DoD and DOE scientific and engineering staff to study and select energetic materials for modern munitions. Further, all new fuze designs being developed by DoD and DOE utilize technologies such as highly compact capacitors, transformers, and sensors developed by the JMP. In addition, state-of-the-art robotic and machine vision discrimination technologies are being successfully applied to munitions demilitarization programs and are being prototyped on several systems, most recently transitioned for a Cluster Bomb Unit (CBU) Download Workcell. A major update to the Constitutive Properties and Constitutive Modeling database was released across the DoD and DOE including data and model parameters for a range of classic and advanced material models for metals and metal alloys, energetic materials, and polymers. New releases of the shock physics code ALE3D and CTH-PRESTO were delivered to the DoD user base and for the Beta Tests under the DoD's High Performance Computing Modernization Office (HPCMO) Multiphase Flow, Target Response (MFT) Portfolio.

The integrated DoD and DOE efforts within the JMP are speeding the realization of new technologies through the advanced development process. The highly challenging technical objectives of the approximately 50 JMP projects require multi-year efforts, and sustained, long-term investments are necessary to achieve success. The JMP is a focal point for collaborative work by over 260 DoD and DOE scientists and engineers, and has been called a model of how the Departments should cooperate, both within their respective organizations (intradepartmental) and with each other (interdepartmental). The JMP also works aggressively, through the Defense Ordnance Technology Consortium (DOTC), to inform industry of the technologies and tools being developed so that they can be transitioned equitably and efficiently for use by our warfighters as quickly as possible.

Projects in the JMP are organized in five munitions technology focus areas. They are: Initiation, Fuzing, and Sensors; Energetic Materials; Computational Mechanics and Material Modeling; Warhead & Penetration Technology; and Munitions Lifecycle Technologies. These focus areas are described more fully in the accompanying R2a project exhibit.

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603225D8Z: *Joint DOD/DOE Munitions Technology Development*

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	23.727	23.276	0.000	0.000	0.000
Current President's Budget	21.678	23.088	22.700	0.000	22.700
Total Adjustments	-2.049	-0.188	22.700	0.000	22.700
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	-1.220	0.000			
• SBIR/STTR Transfer	-0.654	0.000			
• Program Review Adjustment	-0.175	0.000	22.700	0.000	22.700
• Other	0.000	-0.188	0.000	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense											DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603225D8Z: *Joint DOD/DOE Munitions Technology Development*				PROJECT P225: *Joint DOD/DOE Munitions*			
COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
P225: *Joint DOD/DOE Munitions*	21.678	23.088	22.700	0.000	22.700	22.926	23.189	23.565	23.987	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Joint Department of Defense (DoD)/ Department of Energy (DOE) Munitions Technology Development Program (JMP) is a collaborative, jointly-funded effort between DoD and Department of Energy (DOE), which has the mission to develop new and innovative warhead, explosive, initiation, and lifecycle technologies, as well as enabling tools, in order to bring about major improvements in non-nuclear munitions. The JMP supports the development and exploration of advanced munitions concepts and enabling technologies which precede system engineering. Through a Memorandum of Understanding (MOU) arrangement with DOE, DoD resources are evenly matched. More importantly, this relatively small DoD contribution effectively taps the annual multi-billion dollar DOE Research, Development, Test, and Evaluation (RDT&E) investments by accessing technical experts with highly specialized skills, advanced scientific equipment, unique facilities, and computational tools not available within DoD. These efforts take advantage of the extensive and highly developed technology base resident in the DOE National Laboratories relevant to achieving the JMP goals of developing capable, cost-effective, conventional munitions.

The JMP is aligned with Department strategic plans such as the key capability gaps and COCOM needs consistent with the Research and Engineering (R&E) Metrics for Force Development and is developing needed munitions capabilities and modeling tools for urban combat and counter-terrorism efforts. The JMP provides a proven and successful mechanism for the collaboration of DoD and DOE scientists and engineers so they can develop technologies of interest to both Departments, within a structured framework of technical reviews and scheduled milestones. The JMP has strong support from the Services through the leadership by DoD lab managers and technical experts of JMP technical activities and in collaborations on the transition of new capabilities to industry.

The JMP currently supports about 50 projects which can be summarized in five technical focus areas: Initiation, Fuzing, and Sensors; Energetic Materials; Computational Mechanics and Material Modeling; Warhead and Penetration Technology; and Munitions Lifecycle Technologies. The JMP is administered and monitored by the Office of the Secretary of Defense (OSD), and reviewed annually by the Technical Advisory Committee (TAC) composed of over 25 senior executives from the Army, Navy, Air Force, Special Operations Command, the Defense Threat Reduction Agency (DTRA), OSD, and DOE. Projects are organized in ten Technology Coordinating Groups (TCGs) in order to bring together the disciplines necessary to properly evaluate technical content and progress. DoD Service laboratory technical experts lead each of the Technology Coordinating Groups to ensure that the technologies under development address high priority DoD needs; they also coordinate the semi-annual technical peer-review process.

Please see the corresponding R2 exhibit for additional JMP background information and accomplishments. More details about each of the technical focus areas are described below in the Accomplishments/Planned Program sections.

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Joint DOD/DOE Munitions / Computational Mechanics and Material Modeling	8.060	8.510	8.004	0.000	8.004

In the area of Computational Mechanics and Material Modeling, the Joint Department of Defense (DoD)/ Department of Energy (DOE) Munitions Technology Development Program (JMP) is developing the ability to accurately predict the behavior of weapons in operating environments of extreme pressure, temperature, and velocity. This capability is essential to the development of lethal, accurate, and cost effective systems. To meet the needs of the DoD and DOE communities, there is a requirement for validated models using high-performance computing hardware and software that are capable of carrying out a broad class of continuum mechanics simulations where shock waves, nonlinear dynamics, and multi-materials gas dynamics are important. In particular, this aspect of the JMP focuses on significant improvements to material models that accurately represent the materials of interest in dynamic states coupled with numerical and algorithmic improvements to enhance our problem-solving capabilities for munitions development, advanced energetics, and target lethality predictions.

Four general classes of modeling codes offer solutions to the varied requirements posed by the defense community for the shock analysis regime. Eulerian shock physics tools are effective for a large number of conventional weapons and advanced energetics-related simulations. In situations where there is significant material deformation and turbulent mixing, Eulerian formulations are the most efficient. A second class of codes addresses the large, nonlinear dynamics that can be important for weapons design and development. Such Lagrangian calculations provide design information that complements information provided by the Eulerian shock physics codes. For example, many penetration problems involve detailed structural mechanics that are not appropriate for Eulerian codes but can be addressed by Lagrangian methods. A third class of tools combines these capabilities by using Arbitrary Lagrangian-Eulerian (ALE) algorithms to solve the conservation equations appropriate for shock analysis. This class of codes performs a range of simulations such as penetration mechanics, thermal cook-off, and fragment impact, where multi-physics phenomena descriptions are required

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
across a wide range of time scales that cannot be addressed adequately with either Eulerian or Lagrangian codes. These ALE codes and associated validated material models represent the future in modeling complex dynamics encountered in a broad spectrum of applications across the defense community. Meshless Particle Techniques such as the Dual Particle Dynamics (DPD) Code have been under development for several years. Particle codes are particularly effective for problems with severe distortions, damage, and failure, phenomena that can be problematic to capture with the workhorse Lagrangian codes. The Department's utilization of these capabilities has primarily been in the Science and Technology (S&T) community. It is desirable to extend the use of modeling and simulation tools into the engineering design community, and the JMP is pursuing this objective and continues to provide and enhance these advanced modeling tools. *FY 2009 Accomplishments:* Includes the continued development, extension, and application of the hydrocodes and associated materials models to warhead and explosives design and evaluation. Ongoing code and material model development will focus on greater accuracy, improved physics, extension to mixed phase flow problems, and increased scale of system level simulations. The JMP will continue to support the transition of these tools as well as the training of, and consulting for, the DoD user community. New material models will continue to be migrated into codes, including CTH and ALE3D. Efforts continue to improve the physical underpinning of material models to offer improved fidelity to temperature and strain rate dependence, capture complex load path and stress state dependence. The task for non-shock initiation of energetic materials continues to support the broader evaluation of hazards. Development continues for SIERRA, a new simulation concept for integrating individual physics codes together into a single application, promising to reduce the time needed to apply models to new physical situations. A new emphasis has been placed on improving the multi-phase flow modeling capability in CTH and ALE3D. Numerical methods, e.g. meshless methods, are being developed to overcome deficiencies in hydrocodes to maintain numerical stability and predict damage softening, localization, and failure. These numerical methods will then be incorporated into hydrocodes across					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
DOE and DoD. There is an increased focus on the inclusion of stochastic effects, verification and validation, and quantification of errors and sensitivities of solutions. Lead-free solder high strain rate data and models were transitioned to ARDEC to support guidance electronics in the Army's Excalibur, which resulted in approximately $10M savings to the program. The flow stress portion of the strength models such as MTS and JC for materials with solid-solid phase transformations have been generalized from linear hardening to general hardening. The latest version of the shock physics hydrocodes CTH (version 9.0) and ALE3D were released to DoD organizations. The new version of CTH includes an improved mixture theory based reactive flow model. A new material model for amorphous glassy polymers was developed and incorporated into computational codes. The high explosive constitutive models ViscoSCRAM, ViscoDCA, and ViscoPlastSCRAM model were refined and implemented into the physics codes ABAQUS, EPIC, ALE3D, and PRESTO. *FY 2010 Plans:* Includes the continued development, extension, and application of the hydrocodes and associated materials models to warhead and explosives design and evaluation. Ongoing code and material model development will focus on greater accuracy, improved physics, extension to mixed phase flow problems, and increased scale of system level simulations. The JMP will continue to support the transition of these tools as well as the training of, and consulting for, the DoD user community. New material models will continue to be migrated into codes, including CTH and ALE3D. Efforts continue to improve the physical underpinning of material models to offer improved fidelity to temperature and strain rate dependence, capture complex load path and stress state dependence. The task for non-shock initiation of energetic materials continues to support the broader evaluation of hazards. Development continues for SIERRA, a new simulation concept for integrating individual physics codes together into a single application, promising to reduce the time needed to apply models to new physical situations. A new emphasis has been placed on improving the multi-phase flow modeling capability in CTH and ALE3D. Numerical methods, e.g. meshless methods, are being developed to overcome deficiencies in hydrocodes to maintain numerical stability and predict damage softening,					

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Joint DOD/DOE Munitions / Energetic Materials The energetic materials (EM) focus area is aimed at developing the next-generation of EMs that have increased energy density over those in the current inventory, while attempting to provide enhanced insensitivity to extreme environments. There is a need to develop EMs that, when integrated into munitions, offer advantages of enhanced lethality against a variety of targets. Lighter and/or less bulky	4.438	4.928	5.273	0.000	5.273

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munitions significantly reduce the logistics burden of military actions and are also highly desirable. Similarly, a decrease in hazard classification brought about by the use of insensitive energetic materials and better designs will greatly decrease transportation and storage costs. Smarter munitions, capable of selectable, differential output, are another advantage to military agility. Hence, there is also a need for advanced EMs that can be used in small-scale devices such as distributed fuzing systems. In addition, as the operational environments have become more severe, EMs must survive setback forces in guns and severe impact forces in hard-target penetration applications. For enhanced lethality effects, the energy in EMs must be released either in the detonation reaction zone, or early enough in the gas expansion process so that it couples to impulse loading or sustains high temperatures. Increased lethality of EMs and munitions while simultaneously reducing collateral damage is of critical importance. Enhanced lethality requires that the energy be released in an appropriate time domain to allow optimized coupling to the target. Material ingredients that contribute to later energy release offer no enhancement in lethality. For micro devices suitable for distributed fuzing systems, the requirement on energy release is very exacting in order to sustain reaction propagation in environments with extensive shock and heating losses. Like advanced initiation, advanced energetic materials are an enabling technology for the next generation of weapon systems that will be safer, smaller, and more lethal.					
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with targeted experimental measurements. A Java Graphical interface will be developed to insure that the code continues to be user friendly. In addition to continuation of the proton radiography experiments for visualization of slow cook-off, a series of experiments are being developed to use the technique to visualize the detonation front within a detonator-booster-main charge integrated assembly. High explosive formulation efforts continue, including a spray-on formulation. Development of nanoscale, microscale, and mesoscale energetic materials with enhanced performance that are less sensitive and more cost effective enablers for defense transformation will continue. Computer codes for modeling cook-off behavior with coupled thermal/mechanical response will also be developed including numerical methodologies to deal with the flow of energetic materials within confined. A new microreactor technology will be investigated as an alternate method for synthesis of energetic compounds. The development and characterization of an LLM-105 booster composition will continue. *FY 2011 Base Plans:* For EM the mini-sandwich test developed for use with conventional high explosives is being further developed for testing of insensitive high explosives. Cheetah 6 development is ongoing and will include improvements of both the equation of state (EOS) and kinetics models, done in conjunction with targeted experimental measurements. A Java Graphical interface will be developed to insure that the code continues to be user friendly. In addition to continuation of the proton radiography experiments for visualization of slow cook-off, a series of experiments are being developed to use the technique to visualize the detonation front within a detonator-booster-main charge integrated assembly. High explosive formulation efforts continue, including a spray-on formulation. Development of nanoscale, microscale, and mesoscale energetic materials with enhanced performance that are less sensitive and more cost effective enablers for defense transformation will continue. Computer codes for modeling cook-off behavior with coupled thermal/mechanical response will also be developed including numerical methodologies to deal with the flow of energetic materials within confined. A new microreactor technology will be investigated as an alternate method for synthesis of energetic compounds. The development and characterization of an LLM-105 booster composition will continue.					
Joint DOD/DOE Munitions / Initiators, Fuzes, and Sensors	4.076	4.311	4.329	0.000	4.329

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Initiators, fuzes, and sensors are critical components in every munition system. These components must work together to ensure personnel safety by preventing unintended weapon detonation, allow arming of a firing mechanism, detect the target through the use of sensors, and initiate detonation when required. With the increasing need for robust, hard-target-defeat capability, advanced fuze systems must be able to survive and function in increasingly higher-velocity and higher-G penetration environments. Methods for these sub-systems to survive high-G environments include the miniaturization, integration, and/or robust packaging of conventional fuze components such as detonators, switches, transformers, capacitors, sensors, and advanced batteries. In support of this technology area, the Joint Department of Defense (DoD)/Department of Energy (DOE) Munitions Program (JMP) continues to demonstrate advances in miniaturizing high-voltage Electronic Safe and Arm Devices (ESAD), through research and development of low-energy detonator/booster combinations, and with miniature Capacitive Discharge Units (CDUs). This focus builds on recent advances in micro-detonic/energetic materials research and MicroElectroMechanical Systems (MEMS) device development. Efforts in this portion of the JMP generally advance fuze technology and ultimately provide the DoD and DOE with next generation fuzing components for all weapons, particularly hard-target-defeat munitions (penetrators), and small, intelligent low-cost applications (artillery). Advanced initiation technology is an enabler for the next generation of warheads that can be aimed, are target adaptable, and extremely robust. The primary focus of sensors in this focus area relate to guidance applications for precision weapons. *FY 2009 Accomplishments:* This focus area includes design and development of 10- and 20-W solid state power amplifiers using gallium nitride (GaN) monolithic integrated circuits in support of future mini-SAR/MESASAR developments. The Vertical Cavity Surface Emitting Lasers (VCSEL) project continues development of a robust and compact photonic proximity sensor for munitions applications, with applicability as a Height-of-Burst (HOB) sensor. The effort focuses on developing innovative technologies for advanced thermal batteries will proceed to full electrochemical cell fabrication and testing. The further exploration of the effects of firing slappers at the low inductances associated with miniature					

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firing systems will feed into an integrated fire set demonstration. Furthering the development of new diagnostics applying state of the art technologies to improving and expanding the dimensionality, scale, scope and/or accuracy of traditional diagnostics, new three-dimensional (3D) temporally resolved diagnostics will continue to be developed including Dynamic Optical Topography of Surfaces (DOTS), spatial interferometery and structured light techniques. A "hard-science" question associated with miniature munitions is the transfer of detonation from a miniature detonator into the main charge explosive. This could dramatically affect the performance of a small munition. We will continue to study microdetonics, which refers to detonation initiation, acceleration (buildup), and curvature effects in small explosive systems. We plan to conduct numerous small-scale tests to determine the performance of insensitive high explosives of interest. The other portion of the microdetonics effort is to develop the diagnostics for characterizing detonator/booster explosive behaviors and a design code that will make effective use of the microdetonics data for miniature munitions design. Over the next five years, this portion of the JMP will work toward demonstrating emerging technologies that support robust, intelligent fuzing that can survive and function in environments exceeding 30,000 G's. The Low Temperature Co-Fired Ceramic (LTCC) technology was transitioned to NACENTechnology. A PLZT processing technique to make nanoparticles for firing set and fuze capacitors was developed. Real-time MiniSAR-based UFRR endoclutter GMTI capability (with simultaneous azimuth angle measurement) was demonstrated. *FY 2010 Plans:* This focus area includes design and development of 10- and 20-W solid state power amplifiers using gallium nitride (GaN) monolithic integrated circuits in support of future mini-SAR/MESASAR developments. The Vertical Cavity Surface Emitting Lasers (VCSEL) project continues development of a robust and compact photonic proximity sensor for munitions applications, with applicability as a Height-of-Burst (HOB) sensor. The effort focuses on developing innovative technologies for advanced thermal batteries will proceed to full electrochemical cell fabrication and testing. The further exploration of the effects of firing slappers at the low inductances associated with miniature					

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Joint DOD/DOE Munitions / Munitions Lifecycle Technologies	1.531	1.606	1.491	0.000	1.491
Munitions lifecycle technologies, including stockpile aging, surveillance, demilitarization, and disposal, are developed under the auspices of the Joint Department of Defense (DoD)/ Department of Energy (DOE) Munitions Technology Development Program (JMP) . The Department has a large and growing inventory of conventional munitions in its demilitarization stockpile. Currently, the stockpile includes more than 400,000 tons and is expanding by about 70,000-100,000 tons per year. As the long-term focus for demilitarization and disposal within the DoD turns from open-burn (OB) and open-detonation (OD) to resource recycle and recovery, alternative technologies are required to turn waste materials into useful products. The technologies developed in this portion of the JMP enhance DoD capabilities to field safe, cost-effective processes for disposal, resource recovery, and reutilization of munitions and munitions components. For an aged weapon stockpile that has not reached end of useful life, reliability and surety may change with time because of age-related degradation of constituent materials. Existing stockpile assessment methods typically focus on addressing materials aging and reliability problems after they occur, rather than on anticipating and avoiding future problems or failure mechanisms. The predictive materials aging and reliability portion of the JMP is focused on improving our ability to understand, measure, predict, and mitigate safety and reliability problems caused by materials aging and possible degradation in weapons systems. Together with complementary demilitarization					

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technologies, this focus provides a base of scientific knowledge and understanding that enhances the Department's ability to efficiently support the late phases of weapon lifecycle. *FY 2009 Accomplishments:* For this thrust area includes continued studies on predictive material aging of solders, including the investigation of tin wiskers, electronics corrosion, and aging of propellants and adhesives. Experimental studies on electroplated tin (Sn) coatings and physical vapor deposition (PVD) thin films are ongoing and two modeling approaches are being considered to describe/predict Sn whisker growth. Further development of the Bayesian approach to system reliability assessment will be conducted. The development of robotic disposal of munitions will continue and new automation technologies for removing and safeing sub-munitions that are automatically armed on exit from a projectile will be developed. A project to develop a solid-phase microextraction-gas chromatographic-mass spectrometric (SPME GC-MS) for monitoring and analysis of propellants is continuing. A focused effort is going into developing broader munitions lifecycle efforts in the areas of stockpile aging and surveillance to complement to strong successes in transitioning of technologies in the areas of demilitarization and disposal. System software for MLRS download was delivered to AMCOM and an analysis of RAM, AMRAAM, and TOW was completed. A new version of the system reliability assessment tool, SRFYDO, was released and documented and a first training session for interested DoD users was conducted. An automated grenade processing system to recover copper shape charge liners, Comp A5, and grenade bodies is being installed at Hawthorne Army Depot and pedestal robotic software was installed at Anniston Army Depot. A prototype thermal sensor for environmental monitoring was developed and is being incorporated into the life cycle sensor package design. *FY 2010 Plans:* For this thrust area includes continued studies on predictive material aging of solders, including the investigation of tin wiskers, electronics corrosion, and aging of propellants and adhesives.					

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Joint DOD/DOE Munitions / Warhead and Penetration Technology In the warhead and penetration technology thrust, a major activity continues to be design and development of technologies and warheads for hard-target-defeat. As hard-target weapons evolve,	3.573	3.733	3.603	0.000	3.603

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several technical issues need to be addressed, including penetrators, fuzing, and simulation tools, along with associated validation data. Hardened military facilities are being buried in layered earth and concrete, "cut and cover" constructions, tunneled into mountainsides, or mined into rock far beneath the earth's surface. Buried structures accounted for a significant number of targets attacked by our forces during the Gulf, Afghanistan, and Iraq wars, and much of our military planning is being devoted to defeating them. Thus, a major thrust of the Joint Department of Defense (DoD)/ Department of Energy (DOE) Munitions Technology Development Program (JMP) continues to be hard-target-defeat. As hard-target weapons evolve, several technical issues need to be addressed. Specifically, penetrators striking targets with obliquity or at high angles of attack experience violent dynamic responses that can cause their cases to fail or interfere with the functionality of fuzes. Similarly, oblique, low velocity target impacts can result in ricochet, undesirable shallow trajectories, or bouncing out of the target. In general, new delivery vehicles tend to be smaller and faster, requiring smaller penetrators that carry less payload, and must survive more stressing impacts. Developing improved penetrating weapons depends on a solid understanding of the physics of penetration as well as affordable materials and processes to execute new designs that require more strength and durability from the penetrator. Although we can predict penetration depth with acceptable confidence, there are some targets for which we have insufficient data and experience; consequently, predicting the path a penetrator will take and whether it will survive is much less certain. The JMP provides a fundamental penetration technology base that addresses many of these issues and enables our future strike weapons. Additionally, warhead concepts which greatly extend the current range of capabilities in speed and tailored target effects are being explored. With increasing emphasis and interest in defeating targets of military interest in civilian areas, and of defeating and neutralizing Weapons of Mass Destruction (WMD) facilities, the application of energy to targets must be thoroughly controlled and understood. This requirement places increased demands on warhead output and is being pursued under the JMP. *FY 2009 Accomplishments:* In FY09 this project will include continued low collateral damage weapon verification and validation testing in comparison with current best baseline munitions. The effort involves the advancement of					

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APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603225D8Z: *Joint DOD/DOE Munitions Technology Development*	**PROJECT** P225: *Joint DOD/DOE Munitions*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
the science of multi-phase blast explosives (MBX) integrated with composite case penetrators to yield discriminate lethality munitions. This work will include efforts to develop and integrate technology for a new generation of precision lethality munitions based on MBX technology. The goal is to develop the technology for future munitions with two key features: increased near field lethality (at the point of target engagement) and virtually zero, far field collateral damage (no fragmentation). Both of these features are critical for enabling discriminant lethality for military operations in urban terrain (MOUT) and close air support (CAS). The focus of the planned work is on understanding the science of MBX technology (material characterization, modeling and simulation, energetics, and target interaction effects). This includes the ability to model and design warheads and munitions fracture, failure, and post-fracture behavior including fragmentation. High rate continuum modeling technology will be investigated, developed, and demonstrated to provide the capability to predict and therefore control fracture and post-fracture behavior. Studies will continue toward providing a fundamental understanding of the penetration process by conducting carefully designed experiments and analyses. Linking numerous experimental research efforts in fragmentation across the DoD and DOE with well characterized pedigreed materials will support better leveraging of shared data and focus on the underlying physics of fragmentation. Well-controlled, subscale penetration and perforation experiments are planned with clearly defined experimental variables. Penetrators will be instrumented with on-board accelerometers and data recorders to acquire high quality deceleration data for penetrator response. The on-board accelerometers and data recorders are previous transitions from the JMP. Data from these experiments not only provide a crucial database on the physical phenomena of the penetration process, but also provide researchers with valuable penetration data to benchmark codes and models. Algorithms for remote geologic target characterization were developed. Initial data for HE-driven shock on 1018 steel to support the Insensitive Munitions Initiative was completed. The characterization and constitutive modeling of 4130 rocket motor steel casing was also completed. The bond-based peridynamics code EMU was improved and applied to the fragmentation analysis of thick-walled munitions. A complementary analysis of fragmentation tests conducted by ARDEC was completed.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2010 Plans: In FY10 this project will include continued low collateral damage weapon verification and validation testing in comparison with current best baseline munitions. The effort involves the advancement of the science of multi-phase blast explosives (MBX) integrated with composite case penetrators to yield discriminate lethality munitions. This work will include efforts to develop and integrate technology for a new generation of precision lethality munitions based on MBX technology. The goal is to develop the technology for future munitions with two key features: increased near field lethality (at the point of target engagement) and virtually zero, far field collateral damage (no fragmentation). Both of these features are critical for enabling discriminant lethality for military operations in urban terrain (MOUT) and close air support (CAS). The focus of the planned work is on understanding the science of MBX technology (material characterization, modeling and simulation, energetics, and target interaction effects). This includes the ability to model and design warheads and munitions fracture, failure, and post-fracture behavior including fragmentation. High rate continuum modeling technology will be investigated, developed, and demonstrated to provide the capability to predict and therefore control fracture and post-fracture behavior. Studies will continue toward providing a fundamental understanding of the penetration process by conducting carefully designed experiments and analyses. Linking numerous experimental research efforts in fragmentation across the DoD and DOE with well characterized pedigreed materials will support better leveraging of shared data and focus on the underlying physics of fragmentation. Well-controlled, subscale penetration and perforation experiments are planned with clearly defined experimental variables. Penetrators will be instrumented with on-board accelerometers and data recorders to acquire high quality deceleration data for penetrator response. The on-board accelerometers and data recorders are previous transitions from the JMP. Data from these experiments not only provide a crucial database on the physical phenomena of the penetration process, but also provide researchers with valuable penetration data to benchmark codes and models.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: In FY11 this project will include continued low collateral damage weapon verification and validation testing in comparison with current best baseline munitions. The effort involves the advancement of the science of multi-phase blast explosives (MBX) integrated with composite case penetrators to yield discriminate lethality munitions. This work will include efforts to develop and integrate technology for a new generation of precision lethality munitions based on MBX technology. The goal is to develop the technology for future munitions with two key features: increased near field lethality (at the point of target engagement) and virtually zero, far field collateral damage (no fragmentation). Both of these features are critical for enabling discriminant lethality for military operations in urban terrain (MOUT) and close air support (CAS). The focus of the planned work is on understanding the science of MBX technology (material characterization, modeling and simulation, energetics, and target interaction effects). This includes the ability to model and design warheads and munitions fracture, failure, and post-fracture behavior including fragmentation. High rate continuum modeling technology will be investigated, developed, and demonstrated to provide the capability to predict and therefore control fracture and post-fracture behavior. Studies will continue toward providing a fundamental understanding of the penetration process by conducting carefully designed experiments and analyses. Linking numerous experimental research efforts in fragmentation across the DoD and DOE with well characterized pedigreed materials will support better leveraging of shared data and focus on the underlying physics of fragmentation. Well-controlled, subscale penetration and perforation experiments are planned with clearly defined experimental variables. Penetrators will be instrumented with on-board accelerometers and data recorders to acquire high quality deceleration data for penetrator response. The on-board accelerometers and data recorders are previous transitions from the JMP. Data from these experiments not only provide a crucial database on the physical phenomena of the penetration process, but also provide researchers with valuable penetration data to benchmark codes and models.					
Accomplishments/Planned Programs Subtotals	21.678	23.088	22.700	0.000	22.700

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C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

1) Transitions of technologies developed by the Program are tracked and documented.
2) Attendance and technical interactions at the biannual meetings of the nine 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 Chairmans' 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 Technical Advisory Committee (TAC).
6) Annual technical reports and papers are tracked and documented.

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603618D8Z: *Joint Electronic Advanced Technology*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	8.757	10.751	8.386	0.000	8.386	8.479	8.587	9.244	9.917	Continuing	Continuing
P619: *Joint Electronic Advanced Technology*	8.757	10.751	8.386	0.000	8.386	8.479	8.587	9.244	9.917	Continuing	Continuing

A. Mission Description and Budget Item Justification

(U) In Overseas Contingency Operations, the United States (U.S.) must be ready to meet the widespread and growing threat of Man Portable Air Defense Systems (ManPADS) and other portable small weapons improvised from commercially available electronic sensors, computer modules, navigation and control components coupled with widely proliferated explosives, mortars, rockets and small manned or unmanned aircraft. Such devices provide terrorists and foreign military units the novel means to rapidly construct a wide range of weapons capable of disruptive actions against civilian and military forces alike. The U.S. must be ready to counter such weapons on short notice.

(U) The asymmetric nature of such devices is already well understood by terrorists. Improvised explosive devices are in widespread use. ManPADS and mortars have been used to attack both air and ground forces, and pose a threat to any region due to their portability. Unmanned Aerial Vehicles (UAVs) capable of short range operations involving chemical, biological or explosive payloads can be found routinely available through commercial purchase and are easily adaptable to conduct precision attacks for terror purposes using commercial radio control systems. Civil navigation and autopilot devices capable of precisely controlling UAVs can be held in the palm of the hand. Digital processors, analog-to-digital converters and digital optical sensors give terrorists the means to deploy unexpected threats on short notice. Conventional kinetic defenses against these devices can be impractical in urban settings. Because the speed of appearance of these disruptive devices can be short, such threats are asymmetric in comparison with the typical long development cycles associated with U.S. military defensive systems. Together these asymmetries highlight the need to rapidly evolve alternative Electronic Warfare, Information Operations and Counter Terrorism capabilities suitable for neutralizing such threats. This program element investigates novel means to detect and neutralize these asymmetric threats, as well as special mission and other methods to employ asymmetric principles against our adversaries.

Exhibit R-2, **RDT&E Budget Item Justification:** PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
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B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	9.320	10.838	0.000	0.000	0.000
Current President's Budget	8.757	10.751	8.386	0.000	8.386
Total Adjustments	-0.563	-0.087	8.386	0.000	8.386
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	-0.443	0.000			
• SBIR/STTR Transfer	-0.120	0.000			
• Other Adjustments	0.000	-0.087	8.386	0.000	8.386

Change Summary Explanation

FY 2010 Program/budget decisions

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense											DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603618D8Z: *Joint Electronic Advanced Technology*				PROJECT P619: *Joint Electronic Advanced Technology*			
COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
P619: *Joint Electronic Advanced Technology*	8.757	10.751	8.386	0.000	8.386	8.479	8.587	9.244	9.917	Continuing	Continuing

A. Mission Description and Budget Item Justification

(U) The widespread and growing availability of sophisticated, commercially available electronic sensors, computer modules, navigation and control components coupled with widely proliferated Man Portable Air Defense Systems (ManPADS), portable explosives, mortars, rockets and small aircraft provide terrorists and foreign military units with the novel means to rapidly construct a wide range of weapons capable of disruptive actions against military forces. In Overseas Contingency Operations, the United States (U.S.) must be ready to counter such weapons on short notice. The asymmetric nature of such devices is already well understood by terrorists. Improvised explosive devices are in widespread use. ManPADS, man portable weapons and mortars have been used to attack both air and ground forces, and pose a threat to any region due to their portability. Unmanned Aerial Vehicles (UAVs) capable of short range operations involving chemical, biological or explosive payloads can be found routinely available through commercial purchase and are easily adaptable to conduct precision attacks for terror purposes using commercial radio control systems. Civil navigation and autopilot devices capable of precisely controlling UAVs can be held in the palm of the hand. Digital processors, analog-to-digital converters and digital optical sensors give terrorists the means to deploy unexpected threats on short notice. Because conventional kinetic defenses against these devices can be impractical in urban settings and because the speed of appearance of such devices can be short, such threats are disruptive and asymmetric in comparison with the typical long development cycles associated with U.S. military defensive systems. These asymmetries highlight the need to rapidly evolve alternative Electronic Warfare, Information Operations and Counter Terrorism capabilities suitable for neutralizing such threats. This program element will investigate novel means to detect and neutralize these asymmetric threats, as well as special mission and other methods to employ asymmetric principles against our adversaries.

(U) This program element seeks to identify rapidly deployable solutions (outside of service programs of record) that can effectively mitigate asymmetric threats by integrating advanced commercial or military off-the-shelf technology in innovative ways that augment and/or reduce risk when inserted into service programs of record. Laboratory and field testing will be used to evaluate the feasibility and military utility of resultant low cost, near term capabilities. FY 2011 efforts will investigate, integrate, test and demonstrate elements of the following technologies:

1. Ground based counter ManPADS concepts and systems that provide area protection in the vicinity of military airports, expeditionary airfields, forward operating bases, forward area refueling points or other high value locations. A real time distributed ground based missile warning system will be evaluated at a major urban airport to collect clutter data and verify performance enhancements developed in FY 2009 and FY 2010. This missile warning system is being initially integrated via data link to countermeasure equipped helicopters, with further application to fixed wing countermeasures equipped aircraft. Potentially viable ground based countermeasures concepts will be evaluated and tested to assess developmental risk. Subsequent efforts will assess integration of ground based missile warning/ tracking systems with future ManPADS countermeasures systems.

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2. Low cost, near term technologies to allow Department of Defense aircraft to fly in medium to high Man Portable Air Defense Systems (ManPADS) threat airspace in support of Overseas Contingency Operations (OCO). Emphasis is on threats, aircraft and system approaches not covered by existing programs of record; including innovative active missile warning, advanced kinetic decoys, miniature high reliability lasers, ultra-short pulsed lasers, magnetically steered high reliability pointer-trackers, higher powered and higher duty cycle lasers, data linked mutual warning and countermeasures, and preemptive countermeasures systems. Initial tasks leading to a rapid technology transition will be completed.

3. Emerging commercially derived technologies; including rapid prototyping of those required to combat adaptive threats in the OCO including, small unmanned aerial vehicle detection and engagement by kinetic and non-kinetic means. Emphasis will be on demonstrating an end-to-end kill chain and techniques which minimize or eliminate collateral damage. New efforts starting in FY 2010 and FY 2011 will include novel techniques to detect and locate the signatures of terrorist activities using electronic means, as well as conducting counter-terrorism experiments to evaluate the maturity of and transition special mission projects to theater.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Ground Based Counter-Man Portable Air Defense Systems	2.300	2.685	0.446	0.000	0.446
Ground based counter ManPADS concepts and systems that provide area protection in the vicinity of military airports, expeditionary airfields, or other high value locations. A second complete distributed ground based missile warning system will be built and evaluated at a major urban airport to collect clutter data and verify performance enhancements developed in FY 2009. This missile warning system is being initially integrated with aircraft based countermeasures systems. Potentially viable ground based countermeasures concepts will be evaluated and tested to assess developmental risk. Subsequent efforts will assess integration of ground based missile warning/tracking systems with future ManPADS countermeasures systems. *FY 2009 Accomplishments:* Under a Cooperative Research and Development Agreement with Army Research Laboratory and Northrop-Grumman, performed initial testing of a novel ground based countermeasures and static testing at White Sands Missile Range. Developed proposals and submitted to the Department of Homeland Security for testing the Raytheon Vigilant Eagle high powered microwave airspace					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
protection system in a live fire environment. Evaluated Infrared (IR) sensors for missile detection performance and suitability; modeled and evaluated ground-engagement concepts; developed and refined integration and tracking software; evaluated detection and tracking performance in live fire events; completed Event Origin Estimator that pinpoints shooter location after missile alert is issued; implemented remote power and control systems in software to allow for full operational control of each remote optical node, allowing for unattended system deployment. The results should yield a proven, three-element IR sensor array whose demonstrated performance in a four-pole configuration is capable of exceeding required detection and tracking parameters under constrained launch conditions for all threats tested. Provided thermal signature data on a representative set of fixed-wing commercial aircraft to the United States Air Force tanker program. *FY 2010 Plans:* This project integrates netted, ground-based, infrared sensor technologies including the Distributed Ground Based Threat Detection System (DGTDS). By combining high-speed, high-resolution tracking mechanisms with either on-board decoys or on-/off-board directed-energy devices, it seeks to demonstrate the end-to-end capability to detect, track, and defeat shoulder-fired Man Portable Air Defense Systems (ManPADS) known to be in the hands of terrorists in Iraq and elsewhere. Subsequent efforts will complete the assessment of this system and will document performance characteristics for consideration by force protection planners, integrated military base defense experts, and homeland defense officials. FY 2010 will develop a portable missile verification system which will integrate a gimbaled track mount to optically identify threat missiles; test and measure this system for its ability to detect, warn and track other threats such as aircraft, cruise missiles, and unmanned aerial vehicles whose signatures represent a difficult challenge for many conventional weapons systems. FY 2010 will address transportability of commercial off-the-shelf sensor hardware with custom processors and software. Follow-on testing will continue under the Cooperative Research and Development Agreement (CRADA) with Army Research Laboratory and Northrop-Grumman.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: FY 2011 efforts will address mobility and militarization, as well as testing of other ground based countermeasures concepts. FY 2011 will initiate long-term comparison testing of DGTDS tracking vs. Kinetic Tracking Mount tracking, and initiate several new algorithms, including early process false alarm elimination and attempts to identify missile type. Follow-on testing will continue under the CRADA with Army Research Laboratory and Northrop-Grumman.					
Low Cost/Near Term Counter-Man Portable Air Defense Systems	4.046	5.197	3.348	0.000	3.348
Low cost, near term technologies to allow Department of Defense aircraft to fly in medium to high ManPADS threat airspace in support of Overseas Contingency Operations. Emphasis is on threats, aircraft and system approaches not covered by existing programs of record; including innovative active missile warning, advanced kinetic decoys, miniature high reliability lasers, ultra-short pulsed lasers, magnetically steered high reliability pointer-trackers, higher powered and higher duty cycle lasers, data linked mutual warning and countermeasures, and preemptive countermeasures systems. Initial tasks leading to a rapid technology transition will be completed. *FY 2009 Accomplishments:* Completed phase II and IIIa of a three phase project to combine ground based passive missile warning with a data link to a UH-1Y/AH-1Z equipped with flares. Completed data link study and selected minimum cost, weight, and power data link; briefed Naval Air Systems Command on plans for phase III. Completed the analysis of previous laboratory, anechoic chamber characterization, and live fire testing of selected components; initially evaluated pyrophoric material effectiveness in a responsive scenario. Published final report on active Man Portable Air Defense Systems (ManPADS) testing. *FY 2010 Plans:* This project completes ongoing efforts to determine the feasibility of substantially improving the protection of air platforms by combining ground based detection with airborne pyrophoric countermeasures. FY 2010 will advance this hybrid countermeasure project to demonstrate a tactical					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
data link useable on UH-1/AH-1 platforms of ManPADS detection, tracking, warning and engagement under all-aspect launch conditions and will complete the integration required for a separately funded initial flight demonstration of the integrated system and countermeasures called Aircraft ManPADS Protection System. It may produce a proof of concept event which positively confirms the ability of the system to defeat a ManPADS under live-fire conditions by automatically remotely triggering flares on drone aircraft. Air platform protection can reduce false alarm events by combining existing active and passive sensors with advanced sensor fusion software. Current operations have shown that missile detection and warning systems now used by United States and coalition forces are adversely affected by the large number of background events. The technologies under examination use multiple spectrally independent sensors and fusion algorithms, since at least one sensor would always be free of interference, it is estimated that the fusion could reduce false alarms to near-zero levels while retaining exceptionally high threat detection rates. Joint and Allied Threat Awareness System will transition multi-spectral missile warning as part of its System Development Demonstration program. FY 2010 will use measured data to update simulated performance objectives prior to attempting an on-aircraft integration and evaluation; will conclude testing to verify and validate performance and will document results for inclusion in future aircraft force protection programs. *FY 2011 Base Plans:* This project completes ongoing efforts to determine the feasibility of substantially improving the protection of air platforms by combining ground based detection with airborne pyrophoric countermeasures. FY 2011 will advance this hybrid countermeasure project to demonstrate a tactical data link useable on UH-1/AH-1 platforms of Man Portable Air Defense Systems (ManPADS) detection, tracking, warning and engagement under all-aspect launch conditions and will complete the integration required for a separately funded initial flight demonstration of the integrated system and countermeasures called Aircraft ManPADS Protection System.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Air platform protection can reduce false alarm events by combining existing active and passive sensors with advanced sensor fusion software. Current operations have shown that missile detection and warning systems now used by United States and coalition forces are adversely affected by the large number of background events. The technologies under examination use multiple spectrally independent sensors and fusion algorithms, since at least one sensor would always be free of interference, it is estimated that the fusion could reduce false alarms to near-zero levels while retaining exceptionally high threat detection rates. Joint and Allied Threat Awareness System will transition multi-spectral missile warning as part of its System Development Demonstration program. FY 2011 will use measured data to update simulated performance objectives prior to attempting an on-aircraft integration and evaluation; will conclude testing to verify and validate performance and will document results for inclusion in future aircraft force protection programs. Further work will include evaluating higher powered and higher duty cycle lasers, hostile fire evaluation, and innovative use of Mini Scanning Mirror for visually degraded environments. The management and sustainment of the Infrared (IR) signatures database and development of an IR countermeasures database will be funded from this project in FY 2011. The project will complete planning for a database project based upon current Electronic Warfare database capability to create an IR countermeasure effectiveness database.					
Disruptive Technology Defeat and Utilization	2.411	2.869	4.592	0.000	4.592
Emerging commercially derived technologies; including rapid prototyping of those required to combat adaptive threats in the Overseas Contingency Operations including, small unmanned aerial vehicle detection and engagement by kinetic and non-kinetic means. Emphasis will be on demonstrating an end-to-end kill chain and techniques which minimize or eliminate collateral damage. New efforts starting in FY 2010 and FY 2011 will include novel techniques to detect and locate the signatures of terrorist activities using electronic means.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: This project hosted a Counter Unmanned Aerial Vehicle (UAV) event, nicknamed Black Dart, currently the largest known database for sensor-weapons detection and response capabilities. Documented various UAV signatures, sensors and defeat mechanisms to assess the current range at which such UAVs can be reasonably detected and determined state of the art, unconventional, near-term defeat options, including directed energy options. Addressed risks identified by Defense Science Board, United States Air Force Science Advisory Board, Chief of Naval Operations Deep Blue, and Department of Homeland Security. Further efforts completed numerous studies for Office of the Secretary of Defense-Acquisition, Technology and Logistics (AT&L) and provided subject matter technical expertise to the AT&L Aviation Support Equipment Joint Analysis Team resulting in an Acquisition Decision Memorandum by the Under Secretary of Defense. *FY 2010 Plans:* This project will provide expertise to Joint Integrated Air and Missile Defense Organization, jointly with United States Northern Command (USNORTHCOM), for a variety of United States defense systems to be demonstrated and evaluated in the May 2010 timeframe and to demonstrate an end-to-end kill chain. FY 2010 efforts will be developed in coordination with the defense research community and Defense Intelligence Agency (DIA) elements seeking ways to avoid technological surprise. Further efforts will investigate novel means of detecting and locating signatures of terrorist activity, differentiating between terrorist and indigenous activities and providing timely, actionable intelligence that allows asymmetric disruption of terrorist kill chains. The project will perform studies for Office of the Secretary of Defense-Director Defense Research and Engineering (DDR&E) and provide subject matter technical expertise to the DDR&E DST team as directed by the Under Secretary of Defense. *FY 2011 Base Plans:* This project will continue to provide expertise to Joint Integrated Air and Missile Defense Organization, jointly with USNORTHCOM, for a variety of United States defense systems to be demonstrated and evaluated in the May 2011 timeframe and to demonstrate an end-to-end kill chain. FY 2011 efforts will					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
be developed in coordination with the defense research community and DIA elements seeking ways to avoid technological surprise. Further efforts will investigate novel means of detecting and locating signatures of terrorist activity, differentiating between terrorist and indigenous activities and providing timely, actionable intelligence that allows asymmetric disruption of terrorist kill chains. Offensive operations involving information operations disruptive technology will be evaluated in a scenario based exercise which will lead to immediate deployment of special mission capability. The project will perform studies for Office of the Secretary of Defense-Director Defense Research and Engineering (DDR&E) and provide subject matter technical expertise to the DDR&E DST team as directed by the Under Secretary of Defense.					
Accomplishments/Planned Programs Subtotals	8.757	10.751	8.386	0.000	8.386

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

Not applicable.

E. Performance Metrics

Not applicable.

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603648D8Z: *Joint Capability Technology Demonstration (JCTD)*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	196.076	168.577	206.917	0.000	206.917	211.229	214.065	217.537	221.388	Continuing	Continuing
P648: *Joint Capability Technology Demonstration (JCTD)*	196.076	168.577	206.917	0.000	206.917	211.229	214.065	217.537	221.388	Continuing	Continuing

Note

The appropriation, Program Element (PE) and Budget Activity (BA) structure for the JCTD model includes the following:
JCTD PE 0603648D8Z (RDT&E/DW BA-3)
JCTD Transition Funding PE 0604648D8Z (RDT&E/DW BA-4)
Defense Acquisition Executive (DAE) (RDT&E/DW BA-5)

In FY 2011 funding is transferred from the JCTD BA4 PE and Defense Aquisition Executive (DAE) Pilot programs into the JCTD BA3 PE.

Today's operations require even faster delivery of new capabilities. Therefore, the JCTD Program is being revised to accelerate project selection, capability demonstration phase, and delivery rate of new capabilities. This new process will include: improved synchronization with COCOM experimentation, streamlined project approval and initiation, and clear 1-year deliverables and decision points for projects greater than a year in duration.

The Director, Defense Research and Engineering (DDR&E) and the Joint Staff/J8 Deputy Director for Resources and Acquisition (DDRA) will chair and cochair quarterly Candidate Decision Boards (CDBs).

A. Mission Description and Budget Item Justification

The purpose of the Joint Capability Technology Demonstration (JCTD) Program is to:

- Demonstrate joint solutions to prioritized Combatant Commander (CoCom) capability gaps.
- Speed solutions to warfighters inside the traditional two-year programming/budgeting cycle with a goal of 12 to 30 months.
- Mitigate the technical risk and facilitate transition to programs of record for projects responding to enduring capability needs.

The JCTD Program was redesigned in FY 2006 from the Advanced Concept Technology Demonstration (ACTD) Program. The Department initiated forty-nine (49) JCTDs from FY 2006 through FY 2009 and will initiate up to seven immediate start JCTDs in FY 2010, plus five (estimated) rapid starts as determined in the new selection process as funds are identified.

Exhibit R-2, **RDT&E Budget Item Justification:** PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603648D8Z: *Joint Capability Technology Demonstration (JCTD)*

- The JCTD model is based on DoD, Government Accountability Office (GAO), and Congressional recommendations for risk reduction and shorter transition cycles.
- The tenants of the JCTD model provide increased funding in the first two years of the demonstration effort to accelerate completion with “transition” funding available for projects that provide significant military utility.
- Program goals include: Interim products and deliverables; Operational Utility Assessment (OUA) complete within 12 to 30 months; and 80 percent of the JCTDs transition products to fielded capability sustainment and/or a program of record (POR).
- The JCTD business model explicitly calls attention to the needs of the joint warfighter through the U.S. Combatant Commands, while garnering JROC validation through the Joint Staff Joint Capability Integration Development System (JCIDS) process.
- The JCTD program provides flexibility through the new selection process to address the most urgent U.S. Combatant Commanders needs.

MEASURABLE OUTCOMES: The JCTD model is capability based, not threat based, serving U.S. Combatant Command priorities by focusing on near-term joint needs. Stated metrics include: 50 percent of JCTDs will provide an operationally relevant product demonstration within 12 months and 75 percent will complete final demonstration within 30 months of Implementation Directive signature. JCTDs will spiral products and deliverables during the demonstration. Since inception in 2006, the JCTD program is exceeding all metrics including faster completion times and increased transition rate to Programs of Record (PORs).

Transition Achievement: The JCTD program has been achieving actual transition rates in excess of the stated goal. The JCTD Program defines transition as a project’s product or products going to new or existing Programs of Record (PoR) and/or providing residual products in direct support of the Warfighter that satisfies a specific requirement. Fourteen of 15 completed JCTDs have transitioned to programs of record (POR) and/or operational sustainment (93% successful transition). As of FY09, out of 184 total AC/JCTDs, 64 have deployed in support of OEF/OIF covering the following Functional Areas: Battlespace Awareness: 26, Command & Control: 11, Force Application: 9, Logistics: 14, Protection: 13, Net-Centric: 2. CENTCOM-sponsored AC/JCTDs deployed in OEF/OIF: 13. This exceeds the objective of 30 percent for demonstration programs (Draft Strategic Objective 4-2, Office of the Under Secretary of Defense, Acquisition, Technology & Logistics (OUSD (AT&L)).

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B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	207.096	198.352	0.000	0.000	0.000
Current President's Budget	196.076	168.577	206.917	0.000	206.917
Total Adjustments	-11.020	-29.775	206.917	0.000	206.917
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		-30.000			
• Congressional Rescissions	0.000	-1.375			
• Congressional Adds		1.600			
• Congressional Directed Transfers		0.000			
• Reprogrammings	-6.671	0.000			
• SBIR/STTR Transfer	-4.349	0.000			
• Other Program Adjustments	0.000	0.000	206.917	0.000	206.917

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2009	FY 2010
Project: P648: *Joint Capability Technology Demonstration (JCTD)*		
Congressional Add: *Distributed Network Switching (DNS)*	2.000	1.600
Congressional Add: *Maritime UAS Demonstration for the SOUTHCOM Region*	3.000	0.000
Congressional Add: *Simultaneous Field Radiation Technology (SFRT)*	2.300	0.000
Congressional Add: *Spartan Advanced Composite Technology*	1.600	0.000
Congressional Add Subtotals for Project: P648	8.900	1.600
Congressional Add Totals for all Projects	8.900	1.600

Change Summary Explanation

This budget submission combines the three JCTD Program Elements (transfers BA4 and Defense Acquisition Executive Pilot programs back to JCTD BA3 0603648D8Z).

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense											**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				**R-1 ITEM NOMENCLATURE** PE 0603648D8Z: *Joint Capability Technology Demonstration (JCTD)*				**PROJECT** P648: *Joint Capability Technology Demonstration (JCTD)*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P648: *Joint Capability Technology Demonstration (JCTD)*	196.076	168.577	206.917	0.000	206.917	211.229	214.065	217.537	221.388	Continuing	Continuing

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In FY 2011 funding is transferred from the JCTD BA4 PE and Defense Aquisition Executive (DAE) Pilot programs into the JCTD BA3 PE.

Today's operations require even faster delivery of new capabilities. Therefore, the JCTD Program is being revised to accelerate project selection, capability demonstration phase, and delivery rate of new capabilities. This new process will include: improved synchronization with COCOM experimentation, streamlined project approval and initiation, and clear 1-year deliverables and decision points for projects greater than a year in duration.

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The purpose of the Joint Capability Technology Demonstration (JCTD) Program is to:
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The JCTD Program was redesigned in FY 2006 from the Advanced Concept Technology Demonstration (ACTD) Program. The Department initiated forty-nine (49) JCTDs from FY 2006 through FY 2009 and will initiate up to seven immediate start JCTDs in FY 2010, plus five (estimated) rapid starts as determined in the new selection process as funds are identified.
- The JCTD model is based on DoD, Government Accountability Office (GAO), and Congressional recommendations for risk reduction and shorter transition cycles.

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• The tenants of the JCTD model provide increased funding in the first two years of the demonstration effort to accelerate completion with "transition" funding available for projects that provide significant military utility.
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• The JCTD program provides flexibility through the new selection process to address the most urgent U.S. Combatant Commanders needs.

MEASURABLE OUTCOMES: The JCTD model is capability based, not threat based, serving U.S. Combatant Command priorities by focusing on near-term joint needs. Stated metrics include: 50 percent of JCTDs will provide an operationally relevant product demonstration within 12 months and 75 percent will complete final demonstration within 30 months of Implementation Directive signature. JCTDs will spiral products and deliverables during the demonstration. Since inception in 2006, the JCTD program is exceeding all metrics including faster completion times and increased transition rate to Programs of Record (PORs).

Transition Achievement: The JCTD program has been achieving actual transition rates in excess of the stated goal. The JCTD Program defines transition as a project's product or products going to new or existing Programs of Record (PoR) and/or providing residual products in direct support of the Warfighter that satisfies a specific requirement. Fourteen of 15 completed JCTDs have transitioned to programs of record (POR) and/or operational sustainment (93% successful transition). As of FY09, out of 184 total AC/JCTDs, 64 have deployed in support of OEF/OIF covering the following Functional Areas: Battlespace Awareness: 26, Command & Control: 11, Force Application: 9, Logistics: 14, Protection: 13, Net-Centric: 2. CENTCOM-sponsored AC/JCTDs deployed in OEF/OIF: 13. This exceeds the objective of 30 percent for demonstration programs (Draft Strategic Objective 4-2, Office of the Under Secretary of Defense, Acquisition, Technology & Logistics (OUSD (AT&L)).

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Adaptive Planning Pilot (APP)	2.800	2.420	2.600	0.000	2.600
The Adaptive Planning Pilot JCTD is designed to provide Combatant Commanders with vitually needed dynamic and agile force planning capabilities as outlined in the Adaptive Planning Road Map II. The APP JCTD will provide global force management tools for Adaptive Planning and Execution (APEX) users. The APP JCTD is a multi-year project under the sponsorship of Joint Forces Command (JFCOM) and will be used to provide early capability to planners and force providers by providing additional services that are not present in the Global Command and Control System (GCCS) Family of					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Systems. The JCTD is also used as a risk mitigation tool for the APEX program by providing valuable lessons learned from the Services Oriented Architecture (SOA) development approach. Completion of development and demonstration is planned for 2012. The Transition Manager is the Adaptive Planning (AP) Program Office in the Defense Information Systems Agency (DISA). The primary output will be the ability of COCOM and Joint Staff planners, as well as the military Services to conduct streamlined operations with the Global Force Provider (JFCOM) and with members of the Joint Planning and Execution Community (JPEC).The primary metric is more accurate and timely global force management during planning and execution. Completion date is April 2012. *FY 2009 Accomplishments:* Developed Spiral 1 technical demonstration strategic guidance services. *FY 2010 Plans:* Spiral 1 technical demonstration and limited operational assessment. Develop Spiral 2. *FY 2011 Base Plans:* Spiral 2 technical demonstration 1Q FY 2011 and Operational User Assessment Planned for 3Q FY 2011. Transition functionality to configuration management and sustainment by the DISA Adaptive Planning Program Office. JCTD completes in April 2012.					
Advanced Distributed Aperture System (ADAS) The Joint Requirements Oversight Council (JROC) validated the capability need for ADAS in FY 2008. The outcome of ADAS is to demonstrate and assess the military utility of a multi-spectral suite of sensors on an H-60 aircraft to provide full spherical imagery to aircrew members via head-tracked helmet mounted displays with day/night pilotage, heads-up display with navigational/flight symbology data, multi-band threat laser warning, weapons symbology, partial brownout solution, and some hostile fire indications and friendly/enemy aircraft tracking information enhance aircraft survivability and aircrew situational awareness. During the developmental phases, ADAS Concept of Operations (CONOPS)	5.000	5.291	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
and Tactics, Techniques, and Procedures (TTPs) will be developed and refined. ADAS is a mult-year project under the Combatant Command (CoCom) sponsorship of U.S. Special Operations Command (USSOCOM) with completion of development and demonstration by end of FY 2010, based on release of funds. If the ADAS JCTD shows sufficient military maturity and utility, it will transition to a Program of Record (POR) under the USSOCOM Program Executive Officer for Rotary Wing by FY 2011. The U.S. Army is the lead service. The primary outputs and efficiencies to be demonstrated in the JCTD Military Utility Assessment are: 1) Increased survivability of Special Operations Aviation (SOA) forces; 2) Increased capability for SOA forces during Direct Action (DA) missions; 3) Enhanced capabilities for SOA forces to move and identify targets in low/no-light environments; 4) Enhanced capabilities for SOA forces to move and identify targets in urban/restrictive terrain. *FY 2009 Accomplishments:* Completed baseline development and system hardening. Draft integration plan onto aircraft. Completed transition plan, and assessment plan for the final Military Utility Assessment. *FY 2010 Plans:* Complete Military Utility Assessment, begin transition to Program Executive Office (PEO) Rotary Wing. Complete transition to PEO Rotary Wing. ADAS JCTD scheduled completion date is December 2010.					
Airborne Weapons Surveillance System (AWSS) The Joint Requirements Oversight Council (JROC) validated the capability need for AWSS in FY 2007. Funding was secured and planning finalized for FY 2008 start. The output of AWSS will be demonstration of a capability to immediately detect enemy artillery, rocket, and mortar fires, classify those fires, and relay locations of enemy firing units to coalition counter-fire systems. The JCTD will use advanced staring non-imaging infra-red wide field-of-view detectors, together with electro-optic video, aboard unmanned air vehicles. The efficiencies of the AWSS system will be: (1) percent of detections of artillery fires at ranges of 20 km or greater, (2) location accuracy of hostile firing units, and (3) transmission time of hostile fires and hostile firing locations to coalition counterfire units, in	2.100	1.861	1.998	0.000	1.998

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
efficient machine readable formats. The sponsor of AWSS is U.S. Pacific Command, and Republic of Korea is the coalition partner. Operational management is from Commander US Forces Korea and Republic of Korea Army. Technical lead is Army Aviation & Missile Research, Development and Engineering Center, and transition lead is Army Program Manager Unmanned Air Systems. Technical demonstrations will occur in the US using US Army manned and unmanned air vehicles, with operational assessment in forward areas using a Republic of Korea unmanned air vehicle. *FY 2009 Accomplishments:* Completed component testing. Integrated payload into unmanned air systems. Conducted laboratory and field trials. Conducted military utility assessment. *FY 2010 Plans:* Deliver residual capability to Combined Forces Korea. Integrate refinements identified in utility assessments. Refine concepts of operations. Support residual operations. *FY 2011 Base Plans:* Support residual operations by Combined Forces Korea. See JCTD Transition Budget Activity 4 (BA4) R2a exhibit for additional planned US transition activities.					
CORPORAL The Joint Requirements Oversight Council (JROC) validated the need for CORPORAL capabilities in FY 2008. The output of CORPORAL will be to provide ground-based, deployed Marines and Soldiers with the capability to take full advantage of tactically relevant sensor data, Command & Control (C2), and Electronic Attack (EA) in near real time. Specifically, Non-Traditional ISR (NTISR) 'on-demand" to the ground unit; beyond Line of Sight connectivity maximizing opportunity for collaboration or synchronization; distributed operations demand faster responses and necessitate providing greater capability to existing aircraft rather than introducing new aircraft; greater joint service capacity from existing and planned EA assets and platforms. The efficiencies of the CORPORAL JCTD will be to	5.500	2.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
decentralize the data to share openly across systems allowing airborne and ground-based tactical systems to be connected. The result is a greatly improved/ expanded communications range and availability so that critical data/information can be shared with other warfighters allowing collaboration and visibility to higher authorities. This will provide the ground forces with a beyond-line-of-sight (BLOS) connectivity to ISR resources (traditional and non-traditional) that they do not have today. This JCTD will provide a collaborative distributed data and information exchange framework based on existing and planned warfighters' communication waveforms. CORPORAL is a multi-year project sponsored by US Central Command with a planned transition by the Marine Corps in 2011. *FY 2009 Accomplishments:* Limited Utility Assessment (LUA) was being conducted in September 2009 at a Weapons and Tactics Instruction exercise at Marine Corps Air Station, Yuma, AZ. At the LUA CORPORAL demonstrated the networking capability provided by CINAPS on board an EA-6B, FA-18; and an AV-8B. The LUA also demonstrated the commander workstation capability as well utilize an unmanned aerial vehicle to provide imagery data on the CORPORAL network. Additionally the LUA was incorporated the Intrepid Tiger program as a node on the CORPORAL network and thus an accessible asset to the warfighter. The LUA marks the end of Spiral 1. *FY 2010 Plans:* Technical Demonstration # 2 will be conducted demonstrating the Electronic Attack capability of CORPORAL. technical Demonstration # 3 will be conducted in December 2010 as a dress rehearsal for the Military Utility Assessment (MUA) that will be conducted in April 2011 at a Weapons and Tactics Instruction exercise at Marine Corps Air Station, Yuma, AZ. At TD # 3 and the MUA we will demonstrate the entire CORPORAL capability. This includes the networking, electronic attack, electronic warfare systems architecture, and electronic attack services capabilities. The MUA will mark the end of Spiral 2. Begin transition of CORPORAL to PMA-234. Complete transition to PMA-234. The CORPORAL JCTD scheduled completion date is June 2011.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
CoCom Direct Support, Pre-Transition and Classified Programs	19.275	19.000	23.000	0.000	23.000
The JCTD Direct Program Support is comprised of four programs broken-out separately from the specific JCTDs projects. The direct funding line is used to provide support for the entire JCTD program (versus individual JCTDs). These three programs include (1) Unified Combatant Commander (CoComs); (2) JCTD Pre-Transition Support; (3) Interagency Classified Projects, and 1) Unified Combatant Commander (UCC) Direct Support: The CoComs play an essential role in the selection, validation, demonstration, and transition of JCTDs. The focus of JCTDs is to directly fill joint CoCom/ coalition capability gaps. Many JCTDs have funding allocated for the CoComs from within their specific program funding lines. Additionally, in previous years the Rapid Fielding Directorate would attempt to provide direct demonstration support from OSD if resources became available. This direct support allows for a timely allocation of resources to the CoComs, based on the number of JCTD projects being sponsored and the intensity of effort required. The Department also envisions that the CoComs will play a greater role in the development, support and coordination of JCTDs that are coalition oriented (within their specific AOR). 2) JCTD Pre-Transition Support: The JCTD program has been highly successful in rapidly developing and demonstrating new technologies and complementary concepts of operations for the warfighter. In order to successfully transition more JCTDs to the warfighter, the SECDEF established the goal of increasing the number of JCTDs evolving into formal acquisition programs. In order to enhance this transition effort and to respond to GAO recommendations in earlier years, the JCTD program continues to support a pre-transition line in the JCTD budget submission. 3) Special Capabilities Office (SCO)/Interagency Classified Support for JCTDs: JCTDs also support a limited number of classified efforts which are coordinated with other agencies and detailed in separate DoD budget exhibits.					

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	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: Liasion and review with CoComs and Coalition high leverage, joint urgent requirements for possible candidate. Supported SCO office in demonstration of classified technology capabilities. One example of SCO Office support of classified projects is the WB-57 aircraft that is used to demonstrate the military utility of advanced aerial sensors and systems against realistic and actual high value targets to enhance the information produced by each sensor, derive synergistic information from multiple concurrently operated sensors, and demonstrate advanced data dissemination and processing, thus enhancing the value and timeliness of the information to the warfighter and the COCOM. Another example is the SCO #4 project that during the Thunderstorm Spiral-2 technology demonstration in June 2009, the SC0#4 or "Project 7" JCTD demonstrated a novel computer algorithm that took advantage of residual national sensor systems to improve the accuracy with which several communications devices can be located. The improvement, which in one case reduced the location error by a factor of ten, can be used by JIATF-S forces to improve their probability of successfully interdicting narcotics smugglers and other illicit maritime traffic. *FY 2010 Plans:* Liasion and review with CoComs and Coalition high leverage, joint urgent requirements for possible candidate. Support SCO office in demonstration of classified technology capabilities. *FY 2011 Base Plans:* Liasion and review with CoComs and Coalition high leverage, joint urgent requirements for possible candidate. Support SCO office in demonstration of classified technology capabilities.					
Coalition Secure Management and Operations System (COSMOS) The Joint Requirements Oversight Council (JROC) validated the multinational information sharing requirements and capabilities to be delivered by COSMOS. The COSMOS ACTD began in FY 2005. The COSMOS ACTD outcome was to be a pilot implementation of the Multilateral Interoperability Program (MIP) specifications for C2 data sharing (specifically the Command and Control Information	0.346	0.000	0.000	0.000	0.000

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Exchange Data Model (C2IEDM) and the associated Information Exchange Mechanism (IEM)) in the Combined Enterprise Regional Information Exchange System (CENTRIXS) coalition network environment. COSMOS conducted a final demonstration of foundational capability in CY 2008. The expected output was identification of necessary and sufficient conditions for implementing the MIP specifications with policy-based information sharing operational rules and security enforcement. COSMOS was expected to lead to rapid, secure protected sharing of critical C2 information to and among coalition partners' organic command and control (C2) systems on a single and secure integrated coalition network. The projected efficiencies included substantial reduction of textual message exchange needed for shared situational awareness among coalition commanders, improved collaborative decision making, reduced confusion, uncertainty and delay in combat and crisis operations, and effective bridging of coalition sourced information with US Global Information Grid (GIG) Network Centric Enterprise Services (NCES). Transition to programs of record was planned for FY 2009, targeting the emerging Multinational Information Sharing (MNIS) initiatives. Projected sustainment of the demonstrated capabilities by DISA beyond FY 2009 was not achieved because maturity of the operational concepts and technologies required did not evolve as rapidly as expected. COSMOS was to be a multi-year ACTD co-sponsored by U. S. Pacific Command (PACOM) and U. S. European Command (EUCOM). The Defense Information Systems Agency (DISA) was the lead agency. *FY 2009 Accomplishments:* The COSMOS ACTD demonstrated the concepts for selected, protected, policy-based information sharing among coalition partners (Canada, United Kingdom and Australia. Singapore observed). Completed the ACTD.					
Combat Autonomous Mobility System (CAMS) The Joint Requirements Oversight Council (JROC) validated the capability need for CAMS in FY 2008. Special Operations Forces (SOF) are operating for extended periods in wide ranging, austere,	5.100	0.605	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
non-permissive areas against larger forces; all with resource constrained manpower. The CAMS JCTD output will provide robust organic capability to conduct: timely Intelligence, Surveillance, and Reconnaissance (ISR); Command and Control of multiple assets over extended distances; and automated mobility in support of SOF mission profiles. The system will employ mature sub-components integrated onto an existing ground mobility platform – the High Mobility Multipurpose Wheeled Vehicle (HMMWV). The CAMS technologies will provide a positive impact at multiple levels. At the strategic level, CAMS will increase the combat effectiveness of the available SOF soldiers, allowing the task force commander the ability to control more real estate with his assigned manpower. Operationally, the autonomous nature of CAMS will simplify the task of coordinating assets within the assigned Area of Responsibility. CAMS on-board processing allows automated reconnaissance, screening of imagery, system alerts, and apportionment of data throughout the local grid. At the tactical level, CAMS provides a means to limit exposure of SOF Soldiers to direct hostile fire and offload specific tactical tasks. This will allow the Warfighter to concentrate his effort on the most critical mission tasks as determined by the ground commander. In short, the CAMS JCTD efficiencies will integrate ground-based autonomous technology to force multiply the available SOF manpower. The user sponsor is U.S. Special Operation Command (USSOCOM). CAMS technology will transition to Program Executive Office - SOF Warrior and the Robotic Systems, Joint Program Office. *FY 2009 Accomplishments:* Delivered CAMS-modified Platforms; Completed Tactics, Techniques and Procedures (TTPs); completed Demonstration #1 of Operational Utility Assessment (OUA); Drafted Capability Development Document (CDD). *FY 2010 Plans:* Technical Limited Objective Experiment (TLOE) 2; and Demonstration #2, (Final OUA); Revisions to TTPs and CDD.					
Communications Air-Borne Layer Expansion (CABLE)	5.200	4.300	5.460	0.000	5.460

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B. Accomplishments/Planned Program ($ in Millions)

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The Joint Requirements Oversight Council (JROC) validated the need for CABLE in FY-08. The outcome of CABLE is to demonstrate airborne networking for tactical Joint, Interagency, Intergovernmental and Multi-National (JIIM) users who lack mobile and dynamic connectivity throughout the full range of operations. CABLE will enable interoperability between air, land, and maritime domain communication systems; enable robust information sharing; and provide strategic communications reach back in an austere or over-subscribed SATCOM environment. Transition to the Service Programs of Record (POR) in FY 2011. Outputs and efficiencies to be demonstrated in include (1) seamless interconnection of multiple air, maritime and land network coverage areas supporting voice and data, (2) cross-band and multi-domain connectivity within and between coverage areas through IP routing, (3) the extension of command and control connectivity throughout the full range of operations, and (4) enhanced network services for voice, video and data communications over a common IP network. U.S. Strategic Command (USSTRATCOM) and US. Joint Forces Command (USJFCOM) are the sponsors. US Navy and US Air Force are lead Services.					
FY 2009 Accomplishments: Participated in Bold Quest 2009 to test and evaluate CABLE interface specifications and protocol standards focusing on the tactical edge access layers and forward tactical services applications. Integrated and flight tested CABLE protocols-enabled prototypes. Commenced planning for operational demonstrations and Operational Utility Assessment. Transition strategy shifted to Navy when Air Force Objective Gateway program was canceled. CABLE activities provided input to the emergent Joint Aerial Layer Networking (JALN) Initial Capabilities Document development, capturing tactical interface lessons learned to date.					
FY 2010 Plans: Conduct operational demonstration and Operational Utility Assessment. Finalize planning for operational demonstrations and Operational Utility Assessment. Technical management and lead service shifted to Navy when Air Force Objective Gateway program was canceled. Begin transition to Navy aerial layer networking programs, through Space and Naval Warfare Systems Command, and to					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Air Force Global Cyberspace Integration Center. Transition Managers are Space and Naval Warfare Systems Command and Air Force Global Cyberspace Integration Center. *FY 2011 Base Plans:* Complete transition to the Services. Complete the JCTD.					
Counter Intelligence - Human Intelligence Architecture Modernization Program, Intelligence Operations Now (CHAMPION) The Joint Requirements Oversight Council (JROC) validated the capability need for CHAMPION in FY 2006. The outcome will provide improved capabilities for the counter-intelligence, human-intelligence and special forces communities of interest. These improvements will provide an accessible and actionable information system for management of the CI/HUMINT collection, mission planning and asset management information. The capabilities include technologies for integration of structured and un-structured reports, entity extraction and tagged geospatial information. The primary outputs demonstrated to the users and evaluated in the Military Utility Assessment are: 1) joint data standard for human domain; 2) CHAMPION information collection tool and associated concept of operations (CONOPS), tactics, techniques and procedures (TTPs); 3) CI-HUMINTmission management tools with federated search capability and data replication/access across multiple networks; and 4) integrated geo-tagged photo extraction, CIHUMINT data access tools for multi-intelligence discipline fusion. The efficiencies to be gained are; 1) improved effectiveness of HUMINT operations; 2) elimination of Human domain data stovepipes; 3) joint human domain data standard; 4) improved web enabled data access across multiple networks and security levels; 5) Joint CONOPs/ TTPs; 6) geo-spatially enabled mission and asset management tools, 7) prototype voice biometrics standards, architecture and operational concepts. The transition strategy is to incorporate CHAMPION capabilities into the Distributed Common Ground Station Army program of record (POR) and PdM CHARCS. The sponsoring Combatant Command (CoCom) is the U. S. Central Command (CENTCOM). Other organizations involved as participants, users of capabilities, and/or observers include USSOCOM,	2.500	0.484	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
USJFCOM, Defense Intelligence Agency, and the National Security Agency. The lead service is the Army. *FY 2009 Accomplishments:* Finalized CONOPs and TTPs. COCOM sponsor issue final assessment report. Continued to field interim capabilities into CENTCOM Area of Responsibility (AOR). The JCTD completed in 2009. In FY 2009 the project began transitioning to Programs of Record. Corvett Annex development and integration. CORVETcompleted technical demonstration #2 (TD) and the Military Utility Assessment (MUA). The MUA was conducted at Camp Bullis in August 2009. *FY 2010 Plans:* Corvet Annex enhancement to CI-HUMIT will complete and transition to PM Biometrics.					
Critical Runway Assessment and Repair (CRATR) The Joint Requirements Oversight Council validated the capability need for CRATR in FY 2008. The outcome of CRATR is to develop the capability to conduct rapid airfield damage assessment, determine the minimum airfield operating surface required, identify unexploded ordnance, and repair runway damage to enable critical airfields to rapidly return to operation. The CRATR JCTD will evaluate existing, new and commercial technologies and procedures, and integrate the most successful of these technologies and procedures to develop both material and equipment solutions. The primary outputs and efficiencies to be demonstrated in the JCTD are: 1) Successful solutions from early demonstrations will be used to create an interim modular repair kit which will form the Spiral One capability for theater; 2) After a successful final demonstration, products from the CRATR QRF/JCTD will be packaged into a final modular repair kit that will transition to the USAF Airfield Damage Repair (ADR) program. CRATR is a multi-year project sponsored by US Pacific Command. Lead service is the US Air Force. Air Combat Command is the Transition Manager.	4.100	0.605	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: Down selected demonstrated technologies and integrated them into an operational capability demonstrated at Tyndall AFB and Yuma Proving Ground in April 2009. Completed the Rapid Airfield Damage Assessment System (RADAS) Limited Operational Utility Assessment and the Pavement Repair final Operational Utility Assessment in August 2009. Developed CONOPS documentation. *FY 2010 Plans:* Completed live aircraft test in CONUS following final operational utility assessment. Completed final pavement repair assessment report and sent residuals with operational utility to forward based airfields. Conducted SDD and transitioned pavement repair to ADR program. Finalized CONOPS documentation. Executed the Rapid Airfield Damage Assessment System (RADAS) Limited Operational Utility Assessment in May 2010 and final Operational Utility Assessment in August 2010. Complete the Rapid Airfield Damage Assessment System (RADAS) final assessment report and send residuals with operational utility to forward based airfields. Finalize CONOPS documentation. Conduct SDD and transition RADAS to ADR program in FY 2012. Complete JCTD in September 2011.					
Cross Domain Collaborative Information Environnent (CDCIE) The Joint Requirements Oversight Council (JROC) validated the capability need for CDCIE in FY08. The outcome of CDCIE is to demonstrate, in operationally relevant environments, the ability to share information across security domains. CDCIE provides a standards based, secure, scalable, collaborative information environment (CIE) to enable cost-effective coalition and interagency information sharing in both single and cross security domain environments. The JCTD is a multi-year project under sponsorship of JFCOM with STRATCOM as a cosponsor. CDCIE will transition to DISA's Global Information Grid (GIG) Enterprise Services and Information Assurance Networking program offices. DISA is the lead agency. The primary outputs and efficiencies to be demonstrated in the JCTD Operational Utility Assessment are (1) ability of the Joint Force Commander to collaborate with all mission partners, including coalition, multinational and interagency partners, using internationally	2.000	0.363	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

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recognized format and protocol standards, and (2) ability to share information with mission partners between different networks, classification levels and releasabilty boundaries. *FY 2009 Accomplishments:* Completed security testing of spiral 2 and operational utility analyses on the system. Spiral 2 demonstrated the addition of shared white board collaboration with cross security domain Web Services capabilities in operationally representative exercise environments. Systems were installed CENTCOM and PACOM for real-world use. FY 2010 Planned Output: Transfer government interface for configuration management of certified product configurations to the Defense Information System Agency. *FY 2010 Plans:* Transfer government interface for configuration management of certified product configuration to the Defense Information System Agency. Install system in PACOM, EUCOM, Defense Intelligence Agency, Customs and Border Protection and Joint IED Defeat Organization worldwide .The system includes whiteboard and chat tool. The system is integrated with Web enabled Cross Domain Information Sharing applications. Transition manager is DISA. FY2011 Planned Output: Complete transition to DISA. Complete the JCTD					
Event Management Framework (EMF)	3.000	0.000	0.000	0.000	0.000
The Joint Requirements Oversight Council (JROC) validated the capability need for the EMF ACTD in FY 2006. The goal of EMF is to demonstrate the ground breaking capability of vertical and horizontal sharing of heretofore stove-piped information among organizations within and outside of DOD by emphasizing EMF policies; operational concepts; and tactics, techniques and procedures. In handling a terrorist event or incident, a horizontal information focus among Federal agencies is necessary during the interdiction phase of an incident. During response and recovery phases, a vertical information sharing focus among Federal, state, and local agencies is needed. A coherent interoperable information sharing mechanism is needed to: (1) Discover and share information resources throughout the					

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B. Accomplishments/Planned Program ($ in Millions)

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incident based coalition domain; (2) Recognize the changing value of temporal information; and (3) Analyze and synchronize the large amounts of data relative to an event. All CoComs, as well as their non-DoD partners, have made large investments in command and control (C2) and collaboration coordination tools. But, to date, effective integration of those investments has been sub-optimal. The event management framework consists of policies, operational concepts and technologies to ensure decision makers can build a situational picture of an event with all relevant facts. The primary outputs and efficiencies to be demonstrated in the ACTD Military Utility Assessment (MUA) are: 1) Integrated EMF policies; operational concepts; and tactics, techniques and procedures; 2) Improved and more timely incident and information correlation to "connect the dots"; 3) Faster visualization of analytic results to aid decision makers in event assessment; 3) Addition of EMF databases and engine servers to cache data; 4) Capability to share information and analytical results across CoComs, Coalitions, Services, and its interagency partners; 5) Reduced time required for event based decision making. EMF is a three-year project under the sponsorship of the United States Northern Command (NORTHCOM). The lead agency is the Defense Information Systems Agency (DISA). *FY 2009 Accomplishments:* Delivered Spiral 2.0 and 3.0.Conducted Military Untility Assessment (MUA). Worked with Net-Centric Enterprise Services (NCES) Program Office to support Federated Search with EMF Correlation Service. Use DISA's Federated Development and Certification Environment (FDCE) to institutionalize select services in the Department's Enterprise C2 System/POR (currently envisioned to be GCCS-J). The EMF ACTD is scheduled to complete in September 2009. FY 2010 Planned Transition Strategy - Residual Support of pilots for user assessment, and transition to NCES. Transition of components to the National Senior Level Decision Support System JCTD.					
Focused Lethality Munition (FLM) Small Diameter Bomb (SDB) The Joint Requirements Oversight Council (JROC) validated the capability need for FLM in FY 2006. The outcome of FLM is to provide the Combat Air Force the ability to prosecute high-value targets	1.000	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
in collateral damage sensitive environments. FLM integrates a carbon fiber warhead case and the multi-phase blast explosive (MBX) onto the existing Small Diameter Bomb (SDB) I airframe. The FLM is not intended to replace SDB I but to complement it. FLM's sub-four meter accuracy will result in pin-point focused lethality with minimal collateral damage effects. FLM is a four-year project under sponsorship of United States Central Command (USCENTCOM) and with the U.S. Air Force as Lead Service/Agency. Completion of system development, demonstration, and fielding (approximately 50 residual FLM weapons) occured in mid-CY 2008 with continued contractor provided system field support through mid-CY 2010. The primary outputs and efficiencies to be demonstrated in the JCTD Military Utility Assessment are (1) successful integration of the carbon fiber warhead and MBX onto the existing SDB I airframe with a fully functioning weapon and kill mechanism, (2) safe carriage and separation from F-15E, (3) to demonstrate FLM's sub-four meter accuracy, (4) the elimination of fragmentation as kill mechanisms in the FLM weapon integration design,(5) a full and complete characterization of FLM's capability against defined a target set for USCENTCOM. The planned transition strategy is: (1) Upon successful Military Utility demonstration, USCENTCOM will conduct Extended User Evaluation (EUE) of the residual FLM weapons; (2) Upon receipt of formal direction and funding, the SDB program office will transition FLM into the formal acquisition cycle at Milestone C acquiring Low Rate Initial Production (LRIP) quantities; (3) The SDB program office will conduct follow-on system development and demonstration, production, and fielding support. *FY 2009 Accomplishments:* Continued FLM residual weapon fielding support. Completed FLM insensitive munition and hazard classification certification. Completed Milestone C transition activities which included final system maturation and assessment. The FLM JCTD scheduled completion is January 2010.					
Common Ground	6.100	5.375	7.150	0.000	7.150

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B. Accomplishments/Planned Program ($ in Millions)

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The Joint Requirements Oversight Council (JROC) validated the need for Common Ground functionality in FY 2009. The expected outcome is to have Joint or Coalition capability to interoperate on common ground geospatial data and C2 data and information and to have shared awareness to achieve unity of adaptive planning, execution and effects within C2 enclaves. Common Ground is built upon existing DoD net-centric data and Service Oriented Architecture (SOA) standards and guidance, as well as international standards adopted by the US to address information exchange (i.e., Joint Consultation, Command and Control Information Exchange Data Model - JC3IEDM). Common Ground will enable: 1) the sharing of digital orders and plans across C2 systems, a reduction of errors and misunderstanding among distributed systems. All Common Ground capabilities will be incorporated as commercial software under a DoD Enterprise License currently available to over 200 Joint and Service Programs of Record (POR) through FY 2014 (Commercial Joint Mapping Tool Kit (CJMTK). Common Ground is a multi-year JCTD sponsored by USJFCOM. The US Army Engineering Research Development Command (ERDC) is the technical lead agency, the National Geospatial Agency functions as transition agent. The NATO Consultation, Command and Control Agency (NC3A) serves as technical experts and liaison between NATO's systems and the US systems.					
FY 2009 Accomplishments: Verified unified doctrine for US and NATO ground operations C2, missions and tasks. Established a prototype of a geospatially extended JC3IEDM supporting US-NATO interoperability. Implemented common US analytic services in US ground C2 Systems. Conducted functional technology demonstrations to ensure architectural and IT stability and interim user juries to facilitate a user centric design for the components and information products within mission thread / use case assessment scenarios.					
FY 2010 Plans: Demonstrate commercial geospatially-extended NATO standard Joint Consultation, Command and Control Information Exchange Data Model (JC3IEDM) supporting Joint and multinational interoperability. Demonstrate common NATO and US analytic services in Joint C2 Systems. Draft					

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B. Accomplishments/Planned Program ($ in Millions)

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JC3IEDM specification extension to US and international JC3IEDM standards body (i.e., Multilateral Interoperability Programme). Produce test reports on architectural stability and documented interim user juries to facilitate a user centric design for the components and information products. Perform initial operational user assessment between US and NATO to validate assumptions on C2 efficiencies, model architectures and baseline interoperability, network and architecture metrics. Conduct assessments. *FY 2011 Base Plans:* Conduct final operational assessment. Award DoD Enterprise contract for analytic and interoperability software. Initiate Doctrine, Operations, Training, Materials, Logistics, Personnel, Facilities (DOTMLPF) activities. Complete documentation for enterprise licensing of functionality in NGA Commercial Joint Mapping Toolkit (CJMTK). Complete the JCTD.					
Riverine & Intercoastal Operations (RIO) The Joint Requirements Oversight Council validated the capability need for RIO JCTD in FY 2009. The outcome of RIO is demonstration and transition of technologies and operational concepts for persistent situational awareness in the Intercoastal and Riverine areas. RIO will demonstrate the value of remotely monitoring maritime areas of interest with interagency (DHS) and international (Colombia) partners as well as the U.S. Navy. RIO will enable situational and Maritime Domain Awareness through real time surveillance and advance reconnaissance of the riverine environment from a Mobile Operating Base (MOB), supporting the Battlespace Awareness and Force Protection capability areas. Persistent detection and monitoring of riverine activities will be accomplished through the use of networked Unattended Ground Sensors (UGS) and sensor data displayed in both the local and high-level Common Operational Pictures such as Global Command and Control – Maritime (GCCS-M). Local COP's display all remote detections as well as individual UGS control through wireless communications. RIO is a 2.5 year program with U.S. Southern Command as the operational manager, Naval Surface Warfare Center Dahlgren Division as the Technical Manager and Program Executive Office Littoral Mine Warfare – Antiterrorism/Force Protection (PMS-420480) as the Transition Manager.	2.800	2.420	2.600	0.000	2.600

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B. Accomplishments/Planned Program ($ in Millions)

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The Naval Expeditionary Combat Command (NECC) and Naval Special Warfare community offer U.S. Navy support for RIO. Initial capabilities will be technically demonstrated in late FY 2009. The first operationally demonstrated capability will occur within the Continental US (CONUS) in FY 2010 and will focus on the Intercoastal element of RIO which is of interest to both the U.S. Navy and DHS. The Intercoastal spiral will conclude with a Limited Operational Utility Assessment. The second RIO spiral will focus on the riverine environment and will be held outside CONUS (OCONUS) with Colombia in FY 2011. It will feature both a technical and operational demonstration and Limited Operational Utility Assessment OCONUS culminating with an Operational Utility AssessmentLetter of Observation from the Operational Test Agency. *FY 2009 Accomplishments:* Defined requirements and conceptual operations for both the US Navy and Colombia. Selected and technically demonstrated baseline technology solution set (sensors, communications and COP). Drafted and signed Master Information Exchange Agreement (MIEA) and other supporting agreements between U.S. and Colombia. Began technical and system integration discussions with Colombia. *FY 2010 Plans:* Define requirements and conceptual operations for both the US Navy and Colombia. Selecte and technically demonstrate baseline technology solution set (sensors, communications and COP). Draft and sign Master Information Exchange Agreement (MIEA) and other supporting agreements between U.S. and Colombia. Begin technical and system integration discussions with Colombia. *FY 2011 Base Plans:* Transition technical solution set from U.S. to Colombia. Integrate RIO aboard Colombian Riverine Support Vessel. Technically and operationally test and demonstrate RIO in the Intercoastal environment through formal Limited Operational Utility Assessment. Spiral capability to both the U.S. (Navy and DHS) and Colombia. Complete the RIO JCTD.					
Future Immersive Training Environment (FITE)	0.250	4.500	0.000	0.000	0.000

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The Joint Requirements Oversight Council (JROC) validated the requirements for the capabilities needed from FITE JCTD in FY 2008. The user sponsor and Operational Manager is USJFCOM. FITE JCTD will demonstrate advanced virtual training technologies for the small unit. It will provide a common software training environment for a variety of different training hardware configurations including laptop-based, Virtual Reality, Mixed Reality, and Augmented Reality. This two-year effort has been divided into two spiral demonstrations. The first spiral will demonstrate an individual worn Virtual Reality system based on the hardware platform selected by the U.S. Army's Dismounted Soldier programin support of the US Army CCTT DS program. The second spiral will deliver advanced Mixed Reality technologies for fixed location training facilities such as the Marine Corps' Infantry Immersion Trainer (IIT) and the Army's Combined Arms Collective Training Facility (CACTF). In addition it will deliver an individual worn Augmented Reality demonstration that will allow individuals to train small unit infantry skills at any location with special Augmented Reality equipment. This equipment will include a see-through Helmet Mounted Display that will project realistic looking virtual characters into the training environment. *FY 2009 Accomplishments:* Integrated FITE JCTD components into an individual worn squad- level Immersive Virtual Environment. Operational Demonstration scheduled at Fort Benning, GA and Camp Lejeune, NC. Began development of Spiral 2 demonstrations. *FY 2010 Plans:* Complete integration of Spiral 2 components: Facility Based Mixed Reality and Augmented Reality demonstration systems. Conduct Operational Demonstration in July 2010 at USMC and Army facilities TBD. Begin Transition of FITE JCTD capability to applicable Programs of Record.					
National Senior Leadership Decision Support Service (NSLDSS) The Joint Requirements Oversight Council (JROC) validated the need for NSLDSS in FY 2008. NSLDSS provides senior decision-makers a method for developing rapid situation awareness to	2.000	3.025	3.250	0.000	3.250

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support response planning and execution to time-critical events of national significance. Current processes rely heavily on teleconferences, resulting in much time spent on discovery, not decision-making. Information used to support decision-making is spread across the enterprise, not readily available in dynamic forms to distributed participants. NSLDSS is a combined hardware and software system consisting of DoD and commercial databases, search engines, source repositories, network enterprise services, policy decision services, enterprise universal data descriptor item, visualization tools, and web 2.0 capabilities. The primary outputs and efficiencies to be demonstrated in the JCTD are: (1) improved global situational awareness for senior leadership, (2) improved course of action options, and (3) improved quality of information for senior leader decision-making in a collaborative environment. The user sponsor is the Joint Staff J3 National Military Command Center (NMCC) and the Lead Agency is DISA. *FY 2009 Accomplishments:* Spiral I improved global situational awareness by leveraging existing tools to enhance situational awareness among the following organizations: Joint IED Defeat Organization - Counter-IED Operations Integration Center (JIEDDO (COIC)); STRATCOM (NDMI); DIA (DIOCC); NORTHCOM (Event Mgt Framework); Net Centric Enterprise System (NCES) (Collaboration, M2M, Security, Discovery; Search, etc). Identified and exposed data sources supporting Mission Threads (C2BMC, ESSA, METOC, etc) . Mission Threads are: Ballistic Missile Defense; Hurricane Threat; Mall of America; Hijacking of Airline; National Convention; Space Event. Technical Demonstration in the fourth quarter of FY 2009. *FY 2010 Plans:* Spiral 2 - Improve course of action options and decision making by integrating web services that support identification and visualization of available assets and resources. Conduct technical product integration, testing, and demonstrations including a Limited Operational Utility Assessment (LOUA).					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: Conduct Operational Demonstrations and complete the Operational Utility Assessment (OUA). Complete the transition to DISA Program of Record. The transition manager is DISA. Complete JCTD.					
Global Observer (GO)	8.100	2.800	0.000	0.000	0.000
The Joint Requirements Oversight Council (JROC) validated the capability need for Global Observer in FY 2007. The Global Observer JCTD is a transformational technology program that proposes to demonstrate a liquid hydrogen powered unmanned aerial vehicle, using a modified, off-the-shelf internal combustion engine, capable of flying extremely long endurance (objective of 7 days on station) with a moderately sized payload capacity (380 lbs) at an altitude of 55-65,000 ft. mean sea level. The output of Global Observer will be to provide low-cost persistent surveillance (ISR). The efficiencies of Global Observer will be a long endurance capability that would support placing system into theater from garrisoned locations, reducing the number of forward bases required for world-wide operations and relieving the optempo from other overstressed assets. *FY 2009 Accomplishments:* Supported the manufacture, integration, and test of Aircraft #1 and Aircraft #2. Aircraft #1 was readied for integrated system testing; the manufacture, integration, and test of LRE #1 & LRE #2, was conducted in FY 2009. The system flight test events at the flight test range were complete. Flight test venue preparation, range safety reviews, test planning were completed in the third quarter of FY 2009. LRE #1 was completed and readied for integrated system testing in FY 2009. The System was deployed to flight test venue in the fourth quarter FY 2009. *FY 2010 Plans:* Flight test range operations and T&E support and Operational Test Agency will be conducted in FY 2010. Aircraft #2 complete & ready for integrated system testing, 2Q FY 2010; Flight Readiness Review, 1Q FY 2010; LRE #2 complete and ready for integrated system testing, 2Q FY 2010.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Transition Strategy: The residual package will be transitioned to Air Force Special Operations Command for extended use to support its core mission of intelligence, surveillance, and reconnaissance with the persistent operations using the Eectro-Optics/Infrared and communications relay payloads. Pending Joint Requirements Oversight Council validation of the capability requirement, the Air Force Air Combat Command will transition Global Observer to the Combined Air Force.					
Hard Target Void Sensing (HTVS) Fuse	6.100	6.200	0.000	0.000	0.000
The Joint Requirements Oversight Council (JROC) validated the capability need for HTVS Fuze in FY 2008. The objective of the HTVS Fuze JCTD is to provide the Bomb Live Unit-109 (BLU) and BLU-113 legacy warheads the ability to count voids and detonate at the optimal point, and survivability and function in today's harder target environments. The JCTD will provide warfighting commands a proven capability with a number of residual mission ready fuzes no later than 12 months after the JCTD. The acquisition strategy allows a smooth transition from the JCTD to Engineering Manufacturing and Development (EMD) in FY 2010 followed by production. The U.S. Navy also has a requirement for this capability and provided FY09/10 funds to support the JCTD. The lead Combatant Command is USTRATCOM and the Lead Service is USAF. To date, the HTVS Fuze JCTD has accomplished the following: Sufficiency review for FY09 initiative to fund JCTD complete; Sufficiency review for SDD, Production and Sustainment completed; Acquisition Strategy for entire HTVSF Program Approved; Systems Requirements Review and Systems Functional Review for both contractors; Management and Transition Plan Approved. *FY 2009 Accomplishments:* The Management and Transition Plan was approved. Preliminary Design Review (PDR) and Interim Design Review (IDR) were completed. Initial sub-scale testing (cannon testing) and sled testing were conducted in an effort to refine M&S models. Initial Flight Testing was begun.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2010 Plans: Complete all sled and flight testing. Conduct final operational demonstrations. Complete Operational Utility Assessment (OUA) and Military Utility Assessment (MUA). Begin fabrication of residuals to be transitioned to USAF for future use. FY11 Planned Output: Begin transition of residuals to USAF. Deliver residuals to Whiteman AFB, MO for limited operational use. The Transition Manager is 679 ARSS.					
Internet Protocol Router in Space (IRIS) The Joint Requirements Oversight Council (JROC) validated the need for capability from IRIS in FY 2007. IRIS takes advantage of a planned launch of a commercial communications satellite to introduce Internet Protocol (IP) routing and cross-banding between C-band and Ku-band transponders. USSTRATCOM is assigned responsibility for global network operations, and as the operational user sponsor seeks to improve network reliability and availability through dynamic topology updates (multiple transport paths) and improved collaboration and interoperability among info sources and users (e.g., sensors, soldiers, command centers at Joint, Allied and Coalition levels). The IRIS outputs and efficiencies include (1) demonstrate the capability to collaborate with industry in leveraging the commercial acquisition processes to provide near-term, space-based, IP routing network capability, (2) demonstrate the capability via a commercial payload to conduct on-board IP packet routing communications from a geostationary orbit, (3) explore and incorporate a decision process to determine military user assignment to commercially provided IRIS SATCOM capability. The Defense Information System Agency (DISA) is the DOD lead Agency for obtaining commercial satellite communications support for operations, will develop a provisioning model for future assignment of military users to the demonstrated commercial capability as appropriate, and define contracting language for future services subscription in support of operations, including integration of IRIS services into existing network architectures beyond the IRIS JCTD.	5.200	0.968	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: Integrated industry-funded IRIS payload onto the IS-14 satellite. Industry launch of the IS-14 spacecraft (host for the integrated IRIS functionality) was delayed to FY 2010 because of higher priority military launches from the available launch facility. Conducted live scenario and capability based demonstrations in a laboratory environment using engineering-equivalent hardware to refine concepts for use and network procedures. *FY 2010 Plans:* Participate in the industry led end-to-end IRIS technical capabilities demonstration with representative hardware prior to Intelsat General IS-14 launch. Conduct operational and network services demonstrations with representative military and joint, inter-Agency users. Extend industry SATCOM-based IP-routed services for continued evolution of network services provisioning and management processes, potential billing procedures, and industry-government organizational and technical interfaces. Introduce the functionality to international partners through USAFRICOM sponsored capacity building demonstrations. Complete the JCTD. No additional JCTD investment projected, pending identification of fee-for-service DoD users.					
Joint Coordinated Real-time Engagement (JCRE) The Joint Requirements Oversight Council (JROC) validated the capability need for JCRE in FY 2005. The outcome of JCRE will be to develop the CONOPS and the GIG-enabled software that enables Joint Real-Time Operations and Engagement across multi-Combatant Command (COCOM) Theaters and Echelons. JCRE will support Joint Operations by providing Net-Centric Command and Control Tools that greatly enhance Planning and Execution across multiple COCOMS. These tools will be provided as web services, so they can easily be extended to support Combined Operations as directed by the Operational Sponsor. The JCRE capability will be achieved by extending and integrating the following technologies: Joint Force Global Situational Awareness (SA) Tools; Joint Force Engagement Packages; and Joint Force Synchronization Tools. These JCRE technology components will be implemented using	0.967	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
a Service Oriented Architecture (SOA) with distributed service orchestration. These JCRE technologies, tested on the Global Information Grid (GIG), will help validate whether the evolving GIG IP architecture and enterprise services can support the time sensitive performance requirements for global operations. Output and Efficiencies: percentage of relevant data that is properly synchronized; percentage of global operation centers that have Synchronization awareness; percentage of synchronization problems that go undetected for more than 10 minutes; Average time to detect a synchronization problem; Average time to determine impact of synchronization problems on effects; time to assemble and organize global effects; workload to assemble and organize global effects; time to synchronize global actions, capabilities, and resources; workload to synchronize global actions, capabilities, and resources; number of resynchronizations / number of original synchronizations (synchronization robustness); time to create a globally synchronized operational plan. The lead service is the Navy and the lead CoComs are U.S. Strategic Command and U.S. Special Operations Commands. *FY 2009 Accomplishments:* Prepared JCRE capability for primary transition to the Department's Enterprise C2 System/POR (currently envisioned to be GCCS-J). The Extended User Evaluation (EUE) Package consists of the JCRE System Prototype (all hardware and software required to host JCRE capabilities, in full or presentation server configuration), is being installed at USSTRATCOM, USSOCOM and DISA as necessary, and finalized Concepts of Operations (CONOPS) and Tactics, Techniques, and Procedures (TTP) documents and training packages, to be delivered to US Joint Forces Command (USJFCOM). Secondary transition targets include USSTRATCOM and USSOCOM programs of record-Integrated Strategic Planning & Analysis Network (ISPAN) and Special Operations Mission Planning Environment (SOMPE), respectively. Navy PEO C4I and Space are transitioning relevant capabilities as web services into the Department's Enterprise C2 System/POR (currently envisioned to be GCCS-J). The ACTD completed in FY 2009.					
Joint Enable Theater Access Seaports of Debarkation (JETA-SPOD)	0.600	0.605	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
The Joint Requirements Oversight Council (JROC) validated the need for JETA-SPOD capabilities in FY 2006. The outcome of JETA-SPOD is to develop and demonstrate: a Lightweight Modular Causeway System (LMCS) transportable by and employable from intra-theater sealift vessels such as the JHSV or other current Army/Navy watercraft; and an austere port Decision Support Tool for selection of optimal sites from multiple austere SPOD options. The capabilities proposed for development in this ACTD will optimize the use of the Joint High Speed Vessel (JHSV), current Army/ Naval watercraft, and Lines of Communication (LOC) bridging requirements by providing increased and more rapid flow of combat power and sustainment through multiple theater austere seaport locations. This provides to Joint/ Combined Force (J/CFC) commanders a means to mitigate threat anti-access activities and increases flexibility to conduct operational maneuver from strategic distances. JETA-SPOD ACTD is a three-year project under sponsorship of U.S. Pacific Command, with completion of development and demonstration by end of FY2008; and transition to U.S. logistics systems as early as FY2009. The lead service is Army. The primary outputs and efficiencies to be demonstrated in the ACTD Military Utility Assessment (MUA) are: 1)the LMCS will reduce weight, volume, and deployment time compared to existing military causeway and bridging systems; 2) the operational parameters for evaluating the military utility of the LMCS are based on a quantitative and qualitative comparison to the capability provided by the existing Modular Causeway System (MCS); 3) LMCS will result in a reduction in weight and volume by 50 percent over the MCS; a reduction in deployment time by 50 percent over the MCS; and elimination of in-water connections; 4) the Decision Support Tool capability equates to an increase in availability of throughput prediction information for 50-80 percent of worldwide small ports; and 5) the combination of LMCS and the Decision Support Tool includes a five-fold increase in the number of JHSV-compatible ports and doubling of the port throughput rate. LMCS Output includes incorporation of state-of-the-art connector and tensioning technology; innovative emplacement and recovery system applicable to multiple military/ civilian platforms; innovative self-locking and strap tensioning technologies; high strength fabrics for robust, lightweight floatation technology that quickly inflates/deflates for rapid LMCS emplacement and recovery; puncture/abrasion resistant floatation components; lightweight decking materials; and common 8x20 rapid transport footprint design. The					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
efficiency is that the transport (land/sea) cost of moving causeway capabilities into austere SPODs will be significantly reduced; and causeway capabilities will arrive in theater more rapidly with a smaller logistics footprint. Austere Port Decision Support Tool Output includes query-able austere world port data; a port characterization model; rapid port enhancement tool; austere port throughput simulation; a comprehensive set of environmental and physical factors affecting ingress/egress throughput rates; and parametric algorithms for throughput rates in small ports and rates for planning and execution of vessel offload operations; developed with an open source tool; user friendly Graphical User Interfaces (GUI); and runs on a laptop computer. The efficiency is that the warfighter will possess flexibility and a broader range of options to establish austere seaports as strategic or operational maneuver entry points with a greater assurance of success. The transition strategy for LMCS and the Decision Support Tool is to establish Programs of Record under the guidance of two Transition Managers: Product Director, Army Watercraft Systems (PD AWS) and USTRANSCOM, respectively. *FY 2009 Accomplishments:* Completed final Operational Utility Assessment and ACTD report; transitioned the Decision Support Tool to USTRANSCOM Program of Record and planned LMCS transition to Army Watercraft Systems Program of Record in FY12. Delivered the Decision Support Tool interim capability/residuals to the user (with Final Data Set). Demonstrated LMCS in both a “wet gap” crossing mode enabling the transit of a Disaster Relief force from bank to bank across the causeway and a crane launched emplacement simulating launch from a Joint High Speed Vessel (JHSV). Continued socialization for transition. *FY 2010 Plans:* Completed Lightweight Modular Causeway System (LMCS) sea state testing, demonstrated emplacement via rotary wing delivery and use during river crossing operations. Continued socialization and planned transition of LMCS to Program of Record. Finalized CONOPS documentation. Initiated transition of LMCS to Product Director, Army Watercraft Systems (PD AWS). Complete JETA-SPOD ACTD in September 2010.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Joint Force Protection Advanced Security System (JFPASS)	4.800	4.808	0.000	0.000	0.000

The Joint Requirements Oversight Council validated the capability need for JFPASS in FY 2008. JFPASS addresses the validated problem that current force protection technologies and concepts of operation do not provide a comprehensive, effective, and sustainable Joint force protection capability. Fielded systems do not provide comprehensive situation awareness, absorb too much manpower, and are too costly with many variants and redundancies. The outcome of JFPASS is to demonstrate and transition an integrated joint force protection Command and Control architecture, providing rapid situation awareness where needed, decision support, and more effective force protection with reduced workload through systems integration. The primary outputs and efficiencies to be demonstrated in the JCTD are: 1) numbers of currently distinct force protection systems that are integrated for common situation awareness; 2) decreased time required to provide situation awareness to all in chain of command with force protection response missions; 3) decrease in operations center manning and workload required to maintain force protection situation awareness and manage situation responses. JFPASS is a 3-year project sponsored by US European Command. The project will conduct an initial demonstration and limited assessment after one year, to be followed by in-theater installations and operational utility assessment in the second year. Army, Navy, and Air Force force protection experts are participating and contributing funding and expertise to the demonstration of this Joint force protection capability. The US Navy is providing the Technical Manager, US Air Force provides the deputy Technical Manager, and US Army provides the Transition Manager. This project is aligned with the Joint Staff Installation Unit Base Integrated Protection Capabilities Based Assessment process.

FY 2009 Accomplishments:
Refined situation awareness and systems integration architecture. Completed Operational Demonstration 1 and limited utility assessment at CONUS facility. Installed integrated capability at high priority EUCOM-selected base. Conducted Operational Demonstration 2. Continued transition planning.

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2010 Plans: Complete utility assessment. Complete JCTD. See JCTD BA4 R2a for additional transition activity.					
Joint Multi-Mission Electro-Optic Sys. (JMMES)	4.600	0.000	0.000	0.000	0.000
The Joint Requirements Oversight Council validated the capability need for JMMES in FY 2007. The outcome of JMMES is demonstration and transition of airborne sensors and automated processing for automatic detection of items of interest for Joint Service, Coalition, and Interagency partners. The JMMES project will demonstrate use of advanced multi-spectral sensors in an aircraft turret compatible with existing turret mounts in US Navy, US Army, Drug Enforcement Agency, and British and Canadian aircraft, as well as future planned unmanned air systems. The project will develop and demonstrate automatic processing and automated operator cueing for targets such as submarines, mines, targets under trees, illicit crops, and search-and-rescue targets at sea. The primary outputs and efficiencies to be demonstrated in JMMES Military Utility Assessments are (1) ability of JMMES to recognize targets of interest, in terms of (a) percent of auto detections and auto cues that are relevant, (b) distance error of auto detect and auto cue reports, (c) timeliness of reports (seconds) to decision makers; and (2) ability of JMMES to defeat denial and deception efforts, in terms of (a) percent of denial and deception efforts defeated, (b) where and when JMMES applies (operating environments, seasons, time of day, range, etc.), (c) percent of time operable during missions, and (d) reliability and logistic support requirements. JMMES is a 3-year project sponsored by U.S. Pacific Command and U.S. Southern Command. Initial capabilities will be demonstrated and operated in FY 2007, with demonstrations against additional targets with additional aircraft types in FY 2008 and FY 2009. Transition activities began in FY 2007, leading to firm transition to programs of record. The lead Service is U.S. Navy. *FY 2009 Accomplishments:* Completed flight testing and conducted military utility assessment (MUA). Supported ongoing transition and preparation for FY 2010 sustainment/integration activities (bridge to program of					

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B. Accomplishments/Planned Program ($ in Millions)

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record). Completed Concept of Operations, Tactics/Techniques/Procedures, and System Architecture documentation. Completed military utility assessment. Completed the JCTD.					
Joint Surface Warfare (JSuW)	5.800	1.452	0.000	0.000	0.000
The Joint Requirements Oversight Council (JROC) validated the capability need for JSuW in FY 2007. The output of the JSuW JCTD will be to allow multiple existing Intelligence, Surveillance, and Reconnaissance (ISR) assets, launch platforms, and standoff weapons to communicate via maturing weapons data link network technologies. The efficiency will be that Joint ISR platforms may provide initial targeting data and in-flight targeting updates to standoff weapons while the launch platform either remains beyond or decreases time inside the threat envelope. As a result of this interaction via the weapons data link network, the Combatant Commander will be provided multiple options for joint kill chains to increase operational agility, and have significantly extended space in which surface targets may be successfully prosecuted. *FY 2009 Accomplishments:* Completed system testing and flight demonstration. *FY 2010 Plans:* Final demonstration and JCTD completion.					
Large Data	9.000	0.000	0.000	0.000	0.000
The Joint Requirements Oversight Council (JROC) validated the capability need for Large Data in FY 2006. The outcome of Large Data demonstrated the military utility of a highly scalable, rapid, and secure integrated capability to retrieve, store and share massive amounts of information effectively between globally distributed users. It provides increased situational awareness by displaying large, fused sets of geospatially-referenced data in a Joint Warfighting context using intuitive user dataset navigation techniques. The primary outputs and efficiencies demonstrated in the JCTD Military Utility Assessment (JMUA) are: 1) Synchronization of databases across all major operational storage nodes,					

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	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
i.e. cache coherency; 2) Timely delivery and sharing of data - instant real time access and collaboration; 3) Intuitive ways for users to navigate large (petabytes to exabytes) data sets; 4) Ability to easily visualize huge amounts of data generated; 5) Capability to perform "trackback" or change analysis on an unprecedented scale. The sponsor was U. S. Strategic Command. The lead agencies were the National Geospatial Agency (NGA) and Defense Systems Agency (DISA). Transition in FY 2009 to National Geospatial Agency (NGA) and Defense Systems Agency (DISA). *FY 2009 Accomplishments:* Finalized JMUA reporting. Continued use of functionality in preparation for integration and transition into program of record. Large Data is currently operational as is completing early acceptance and transition to the Army's Road Runner program. Completed the JCTD. Transition Strategy: U.S. Forces Korea leadership support has accelerated Army INSCOM plans to transition Large Data to the Distributed Common Ground System (DCGS-A) Fixed POR. Early acceptance testing with JIEDDO and Army stakeholders led to Army G2 funding the Large Data RoadRunner program to accelerate exploitation of wide area persistent surveillance (WAPS) data for OIF/OEF. In parallel, the Large Data team has successfully demonstrated Large Data global, cloud computing services to accomplish data virtualization with inherent failover and recovery. This critical transition milestone followed an early delivery of web service-based Large Data updates to the Integrated Strategic Planning Analysis Network (ISPAN) Global Situational Awareness Tool (GSAT), and secured USSTRATCOM leadership endorsement of the Large Data Transition Plan.					
MASINT Tactical Intelligence Fusion (MASTIF) The Joint Requirements Oversight Council (JROC) validated the capability need for MASTIF in FY 2006. The outcome of MASTIF is to provide the warfighter with a data fusion capability to enable a single operator to exploit the benefits of a suite of multi-disciplined sensors against concealed/ obscured targets in near real-time while: (1) Enabling a single operator with minimum time over target to rapidly detect, identify, and geolocate potential targets using automated sensor fusion and reasoning;	2.000	2.420	0.000	0.000	0.000

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(2) Reducing sensor false alarm rates by combining multiple types of intelligence sensor outputs; (3) Increasing operator efficiency by improving situational awareness through automated sensor management and pointing; (4) Eliminating the need for the operator to gain expertise on each individual sensor; and (5) Providing an open architecture design that can be adapted and tailored to different mission applications and operational environments. This five-year project is under the sponsorship of the United States Southern Command (USSOUTHCOM), which also serves as the Operational Manager. The lead DOD agency is the Defense Intelligence Agency (DIA) and the Transition Manager is the United States Special Operations Command (USSOCOM). *FY 2009 Accomplishments:* Performed final stages of sensor integration and complete developmental testing; carried out operational testing activities; and conducted final demonstration on airborne test platform for JMUA. Coordinated with transition partners for custom capabilities to field during transition and identified opportunities for integration of other on- or off-board sensor information. Supported modifications and provided documentation required for transition. *FY 2010 Plans:* Conduct OCONUS testing in relevant SOUTHCOM environment to examine military utility further, as well as partnering with additional programs and collection capabilities to examine synergies in data and CONOPs. Customize system for installation on user partner platform. Continue development of CONOPs and TTPs, based on user feedback. FY2011 Plans: JCTD complete. Capabilities transition to user community.					
Mapping the Human Terrain (MAP-HT) The Joint Requirements Oversight Council (JROC) validated the capability need for MAP-HT in FY 2007. The outcome will provide improved capabilities to effectively collect, consolidate, visualize and understand open source socio-cultural (green data) information to assist Commanders understanding of the human terrain in their Area of Responsibility (AOR). MAP-HT JCTD will develop and demonstrate	1.200	0.000	0.000	0.000	0.000

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an integrated, open-source, spatially/relationally/temporally referenced human terrain data collection and visualization toolkit to support Brigade Combat Teams (BCT)/Regimental Combat Teams (RCT) in understanding the human terrain in which they operate. The overall project context for MAP-HT is development and deployment by, through, and with deployed units in theaters of operations. The primary outputs to be demonstrated to the users and evaluated in the Military Utility Assessment are: (1) provide a web services application toolkit to collect, disseminate, analyze, and visualize socio-cultural information in geospatial and social network contexts at the non-classified and secret levels, (2) provide standard operating procedures (SOP) and concept of operations (CONOPS) , as well as tactics, techniques and procedures (TTP), (3) provide training on-line and manuals on the use of the system, (4) establishes direct cultural support to BCT/RCT commanders, civil affairs and interagency end-users, which will minimize loss in continuity between unit relief in place/transfer of authority. (U//FOUO) The MAP-HT Transition Sponsor is USA Distributed Common Ground Station Program of Record (DCGS-A POR). The sponsoring Combatant Command (CoCOM) is U.S. Central Command (CENTCOM). Other involved organizations include the U. S. Marine Corps, U. S. Special Operations Command (USSOCOM) and the U.S. Army Civil Affairs and Psychological Operations Command. The U.S. Army is the lead organization. *FY 2009 Accomplishments:* Revised Management & Transition Plan to incorporate changes determined by oversight group. Integrated, demonstrated and assessed spiral 2 capability and provided interim capability for fielding. Developed spiral 3 capabilities and associated assessment plan and conops. Completed the JCTD. FY 2010 Transition Strategy to Distributed Common Ground System -Army (DCGS-A).					
Maritime Auto Super Track enhance Reporting (MASTER) The Joint Requirements Oversight Council (JROC) validated the capability need for MASTER in FY 2007. The initial goal of MASTER is to demonstrate a set of technologies with associated Concepts of Operations (CONOPS), which provides automatic tracking of ship traffic using both unclassified	1.577	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
and classified methods and which will provide a tangible improvement of United States maritime domain awareness on a global-basis. The MASTER JCTD also provides a common set of Tactics, Techniques and Procedures (TTPs) to the Intelligence Community (IC) that will allow adoption of this new capability across the IC. The primary outputs and efficiencies to be demonstrated in the Military Utility Assessment (MUA) are to develop and deploy a persistent maritime awareness capability for the analyst, warfighter and decision maker that enables: (1) significant increase in worldwide, multi-INT vessel tracks using information sources from SCI/Secret/Unclassified-levels and dissemination of these "Super Tracks", to operational users at the JWICS and Secret security levels; (2) percent decrease in the time required for an intelligence analyst to assemble the maritime awareness picture of ships using track , cargo and people information ; (3) percent increase in the ability of an analyst to determine ship threat profile (friend or foe) based on ship track, cargo and people information at the JWICS level; (5) percent increase in number of maritime awareness entities (ship, people, cargo, infrastructure) and the ability to manually and automatically fuse the data. The JCTD Residuals include: 1) Multi-INT fusion for worldwide MDA tracks with associated metadata; 2) web portal at the JWICS level; 3) SOA at JWICS level; 4) Alarms/alerts notification methodology; 5) Operationally tested CONOP for a 24/7 worldwide capability. MASTER is a three-year JCTD under the sponsorship of US Northern Command (NORTHCOM) and U.S. Navy, with completion of development and demonstration by the end of FY 2009 and transition to the IC through Office of Naval Intelligence beginning in FY 2009. The lead Service is Navy. *FY 2009 Accomplishments:* ConductedTechnical Demonstration #2; Conducted Final Operational Demonstration of MASTER with enhanced techniques for analytical user, and transition and operational users; publish Joint Military Utility Assessment (JMUA). Completed the JCTD.					
Medusa	5.638	5.000	4.310	0.000	4.310

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
The Joint Requirements Oversight Council (JROC) validated the capability need for Medusa in FY 2008. The Medusa JCTD will demonstrate the employment of the Low Cost Guided Imaging Rocket (LOGIR) aboard the US Navy MH-60S helicopter against a multi-axis simultaneous attack from Fast Attack Craft (FAC) and Fast Inshore Attack Craft (FIAC). In this manner, US and coalition surface ship formations may protect themselves against coordinated asymmetric threats in a maritime environment. This capability will provide a leap ahead of current ship self-protection options, and contribute to a multi-layered, scalable maritime defense strategy. Additionally, the technology is readily adaptable for use against land-based targets. *FY 2009 Accomplishments:* Designed the launcher and rockets aboard the MH-60 aircraft. *FY 2010 Plans:* Complete the design and integration of the launcher and rockets aboard the MH-60 aircraft. Complete preliminary demonstrations. *FY 2011 Base Plans:* Final Demonstration and JCTD completion will be in the first quarter of FY 2011. Transition Strategy: Flight-qualified launchers and rockets, along with modified MH-60 software builds will be made available for limited use in theaters immediately post-MUA. At this same time, Milestone B documentation will have been prepared along with and SD&D contract package to establish LOGIR as a Program of Record. Medusa rocket and launcher designs, software, CONOPS, and TTPs will transition directly to the LOGIR and MH-60 PORs.					
Multi-Function Threat Detector (MFTD) The Joint Requirements Oversight Council (JROC) validated the need for MFTD JCTD capabilities in FY 2008. The output of MFTD JCTD will be to provide indication, warning, or situational awareness	0.650	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
to the pilot or aircrew of non-guided threats such as small arms fire, tracer fire, anti-aircraft artillery fire, and rockets/rocket propelled grenades (RPGs). The efficiencies of MFTD JCTD will be to reduce significant and unacceptable vulnerabilities to highly proliferated battlefield threats to include MANPADs, RPGs and Unguided Rockets (UR). MFTD JCTD expands aircraft MWS to include Hostile Fire Warning (HFW) from MANPADS, RPGS, URs and incoming Surface-to-Air Fire from small arms to Anti-Aircraft Artillery. MFTD JCTD will develop software algorithms to detect, characterize, and display unguided threats to the aircrew. MFTD JCTD plans to develop an infrared micro-lens optics package that provides simultaneous spatial and temporal co-registration of spectral images. The HFW algorithm will not degrade the current operational performance of the Missile Warning (MW) or LW Sensors. *FY 2009 Accomplishments:* Conducted the MFTD JCTD module demonstration with MFTD sensor module mounted on tripod and tested against HFI threats. Tested data was acquired and analyzed. FY 2010 plans were accomplished with FY 2009 "two year" funding and partnerships. MFTD JCTD was integrated into AAR-47 sensor head as Hostile Fire Indicator (HFI) detector demonstration with the planned demonstration venue at China Lake, CA. It tested the HFI system installed in a remotely controlled helicopter in self-powered hover under realistic flight loads and against actual threats at and around the helicopter in-hover to assess accurate HFI. Recorded measured data to determine project operational utility, provide for system integration, and expedite flight qualification. The final demonstration and OUA will be conducted in a flight simulator in FY 2010. Acquisition/Transition Strategy: MFTD JCTD is targeted to transition into the Navy AAR-47 Program of Record (POR). First, the MFTD JCTD module will be integrated into the AAR-47C(V)1 sensor, and fielded to those aircraft that currently are outfitted with the AAR-47. Also, since the MFTD JCTD technology potentially compliments the Joint and Allied Threat Awareness System (JATAS) program will look at the MFTD JCTD HFI technology during the JATAS program RFP process which is estimated to go out in early FY 2009.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Net Zero Plus (NZP)	2.423	3.025	0.650	0.000	0.650
The Joint Requirements Oversight Council (JROC) validated the capability need for NetZero Plus (NZP) in FY 2008. The outcome of the NZP JCTD is to demonstrate and assess reduced fuel demand, improved infrastructure and alternative energy supply seamlessly provided to the warfighter. This will be accomplished by reducing external fuel requirements for facilities/forward operating bases and reducing risk to coalition lines of communication, i.e., reducing delivery of fuel to bases and facilities by soldiers, sailors, airmen, and marines. NZP leverages research and development from federal and private labs and COTS/GOTS technology in innovative power generation and distribution, energy efficient enduring and expeditionary structures, efficient lighting and renewable energy. The combined capabilities will establish an energy efficient Forward Operating Bases blueprint that may be utilized by tactical elements, operational commanders, theater planners, interagency organizations, and coalition partners. The emphasis will be on replacing or improving temporary living, office, and operational facilities with energy efficient structures and integrating renewable energy technologies with improved energy generation to power those structures. NZP JCTD is a three-year demonstration under the sponsorship of U.S. CENTCOM with the completion of the demonstration by end of FY 2010; and transition to programs of records as early as 2010. The lead Service is the Army but the Air Force and Marine Corps are also participants. The primary outputs and efficiencies to be demonstrated in the JCTD Military Utility Assessment (MUA) are: the performance of alternative structures, distribution and supply with metrics measuring the number of kilowatts used with a goal of 40 percent reduction the first year, 50 percent in the second year and 60 percent the third and final year along with a integrated DOD energy strategy and roadmap. The schedule is to conduct utility assessments in FY 2009 and FY 2010 to achieve Final Demonstration, Completion and Transition FY 2010. After completing a demonstration, a technology will be spiraled, transitioned, or ended due to lack of operational utility. Demand, Infrastructure, and Supply technologies are planned for transition to Mobile Electric Power Program of Record, PEO (Combat Support and Combat Services Support) Force Provider Program of Record, Air Force Basic Expeditionary Airfield					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Resources (BEAR), and placed on the General Services Administration (GSA) Schedule or Defense Logistics Agency (DLA) acquisition. *FY 2009 Accomplishments:* Completed exterior insulation of structures; installed various expeditionary structures including solar power tents and different insulation technologies, installed various internal lighting; installed solar operated perimeter lighting; initiated demonstration of the Deployable Renewable Energy Alternative Module (DREAM) and installed the Electronic Power Control and Conditioning (EPCC) for smart power distribution systems; Data collection continued including user data. *FY 2010 Plans:* Install a two-story energy efficient dome, expand intelligent power distribution with installation of a 1 megawatt microgrid, add a Waste to Energy system and integrate Alternative Power Generation. Continue data collection and analysis; Conduct final Military Utility Assessment; develop Net Zero Plus strategy and roadmap for foreign operating bases (FOB) and U.S. installations. NZP JCTD scheduled completion date is September 2010. *FY 2011 Base Plans:* FY 2011 Planned Output: Complete data collection and assessment and finalize military utility assessment for final Net Zero-Plus strategy and roadmap for FOBs and U.S. installations.					
Shadow Harvest The Joint Requirements Oversight Council (JROC) validated the capability need for SHADOW HARVEST in FY 2008. The outcome of the SHADOW HARVEST JCTD is to provide Combatant Commands an integrated, joint airborne capability to provide persistent surveillance to consistently, accurately and efficiently find, fix, track and target enemy assets obscured by weather, vegetation, camouflage, concealment and/or deception (CC&D). The program leverages the Defense Intelligence Agency's (DIA) SHADOW HARVEST C-130 based program along with several maturing sensors and	6.100	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
relevant networking/data fusion/recognition technologies. SHADOW HARVEST will provide a timely and low cost C-130 based approach to integrate, operationally deploy, and demonstrate new sensor processing, exploitation, and dissemination (PED) capabilities into the intelligence production cycle and will require fewer personnel, reduce or eliminate dependence on specialized collection platforms, mitigate the problems associated with equipment standardization and minimize the impact on the maintenance infrastructure. The goal of this JCTD is to transition a mature system, architectures, flexible adaptive CONOPS and platform which will allow for flexible airborne remote sensing in a tactical or irregular warfare environment. SHADOW HARVEST will be compatible with intelligence community, DoD and COCOM requirements and will provide a rapid to-the-field development capability for future sensor systems. SHADOW HARVEST is a two-year project sponsored by USSOUTHCOM, and the JCTD is scheduled to be complete by the end of FY 2009. It will transition to selected Program Manager(s) / Program of Record(s) by FY 2012. The lead service is the US Air Force. The DIA is the lead agency responsible for organizing a multi-agency, multi-service team for the JCTD. The primary outputs and efficiencies of the JCTD Joint Military Utility Assessments are: (1) Conduct multiple airborne mission demonstrations against challenging CC&D/OTs using a tailorable C-130 multi-sensor system complete with on-board multi-phenomenology data fusion and ground PED, (2) Demonstrate and assess sensor cross-cueing/collaboration techniques for both baseline/new electro-optical/radar sensors and maturing MASINT sensors (to include low frequency/Multi-Band Synthetic Aperture Radar (MB-SAR), and hyperspectral imaging (i.e., Spectral Infrared Remote Imaging Transition Testbed (SPIRITT)), (3) Demonstrate dynamic in-flight mission tasking against emerging/evolving target sets, (4) Publish an OUA of the capabilities demonstrated and develop joint CONOPS and TTPs for COCOM target sets that will help the MAJCOM to develop sensor-mix strategies for COMCOM Target sets/ missions and develop theater specific CONOPS to enable new collection capabilities to be integrated into the COCOM intelligence production cycle, (5) Maintain operation readiness, in flight status, for Extended Use of Residuals (EUR) assets to include a DIA SHADOW HARVEST system available for USAF and DIA tasking until transition to POR.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: Coordinated the Management Plan (to include initial transition plan) and began final system integration activities. Coordinated and planned demonstration activities to requested CoCom AOR. FY 2010 Planned Activities to include additional demonstrations. The partnerships will conduct the final demonstration in the CoCom's AOR and complete the JCTD.					
Small Unmaned Aerial Vehicle (SUAV)	1.300	1.210	0.000	0.000	0.000
The JROC approved the capability need for SUAS in FY 2006. The outcome of SUAS is to address Joint operational concerns noted during on-going operations through the integration of new technology across the entire class of Small UAVs. The outputs and efficiencies to be demonstrated are: technology insertions to provided measurably improved performance/logistical support in the following areas: Command, Control and Communications (C3); Payload Integration; Targeting; Platform Related Issues (power, propulsion, etc.); improved operator training though the use of integrated training programs with emphasis on simulation; improved and more efficient Tactics, Techniques, and Procedures (TTP) across the Services for small unit real-time reconnaissance and surveillance capabilities. New operational capabilities will be evaluated and no less than once per year. Transition strategy: FY 2009/2010 is the transition period. The capabilities will be integrated into USSOCOM systems, and available for integration into all SUAS customers assets (spiraled out of the ACTD into the field as they become available). The User Sponsor and Lead agency is U.S. Special Operations Command (USSOCOM).					
FY 2009 Accomplishments: Military Utility Assessment (MUA) - Performed the final (culminating) assessment, capturing overall improvement to operational capabilities, Extended Use (EU) and transition support of fielded technology and training packages continued.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2010 Plans: MUA reporting, Extended Use (EU) support of fielded technology and training packages will begin. The ACTD will complete in FY 2010.					
Smart Threads Integrated Radiation Sensors (STIRS)	4.050	0.000	0.000	0.000	0.000
The Joint Requirements Oversight Council (JROC) validated the capability need for Smart Threads Integrated Radiological Sensors (STIRS) Joint Capabilities Technology Demonstration (JCTD) in FY 2007. The objective of the JCTD is to demonstrate and transition the capability to detect, identify, and disseminate radiological information on land, maritime, and airborne environments in order to enhance combating weapons of mass destruction operations. The capability suite will use a combination of proven and innovative radiation detection capabilities, networked through open-architectures, to aid in counterproliferation and consequence management missions. These capabilities have global applicability with forward-deployed Combatant Command (CoCom) ground forces (U.S. Army), U.S. Naval Maritime Components, and US Coast Guard elements in the transient areas. In all mission areas, the systems will be capable of being networked and radiological information can be provided through existing tactical, operational and strategic command and control (C2) networks. The is a multi-year JCTD sponsored by the US Northern Command (NORTHCOM); Defense Threat Reduction Agency (DTRA) is Lead Agency and US Naval Sea Systems Command (NAVSEA O4LR) and the Joint Program Executive Office for Chemical and Biological Defense (JPEO CBD) are co-Transition Managers. The operational demonstration/exercise (ODX) phase will complete in FY 2009 and transition will begin in FY 2009 through FY 2010. The capabilities and attributes below are the basis for the Joint Operational Utility Assessment (OUA) measures of effectiveness (MOEs) and measures of performance (MOPs): a. Detect and identify concerning R/N material/threats. - Attributes: precision, spectrum, quality, timeliness.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
b. Correlate and fuse information to develop shared understanding. - Attributes: quality, scalable, tailored to users. c. Enable support of/execution across, spectrum of battlefield environments (land, sea and airborne). - Attributes: robustness, persistence. d. Collaborative, networked joint and interagency information sharing. - Attributes: networked, interoperable, and fully integrated. *FY 2009 Accomplishments:* Conducted operational demonstrations/ exercises (ODX) with US Navy Level I, II and III Boarding Teams (MPDS capabilities); Conducted VMDS technical testing followed by technical demonstrations with operational unit training; Planned and conducted operational demonstrations/exercises (ODX) with 20th Support Command (CBRNE) for both MPDS and VMDS capabilities; Conducted Aerial Radiation Detection, Identification and Measurement System (ARDIMS) technical testing and system characterization, followed by unit training; planned and conducted operational demonstrations/ exercises (ODX) with 20th Support Command (CBRNE) for ARDIMS capabilities, supporting/ interdiction missions, and post-event radiation mapping/detection, utilizing manned and/or unmanned aerial platforms. Completed the JCTD. The FY 2010 Transition Strategy - begin Extended Use activities, continued with transition of STIRS JCTD capabilities to Programs of Record (POR).					
Tactical Service Provider (TSP) The Joint Requirements Oversight Council (JROC) validated the need for TSP in FY 2007. The TSP JCTD takes advantage of emerging wireless commercial technologies to enhance and improve C2 and Net-Centric capabilities to meet critical present and near-term requirements. TSP conducted a final operational demonstration and assessment in the fourth quarter of FY09. Transition to the Global Broadcast Service (GBS) program of record entailed non-recurring engineering to add bi-directional functionality testing to the GBS Test and Evaluation Master Plan, definitize acquisition documentation	3.000	0.000	0.000	0.000	0.000

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for Service ordering of upgraded GBS terminals, and inclusion of TSP JCTD demonstrated functionality in the GBS migration of broadcast management to the Defense Enterprise Computing Centers in FY 2010-FY 2011. TSP outcome improves throughput, efficiency and availability of broadband communications between strategic information sources and tactical users, as well as between tactical users. The output is wideband SATCOM multicast/broadcast of information products to deployed forces while providing lower data rate reach back SATCOM supporting two-way services for tactical users. The efficiency is substantial increase in delivery of tactically relevant command and control and intelligence-related information products to land mobile troops, and the near real time delivery of tactically generated information to operational and strategic echelons. TSP was a three year JCTD co-sponsored by USCENTCOM and USTRANSCOM. The Defense Information Systems Agency (DISA) is the integrating lead agency. US Air Force is the lead transition Service. *FY 2009 Accomplishments:* Demonstrated militarily useful functionality in operationally relevant scenarios. Conducted operational utility assessment. Finalized documentation to transition functionality to programs of record. Completed the demonstration phase of the JCTD. Produced GBS Program focused developmental test and evaluation documentation for transition to sustainment and implementation. Performed pre-acquisition activities for Service implementation in the next cycle of terminal buys. Transitioned the TSP interface specifications, architectural documentation and services definitions to the GBS Program. Completed transition of TSP produced specification documentation, training and use documentation and TEMP adjustments to USAF GBS Program. Participate in USAF GBS OT&E events to confirm integration of TSP functionality into next generation GBS architecture and hardware foundation. Completed JCTD activities.					
Theater Effects Based Operations (TEBO) The Joint Requirements Oversight Council (JROC) validated the capability need for the TEBO. The outcome of the TEBO ACTD is to provide Combatant Commanders with enhanced capabilities to	2.000	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

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analyze, plan, execute, and assess Effects-Based Operations (EBO) at the strategic and operational levels by integrating computer-aided decision support tools, Concept of Operations (CONOPS), and Tactics, Techniques and Procedures (TTPs) into the command's Mission Architectures. The TEBO ACTD is a multi-year project under the sponsorship of Pacific Command and Combined Forces Command/U.S. Forces Korea (CFC/USFK) as the Operational User. Completion of development and demonstration is planned for by the end of CY 2009 with transition to the Net Enabled Command Capability (NECC) System of Record in 2010. The lead service is Army. The primary outputs and efficiencies to be demonstrated in the TEBO ACTD Military Utility Assessments are (1) Exploit existing knowledge base(s) of strategic, operational and tactical environments (e.g. Operational Net Assessments [ONA] - critical capabilities and vulnerabilities, centers gravity [COG] and nodal analysis, (2) Facilitate collaborative effects-based campaign planning within a combined/Joint environment, (3) Support execution with prioritization of strategic and operational levels of effort, synchronization of actions, and battle tracking, (4) Comprehensively assess and forecast progress toward the desired end state by analyzing observed direct and indirect effects. *FY 2009 Accomplishments:* Integrated with Turbo Planner and modeling/simulation tools to fulfill Adaptive Planning Strategic Guidance requirement for APEX. Transitioned to the Department's Enterprise C2 System/POR (currently envisioned to be GCCS-J) POR. ACTD completion in September 2009. Transition Strategy: FY 2010 User Assessment and participation in UFL 2009. FY 2011 - Transition to the Department's Enterprise C2 System/POR (currently envisioned to be GCCS-J).					
Transnational Information Sharing - Cooperation (TISC)	3.000	3.630	0.000	0.000	0.000
The Joint Requirements Oversight Council (JROC) validated the capability need for TISC in FY 2008. The outcome of TISC is to provide software tools for a non-classified portal for collaboration, planning and assessment by external partners and interagency organizations. The TISC capability will allow disadvantaged users to use the portal at low or no cost and accessibility will be possible in austere and					

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minimal network infrastructure environments. This capability will provide collaborative chat, identity management, translation and multi-lingual text chat and Web 2.0 social networking tools. Outputs and efficiencies will include improved planning and response to theater security cooperation challenges and stability and reconstruction operations. Technologies demonstrated will reduce the time and increase the effectiveness of disaster relief, humanitarian assistance and stability operations where DoD, interagency, non-governmental organizations, international organizations, coalition nations and other first responders need to cooperatively act, plan and assess courses of action. The TISC initial demonstration occurred in the 2008 Coalition Warrior Interoperability Demonstration events held at multiple locations. USEUCOM and USSOUTHCOM serve as sponsors and COCOM representatives to determine operational requirements, demonstrations, assessment and operational concepts. Requirements and operational assessment will include external partners outside of DoD in the TISC community of interest. The TISC capability (operational concepts, tactics and procedures) will transition to the Theater Security Cooperation community, while the sustainment of the information sharing portal will become the responsibility of DISA using a fee for service model. The lead COCOM responsibilities are jointly shared between the US Southern Command (SOUTHCOM) and the US European Command (EUCOM) and the lead agency is the Defense Information Systems Agency (DISA). TISC is a multi-year JCTD that will conclude in 2011.					
FY 2009 Accomplishments: Spiral 2 demonstration and assessment was completed in African Endeavor and Common Endeavor for the EUCOM sponsor. Approved the Management and Transition Plan. Continued series of incremental capability technical demonstrations leading to the spiral 2 assessment.					
FY 2010 Plans: Demonstrated and operationally assess TISC in the SOUTHCOM area of operations in Fuersas Aliadas Humanitarias (FAHUM) in April 2010 or another operational venue. FY 2011 Planned Output – Transition TISC capabilities and operational concepts to the Office of Primary Responsibility (OPR) for					

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Theater Security Cooperation policy. Transition sustainment of the TISC portal will transition to DISA and other sustaining organizations in DOD, USG or others.					
One Box One Wire (OB1)	0.500	7.260	7.800	0.000	7.800
The Joint Requirements Oversight Council (JROC) validated the need for OB1 in FY 2009. The outcome of OB1 will be a generic computer workstation using a secure operating system separation kernel, virtual machine technology, and encrypted network communications path to enable a user to access multiple computer networks and information services operating at different levels of security from Top Secret to Unclassified from a single computer workstation. The information domains are kept separate. OB1 consolidates the network infrastructure from multiple terminals and network cabling at individual workstations to a single terminal connected to multiple data centers via one wire (network cable) — one box, one wire, multiple network and security domain access. The OB1 JCTD output will be formally evaluated and certified information security products pursuant to the combined DOD Intelligence Community Cross Domain Solution evaluation process managed by the Unified Cross Domain Management Office (UCDMO) and accredited for use in a broad spectrum of operational environments. The primary efficiencies include significantly reduced physical infrastructure (numbers of computers and network interface cards and wires), time and manpower savings in establishing mission networks, and savings in power, air conditioning, and other base/installation/office operating requirements. OB1 JCTD plans for a final demonstration and assessment in the fourth quarter of FY 2011. OB1 is a multi-year JCTD sponsored by USCENTCOM. *FY 2009 Accomplishments:* Commenced assurance evaluation. Commenced network systems and security engineering and implementation planning with representative operational employment venues. Commenced assessment and deployment planning.					

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FY 2010 Plans: Continue security assurance evaluation, network systems and security engineering and implementation planning with representative operational employment venues. Commence operational assessment and deployment planning. Transition manager is Air Force Cryptologic Systems Group. *FY 2011 Base Plans:* Conduct military utility assessment in operational network environments. Complete accreditation documentation and prepare for initial deployment. Transition to configuration management for sustainment Complete the JCTD.					
Mission Assurance Decision Support System (MADSS)	2.500	1.283	1.313	0.000	1.313
The Joint Requirements Oversight Council (JROC) validated the need for MADSS functionality in FY 2009. The expected output is a standardized framework and global capability for Commanders C2-related anomaly response and execution, and defense support to civil authorities. The MADSS JCTD will provide integrated C3 Operational and critical infrastructure relationships understanding by correlating data from different data sources, using web-based services, secure network and automated data transformation services. MADSS JCTD final demonstration and assessment will occur in the third quarter of FY 2011, with transition to Defense Information Systems Agency programs of record in the fourth quarter of FY 2011. The expected efficiencies are improved responsiveness and proactivity through integrated real-time communications anomaly data feeds, telecommunications infrastructure analysis and assessment data, and a mission area knowledge base for rapid event analysis and Warfighter analysis of alternatives development. MADSS is a multi-year JCTD sponsored by USSTRATCOM. The Defense Information Systems Agency (DISA) is the lead agency. NSWC Dahlgren is the technical lead. *FY 2009 Accomplishments:* Refined operational user requirements for development of system architecture. Conducted limited functionality technology demonstration to refine specific functionality needed for mission thread					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
assessment scenarios for the operational architecture. Completed Spiral 1. Efficiencies were achieved from web-based community of interest (COI) specific access, COI mission area mapping, and automated data collection of DoD Information Technology (IT) infrastructure. *FY 2010 Plans:* Develop communication path to mission linkages. Develop knowledge base architecture and SOA design. Define Authoritative Data Sources. Develop standard data format and semantic mediation services among information feeds. Conduct technical demonstrations and limited operational demonstrations. Finalize operational and system architectures. Complete Spiral 2. *FY 2011 Base Plans:* Conduct final technical demonstration. Conduct operator training. Conduct final operational demonstrations and utility assessment (August 2011). Finalize documentation and transition MADSS functionality to DISA programs of record. Complete the JCTD.					
Joint Recovery and Distribution System (JRaDS)	5.700	4.786	5.850	0.000	5.850
The Joint Requirements Oversight Council (JROC) validated the capability need for Joint Recovery and Distribution System (JRaDS) in FY 2009 new start. The Joint Recovery and Distribution System (JRaDS) Joint Capability Technology Demonstration (JCTD) will develop and demonstrate the military utility of a new family of transportation trailers for the Department of Defense (DOD). JRaDS provides a Family of Systems (FoS) which enables execution of multiple mission profiles via a small number of trailer variants versus the large inventory of distinct type trailer systems currently in the DOD trailer inventory. This FoS will offer high reliability and parts commonality and modularity in design thus reducing Service logistics and maintenance requirements and associated costs of ownership. Additionally, due to the semi-autonomous operating capability of JRaDS, and reduced need for supplementary Materiel Handling Equipment (MHE) needed supporting personnel may be reduced. These aspects will expedite cargo movement from Sea Ports of Debarkation (SPOD), Aerial Ports of					

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Debarkation (APOD), and Theater Supply Depots to front-line users, while reducing costs associated with movement of cargo within theater. JRaDS will also afford an expeditious and efficient method of recovering disabled and catastrophically damaged Tactical Wheeled Vehicles (TWV) such as the Mine Resistant Ambush Protected Vehicles (MRAP) and light to medium weight Rotary Wing aircraft. The JCTD will also produce an Aircraft Interface Kit (AIK) that allows Army Container Roll-On Platforms (CROP) and Flat Racks to be expeditiously loaded into C-130 and C-17 cargo aircraft. The efficiencies to be gained are: JRaDS reduces the time, vehicle and manpower requirements for Tactical Wheeled Vehicle recovery by estimated 50 percent. JRaDS will reduce MHE requirements by estimated 20 percent during operations in an austere environment and improve theater cargo velocity by estimated 20 percent. By having a standardized FoS trailer fleet that has common replacement parts, in-service effectiveness will improve by estimated 20 percent and parts inventory and costs will be reduced by estimated 50 percent. The transition strategy is to have Program Executive Office Combat Support/Combat Service Support (PEO CS/CSS) become the Joint Program Manager to procure and manage the supply of needed JRaDS trailers to the Services. Residual trailers from the JCTD will be used by field units thereby placing the JRaDS capability into forces sooner that waiting for production of trailers. The sponsoring Combatant Command (CoCom) is the U. S. Transportation Command (USTRANSCOM). The lead service is the Army. *FY 2009 Accomplishments:* Developed Implementation Directive and Management Transition Plan; developed operational and system architecture; developed CONOP draft; and purchased first demonstration trailers. *FY 2010 Plans:* Conduct technical and operational demonstrations #1, #2 and #3; Complete final Joint Operational Utility Assessment (JMUA)					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: Submit final Operation Utility Assessment Report; Complete Capability Development Document (CDD); Planned transition is to PEO CS/CSS.					
Joint Medical Distance Support & Evacuation (JMDSE)	4.800	1.379	0.520	0.000	0.520
The Joint Requirements Oversight Council (JROC) validated the capability need for JMDSE in FY 2009. The outcome of JMDSE will demonstrate capabilities mitigating problems associated with low density, high demand casualty evacuation forces; provide virtual/distant triage capability on a noncontiguous battlefield; extend care of medical forces; and provide medical reach-back from first responder to forward resuscitative care facilities. The primary outputs to be demonstrated include battlefield telemedicine, precision aerial delivery of small quantities of critical medical supplies and equipment for casualties in hostile and inaccessible areas. The efficiencies to be gained include: less costly and timelier delivery of critical medical supplies and casualty care equipment; improved battlefield care of casualties; reduced health risk to personnel on the battlefield. The transition strategy includes inclusion of precision aerial medical delivery systems, medical kits, and telemedicine capability in theater-based programs of record. The sponsoring combatant command is US Joint Forces Command and the executive agent is OSD Health Affairs.					
FY 2009 Accomplishments: Completed Implementation Directive; completed first draft of Concept of Operations; conducted multiple Joint Precision Airdrop System Medical Express (Micro Lightweight (JPADS-MedEx MLW) technical tests from C-123 and C-130 aircraft; developed a warfighter capabilities document; completed Management and Transition Plan (MTP); concluded Analysis of Alternatives (AoA); completed the design and tested JPADS-MedEx delivery pod on the Tigershark Unmanned Aerial System (UAS).					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2010 Plans: Identify and select competitive prototype contracts for JPADS-MedEx Ultra Lightweight (JPADS-MedEx ULW) systems; complete technical multiple technical test for Joint Combat Casualty Care System (JCCCS); conduct operational demonstrations #1 and #2; conduct limited operational utility assessment; and execute spiral development #1. *FY 2011 Base Plans:* Conduct operation demonstration #3 to fully integrated JCCS and JPADS-MedEx (ULW and MLW) systems; conduct final operation utility assessment; execute spiral development #2; and complete final report and training documents.					
Cooperative Security Engagement (CSE) The Joint Requirements Oversight Council (JROC) validated the capability need for CSE as an FY 2009 new start. The outcome of CSE is to demonstrate operational concepts and tools for enabling joint, multi-national planning, coordination and synchronization. CSE will provide a framework for improved inter-agency adaptive planning, regional/event based information sharing, and integrated event assessment. The JCTD is a three year project under sponsorship of U.S. Southern Command (SOUTHCOM) with U.S. European Command (EUCOM), and U.S. Agency for International Development (AID) as cosponsors. Technical lead is the US Army Corps of Engineers. Transition will incorporate CSE capabilities into COCOM stability operations, including CONOPS and policy. JFCOM is the transition lead for the JCTD. The primary outputs and efficiencies to be demonstrated in the JCTD Operational Utility Assessment are (1) improved interagency adaptive planning, and (2) streamlined regional and inter-agency assessment. The JCTD is scheduled to complete at the end of FY 2011. *FY 2009 Accomplishments:* Completed implementation directive and integrated assessment plan; identified planning, information sharing, assessment tools, and initial operational concepts. Initial demonstration.	3.500	0.000	1.697	0.000	1.697

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2010 Plans: Integrated architecture, interagency assessment plan; identification of planning, information sharing and assessment tools, initial operational concepts. Technical demonstration of software solutions. *FY 2011 Base Plans:* Demonstration in operational context of tools and operational concepts with cooperative security community of interest in selected regions within SOUTHCOM/ EUCOM/AID areas of operations. Operational Utility Assessment. Development of Tactics, Techniques and Procedures. Transition to JFCOM and AID.					
Daily Watch The Joint Requirements Oversight Council (JROC) validated the capability need for Daily Watch in FY 2009. Classified content only. FY2009 new start, U.S. European Command is the lead CoCom. National Reconnaissance (NRO) is the lead agency. *FY 2009 Accomplishments:* Classified content only *FY 2010 Plans:* Classified content only	2.800	4.500	0.000	0.000	0.000
Precision Acquisition Weaponized System (PAWS) The Joint Requirements Oversight Council (JROC) validated the capability need for PAWS in FY 2009. The objective of the PAWS JCTD will integrate multiple precision weapons aboard organic tactical ISR platforms, and demonstrate neutralization of threats. The weapon designs will allow multiple kills per sortie and engagement in environments where collateral damage and fratricide are unacceptable. This program will resolve the inability of Special Operating Forces (SOF) Intelligence, Surveillance, and Reconnaissance (ISR) platforms to prosecute targets. Currently, these platforms relay target data	4.400	4.500	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
to SOF on the ground, who must then engage the targets directly. In this process, the risk to SOF is increased greatly. The PAWS JCTD will alleviate this risk. Deliverables will include documented Concept(s) of Operation, Tactics, Techniques, and Procedures, (software and hardware changes to demonstration platforms and weapons). Following the demonstration, fieldable prototypes will be made available to operational SOF units in their respective theaters. Tactical ISR system programs of record will make the changes necessary to incorporate this platform-independent technology. The Combatant Command/User Sponsor is the U.S. Special Operations Command (SOCOM) and the Lead Service/ Agency is the U.S. Special Operations Command (SOCOM). *FY 2009 Accomplishments:* Completed Concept of Operations (CONOPS), Tactics, Techniques, Procedures (TTP), Weapon Link, Safety Assessments, and Arming/Firing development. *FY 2010 Plans:* Concept of Operations (CONOPS), Tactics, Techniques, Procedures (TTP) Development, Weapon Link Development, Safety Assessments, and Arming/Firing Development. FY11 Planned Output: Low Collateral Damage Testing, Certification, Integration with Host UAV, End-to-End Testing, and Demonstration #1 and Demonstration #2. Transition planning and execution of residuals to USSOCOM/PEO-FW. The Transition Manager is NAVAIR 4.5.					
Counter-Electronics High Powered Microwave System Advanced Missile Project (CHAMP)	5.800	6.050	6.500	0.000	6.500
The Joint Requirements Oversight Council (JROC) validated the capability need for CHAMP in FY 2009. The outcome of CHAMP is to demonstrate and assess a multi-shot and multi-target aerial HPM platform that is capable of degrading, damaging, or destroying electronic systems. For this effort a compact HPM payload will be integrated into an appropriate aerial vehicle to create the aerial HPM platform demonstrator. CHAMP is a multi-year project under sponsorship of United States Pacific Command (USPACOM), with completion of integration and final demonstration in FY 2012, and transition to an Air Combat Command program of record in POM FY 2012-2017. The lead service is Air					

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Force. The primary outputs and efficiencies to be demonstrated in the JCTD Military Utility Assessment (MUA) are: (1) Delivery of the HPM aerial system to the target; (2) Minimum effectiveness HPM range; (3) Stand-off distance from launch to target; (4) Multiple geographically separated targets; and (5) Navigation, orientation, and fuzing accuracy. The Air Force Research Laboratory, Directed Energy Directorate, High Power Microwave Division is the designated Technical Manager. *FY 2009 Accomplishments:* Developed Implementation Directive and Management and Transition Plan. Conducted a Broad Area Announcement to identify potential industrial partners. Review analysis and solution alternatives. Conducted modeling and simulation and assemble test hardware components. *FY 2010 Plans:* Develop Concepts of Operations (CONOPs) and Tactics, Techniques, and Procedures (TTPs). Develop or refine training, test and security plans. Begin component systems integration and operator training. Conduct ground testing. *FY 2011 Base Plans:* Complete component integration and ground testing. Complete operator training. Refine CONOPs and TTPs. Complete operational demonstration #1 to demonstrate the ability to accurately navigate to a target building and illuminate the building to ensure effects on the internal electronic components at a distance from the target to be a viable military option. Develop/refine requirements and documentation for formal acquisition effort.					
Joint Multi-Effects Warhead System (JMEWS) The Joint Requirements Oversight Council (JROC) validated the capability need for JMEWS in FY 2009. The JMEWS JCTD will demonstrate an updated multi-effect warhead system aboard the Tomahawk Land Attack Missile (TLAM). This warhead technology will provide a leap-ahead capability against a widely varied target set, which includes hard and soft targets. In concert with this warhead, a	3.000	3.630	6.500	0.000	6.500

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Third-Party In-Flight Targeting (3PT) system will be demonstrated that will allow dynamic targeting and retasking of the missile as intelligence is updated. Using these technologies, Combatant Commanders will have the reliable option of neutralizing heavily defended and dynamic targets without the incursion of manned platforms. Hardware and software changes to the TLAM Program of Record (PMA-280) will be incorporated via Engineering Change Proposals once demonstrated. Deliverables will also include documented Concept(s) of Operation, Tactics, Techniques, and Procedures. Production of the TLAM will be shifted to replace the current warhead with the JMEWS warhead, and to add the datalink, radio equipment, and interfaces necessary for 3PT. JMEWS value to Joint Warfighter is it increases number of targets held at risk and reduces cost; Increased flexibility in access denied environments; provides a long range, survivable, high-lethality weapon. The User Sponsor U.S. Special Operations Command (SOCOM), U.S. Strategic Command (STRATCOM) and the Lead Service is the US Navy. *FY 2009 Accomplishments:* Completed systems engineering, integration, & testing. *FY 2010 Plans:* Multiple targets demonstration, Validation, Joint Military Utility Assessment (JMUA). *FY 2011 Base Plans:* Transition to Tactical Tomahawk (TACTOM) production. Transition to Program of Record (POR) first quarter of FY 2012 .					
FY 2011 JCTD New Starts FY 2011 JCTD new starts will be identified under the revised JCTD selection process which will begin with a Candidate Nomination Board in May 2010 followed by a Candidate Decision Board (CDB) in July 2010. This will allow the Department to rapidly execute the JCTDs needed in FY11 to meet the Combatant Commands (CoComs) most pressing needs as soon as FY11 funds becomes available. In addition, quarterly CDBs will be held throughout the year to address emerging CoCom needs. JCTD's	0.000	0.000	68.000	0.000	68.000

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B. Accomplishments/Planned Program ($ in Millions)

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indentified in these quarterly CDBs will be initiated throughout the year as funds are identified. The revised JCTD selection process provides a much more rapid and agile delivery of capabilities to meet urgent CoCom needs than the incremental programming and budgeting methods of the deliberative Planning, Programming, Budgeting and Execution (PPBE) process. This new project selection process will respond directly to time-sensitive CoCom needs, as well as other innovative technology source inputs from the Department's Experimentation Program, laboratories, industry and other rapid response programs. In accordance with expected trends identified in the 2010 Quadrennial Defense Review (QDR) report, reflecting emerging CoCom needs, new start FY11 JCTD projects are expected to focus on the following thrust areas: Defend the US and Support Civil Authority at Home – Improve responsiveness and flexibility of consequence management, enhance capabilities for domain awareness, and accelerate the development of standoff radiological/nuclear detection capability. Counterinsurgency, Stability, and Counterterrorism Operations – Expand unmanned systems for intelligence, surveillance and reconnaissance, key enabling assets for special operations forces and strengthen tactical communication capabilities. Build the Security Capacity of Partner States – Enhance linguistic, regional, and cultural ability, strengthen and expand capabilities for training partner forces, enhance ability to react to natural disasters, and continue development of the tools to support cooperative operations. Prevention Proliferation of Weapons of Mass Destruction – Enhance nuclear forensics, new verification technologies, countermeasures and defense of nontraditional agents.					

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Improve Unity of Effort – Support the whole-of-government approach to national security through partnerships with other government agencies to improve intelligence collection and analysis, and support civil authorities at home. Climate & Energy – Develop the tools needed to perform environmental stewardship at DoD installations, and support resource efficiency and sustainment goals. Cyber Security – Counter threats in cyberspace through demonstrations of new tools in partnership with other agencies. *FY 2011 Base Plans:* Anticipate starting twelve to fifteen new start projects in FY 2011.					
Tactical Edge Data Solutions (TEDS) The Tactical Edge Data Solutions JCTD was validated by the Joint Requirements Oversight Council in FY 2010. The stated outcome of the JCTD is the implementation of C2 Core extensions for tactical information at the Battalion level so that Web-services data sharing frameworks based on Universal Core (UCore) can enable data sharing among disparate systems. The JCTD will focus on exchanging data from Army and Marine Corps C2 Authoritative Data Sources (ADS) for the Command and Control (C2) and Battlespace Awareness domains. The efficiencies to be gained will be reduction of redundant software being developed across multiple programs and the ability to seamlessly exchange data within Military Services as well as NATO and coalition partners who adopt UCore. UCore is the U.S. Government standard for interagency data exchange. The lead CoCom is U.S. JFCOM. The Marine Corps is providing the technical lead and the Army is providing the transition manager. Transition of the C2 Core extensions and Web services for translation and semantic mediation is planned for programs of record in the Army, Marine Corps and DISA. The output of the JCTD will enable moving C2 systems to DoD's goal of implementing a Service Oriented Architecture (SOA) environment. The	0.000	1.500	1.500	0.000	1.500

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final demonstration date will be in midyear FY 2012 and the JCTD will complete in September 2012 with transition expected in FY 2013 of data pilot services. *FY 2010 Plans:* Implementation Plan and Management development. Architecture definition, C2 Core extensions, develop web services for mediation of data (translation and semantic), define repeatable business process and objective services. Demonstrate net enabled tactical edge data exchange in Pilot 1 using a joint Maneuver Mission thread *FY 2011 Base Plans:* Net enabled Coalition Data Sharing demonstrated, expanded web services and C2 core extensions including NATO systems. Net enabled SOA environment using tactical ISR systems. Post extensions to Metadata repository. Provide Web services and standards to C2 community to assist PORs in exposing and daring data. Provide repeatable process for extending C2 Core into other communities of interest.					
Earth Observation Data Sharing Capability	0.000	1.689	3.498	0.000	3.498
USEUCOM has identified the need to share national earth observation environmental data for applications such as cooperative disaster relief, humanitarian assistance, and resource planning for economic development. Envisioned capabilities are: a monitoring, analysis, and visualization decision support system for ecological and environmental forecasting and management; world-wide collaborative data sharing; cross-border, interdependent, national and regional solutions for ecological decision support; and scalable, adaptable, and sustainable core systems. Potential participants include European Command (EUCOM), National Aeronautics and Space Administration (NASA), German Aerospace Center (Deutsches Zentrum fur Luft-und Raumfahrt) (DLR), University Alabama Huntsville (UAH), Von Braun Center for Science and Innovation (VCSI) and Partner Nations, Operators / Analysts and Decision-makers. The project intends to leverage existing space, air, ground-based and NASA's decision support architecture assets. This project aims to demonstrate, assess and transition a decision					

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support system for cross border, regional and multi-national environmental, humanitarian and hazard risk forecasting and management. The DoD user sponsor is European Command. *FY 2010 Plans:* Develop CONOP, functional requirements and TTPs plus, define and establish system architecture. Build and test system components. *FY 2011 Base Plans:* Conduct technical demos (x2) and user suitability evaluations. Perform component integration test and demonstration. Reduce risk via test-fix-test approach and operator / user input. Technical Demonstration (TD) serve as “dress rehearsal” for operational demonstration (OD). Conduct operator and user training. Conduct operational demonstration and perform operation utility assessment. Transition capability/solution to limited operational use and follow-on development acquisition and sustainment. The demonstrations are planned for completion in the second half of FY 11. Transition will commence at the end of FY11, pending successful OUA results.					
Pacific Sail	4.000	4.000	0.000	0.000	0.000
Pacific Sail was an FY 2009 JCTD start that contains classified content only. The user sponsor is USPACOM and the Operational Manager is US Pacific Fleet. This project integrates US Air Force and US Navy capabilities into a new capability that addresses one of USPACOM’s priority capability gaps. An initial demonstration was conducted in late FY 2009, and final demonstration is scheduled for late FY 2010. Pacific Sail project details are classified. *FY 2009 Accomplishments:* Classified content. Integrated US Air Force and US Navy components, conducted land-based demonstration, validated the potential capability of the planned sea-based system.					

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FY 2010 Plans: Classified content. Conduct systems integration of sea-based components, and complete operational demonstration of sea-based system. Complete coordination for follow-on transition.					
Rapid Reaction Tunnel Detection (R2TD)	0.000	3.525	3.460	0.000	3.460
The Joint Requirements Oversight Council (JROC) validated the capability need for R2TD in FY 2010. The outcome of R2TD is to demonstrate a set of detection and mapping technologies, and establish procedures to provide Joint Force Commanders with a capability to detect characterize and interdict tunnels on the battlefield and beneath the US borders. R2TD is a multi-year project under the sponsorship of the United States Northern Command (NORTHCOM) and Joint Task Force North support from the United States Army Corps of Engineers. R2TD will complete development and demonstration by end of CY 2011, and transition to NORTHCOM and Joint Program Manager Guardian by 2Q FY12. The lead service is Army. The primary outputs and efficiencies to be demonstrated in the JCTD Military Utility Assessment are (1) accurately locate subsurface voids up to 100 feet, (2) detect tunnel construction in real-time and report summaries every 4 hours, (3) detect movement of contraband through tunnel in near-real time and report summaries every 4 hours, (4) precisely locate tunnel axis, ingress and egress points, (5) characterize physical dimensions of tunnels including depth, cross-section, and azimuth, and (6) characterize internal features of tunnels including floor, shoring, lighting, ventilation, and water presence/flow.					
FY 2010 Plans: Integration of sensor feeds into single operational picture to produce verification of tunnel detection and movement activity. Sensors to be integrated and technically demonstrated include Border Tunnel Activity Detection Systems (BTADS), Electromagnetic Imaging (EMI), and Active Seismic Imaging Systems (ASI). Characterization o of the tunnel will be technically demonstrated via tele-operated robot.					

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	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: fully integrated sensors and tactics, techniques and procedures (TTPs) will be operationally demonstrated at Yuma Proving Ground, problems identified and resolved, then the entire integrated detection and characterization system operationally demonstrated along the US southwest border. The final Operational Demo is scheduled for 4Q FY11, and completion of the JCTD is scheduled for 2Q FY12 to enable transition of all detection and characterization capability to JPM Guardian. The R2TD Transition manager is Joint Program Manager Guardian. The JCTD is structured to enable a potential "off-ramp" after 12 months if appropriate to deploy the integrated sensor suites and software algorithms for tunnel detection with Joint Task Force North to establish an initial residual detection capability. Follow-on characterization capability will be transitioned at this point for continued development if a transitioning organization can accept, or the JCTD will continue to mature the characterization technology for full-up integrated detection and characterization capability.					
Maritime Awareness, Non-Emitting Vessels The Joint Requirements Oversight Council (JROC) validated the capability need for this capability in FY 2010. The outcome is a CLASSIFIED capability to detect and track non-emitting maritime threats by integrating data from national collection capabilities. This effort is expected to be a three year project under the sponsorship of United States Northern Command (NORTHCOM) and CENTCOM/NAVCENT with the Navy as the lead Service via Naval Research Laboratory. Technologies involve existing automated processing capabilities developed for national systems data. The primary outputs and efficiencies to be demonstrated in the Military Utility Assessment are CLASSIFIED. *FY 2010 Plans:* Capability outputs are CLASSIFIED, initial spiral capability will be integrated for demonstration in late FY10.	0.000	4.000	4.000	0.000	4.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: Capability outputs are CLASSIFIED, and second spiral will be demonstrated in FY11. Extended use is expected to initiate in late FY11. The transition Manager is PM National Tactical Integrated Processing Service (NTIPS) and expects to transition to the NTIPS Program of Record.					
Command and Control Gap Filler (C2GF) The Joint Requirements Oversight Council (JROC) validated the capability need for C2GF as an FY-10 new start. Participants include Department of Defense, Department of Homeland Security (DHS) and other U.S. Gov't agencies. The C2GF JCTD will provide an information systems architecture that can share all-source air surveillance data between government departments. The C2GF solution will also provide data fusion services to users or enable users to operate their existing fusion processes if desired. C2GF will demonstrate for Joint, Interagency, intergovernmental and Multinational (JIIM) partners a capability that enables efficient, secure, timely and trusted exchange of information resulting in enhanced aerospace by shared situational awareness, persistent Wide Area Surveillance, actionable intelligence and information, and event Surveillance and Reporting. Additionally, the C2GF JCTD will also refine the concept of operations and employment and techniques, tactics and procedures necessary for JIIM coordination for air domain surveillance. Demonstrations are planned for FY10, 11, and 12. The COCOM user/sponsor is USNORTHCOM. *FY 2010 Plans:* Architecture, testbed, multi-sensor correlator, data exchanged with DHS AMOC *FY 2011 Base Plans:* SIGINT and additional data to correlators, initial 2-dimensional OTH radar transmit/receive demos. Advanced classified sensor integration, demonstrations and utility assessments	0.000	4.000	4.000	0.000	4.000
Unmanned Air Systems (UAS) Precision Targeting Capability	0.000	1.000	2.000	0.000	2.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
The Joint Requirements Oversight Council (JROC) validated the capability need for small UAS systems in FY 2010. The objective of this effort is to rapidly provide precision coordinates from UAS generated imagery for use with coordinate seeking weapons. The Joint Commander must be able to rapidly transition from observing to striking high value targets with coordinate seeking weapons in all terrain, while minimizing collateral damage. Current UASs and targeting pods are unable to generate precision coordinates (category 1) under most conditions. The ability to rapidly strike targets identified by UAS assets is delayed because UAS derived coordinates lack precision required for coordinate seeking weapons. In order to expedite putting demonstrated capabilities into the hands of Combatant Commands, products and deliverables will be transitioned to the Services in FY12 pending successful JOUA. Deliverables include hardware, software, and documentation and a finalized CONOPS, TTPs, training package, and DOTMLPF change recommendations. The Combatant Command/User Sponsor is the U.S. Special Operations Command (SOCOM) and the Lead Service/Agency is also SOCOM. *FY 2010 Plans:* Approved Implementation Directive (ID). Conduct two technical demonstrations, Conduct repetitive evaluations of CONOPs / TTPs, threats and environment, and scenarios / vignettes. Spiral out capabilities as approved by National Geospatial-Intelligence Agency (NGA). *FY 2011 Base Plans:* Approved Management Transition Plan (MTP). Conduct two operational demonstrations. Conduct Joint Operation Utility Assessment (JOUA). Spiral out capabilities as approved by NGA. FY12 Planned Output: Execute transition activities to provide deliverables to USA (PM-BC PM-UAS). The Transition Manager is USA PM-UAS and SOCOM.					
Fixed Wing Advanced Precision Kill Weapon System (FW-APKWS) The Joint Requirements Oversight Council (JROC) validated the capability need for FW- APKWS JCTD in FY 2010. The objective of the FW APKWS JCTD is to provide the legacy AV-8B and A-10 aircraft with a precision air-to-ground low collateral damage weapon for use in irregular warfare operating	0.000	3.500	4.000	0.000	4.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
theaters and beyond. The FW- APKWS JCTD provides a guided rocket that will help fill the gap left by a diminishing supply of laser Maverick (LMAV) missiles which are out of production. In addition, these legacy platforms are not included as threshold platforms in the Joint Air-to-Ground Missile (JAGM) Program of Record (POR). The FW-APKWS JCTD is considered very low risk as it leverages the existing APKWS POR developing laser guided rockets for the AH-1W rotocraft. As such it is anticipating a rapid transition to the APKWS POR upon completion of the Military Utility Assessment (MUA). Deliverables will include documented Concept(s) of Operation, Tactics, Techniques, and Procedures, and the Technical Data Package necessary to offer a fixed-wing variant in the APKWS POR. In addition, 50 combat-ready residuals will be delivered (25 USN, 25 USAF). The Combatant Command/User Sponsor is the U.S. Central Operations Command (CENTCOM) and the Lead Service/ Agency is USN (PMA-242). *FY 2010 Plans:* Approve Implementation Directive (ID). Conduct Critical Design Review (CDR), Update Technical Data Package as allowed, Conduct Technical Demonstrations. *FY 2011 Base Plans:* Approve Management Transition Plan (MTP). Conduct operational demonstrations (USN and USAF flight tests). Finalize Technical Data Package. Begin fabrication of residuals. FY12 Planned Output: Complete Military Utility Assessment (MUA) and Operational Assessment (OA), Modify Operation Requirements Document (ORD) of APKWS to include fixed-wing production requirements. Deliver combat-ready residuals. The Transition Manager is USN PMA-242.					
Sea Tracker (ST)	0.000	2.000	1.000	0.000	1.000
The Joint Requirements Oversight Council (JROC) validated the capability need for ST in FY 2010. The outcome of ST is a CLASSIFIED capability. The ST JCTD is sponsored by USSOCOM in cooperation with the Navy. The objective of the ST JCTD is to develop and transition capabilities to tag, track, and locate surface vessels of interest for all Theater Commanders for a variety of warfare					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
purposes including: Counter Terrorism; Counter Proliferation; Counter Piracy; and Counter Narcotics. Details are classified. *FY 2010 Plans:* Capability outputs are CLASSIFIED. *FY 2011 Base Plans:* Capability outputs are CLASSIFIED.					
Operational 3- Dimension (Op3D) The Joint Requirements Oversight Council (JROC) validated the capability need for Op3D in FY 2010. The Op3D JCTD is a joint interagency-sponsored program sponsored by USSOCOM. The objective of the Op3D JCTD is to develop and transition capabilities to quickly discover, manage, generate, exploit, disseminate and accurately update 3D GEOINT data from multiple collection systems to the warfighter. This JCTD will also develop and deliver Standard Operating Procedures (SOPs), and appropriate Concept of Operations (CONOPS) with Tactics, Techniques & Procedures (TTPs). This controlled process will enhance effective transition to multiple GEOINT and 3D database production facilities to support military operations. The JCTD will consist of three overlapping development and demonstration spirals. The focus of Spiral One will be on GEOINT Production Centers such as the Special Operations Forces Planning, Rehearsal and Execution Preparation (SOFPREP) facility and will run ten months. The duration of Spiral Two will be eleven months and will focus on dissemination of 3D products to the warfighter and the means for the warfighters to exploit the products. The duration of Spiral Three will be eight months and will focus on final enhancements, user evaluations and transition. It is the intent of the JCTD to demonstrate the capabilities during Special Operations Forces (SOF) Emerald Warrior exercises. Residuals from the effort will include an enhanced 3D data processing pipeline, warfighter/analyst exploitation tools, TTPs, CONOPs, user guides and training packages.	0.000	3.400	3.085	0.000	3.085

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
The Op3D CONOP consists of four phases: Phase I – Collection/Discovery – Import and export modules exercising standards for a variety of 3D sources result in improved sharing of 3D source data. GEOINT source data discovery and management via automated search, retrieval and management processes enhance data and product retrieval. Phase II – Processing – 3D scene visualization databases are the output of data processed through imagery manipulation, feature extraction and digital elevation model (DEM) production tasks. Phase III – Dissemination – Databases are efficiently disseminated to various production facilities and the warfighters, including disadvantaged users, by employing compression, data streaming, database update subscription, and automated database update pushes. Phase IV – Exploitation – The warfighter/analyst uses exploitation tools to take advantage of the 3D products provided by Op3D to establish a common operational picture of urban and austere environments and serve other critical functions for military operations. USSOCOM acts as Lead Service and is responsible for requirements validation and transition management for the SOF community. The Director, Army Geospatial Center (AGC), will be the Technical Manager (TM) providing: program management for funding and technical development; interagency coordination; oversight for contracts to provide technologies; and direct development community activities. The TM will plan and conduct technical testing, demonstrations, and test readiness reviews; and provide components and/or enhancements to existing components to the Operational Manager (OM) to support timely execution of operational demonstrations. The USSOCOM Special Operations Planning, Rehearsal and Execution Preparation Planning (SOFPREP) Branch Chief will provide the TM with subject matter expertise. As Deputy TM will also support all transition activities associated with the SOFPREP facility.					

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B. Accomplishments/Planned Program ($ in Millions)

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USSOCOM J7T will plan, coordinate, and direct all user activities related to the JCTD. The OM will coordinate user participants, user-provided equipment, and user-provided facilities for both technical and operational demonstrations and events. The OM will develop the CONOPS, mission scenarios, requirements documentation, and demonstration plans, and will plan for extended user evaluations and operational use of residuals. The OM is responsible for coordinating with an Operational Test Agency (OTA) for the development of the Integrated Assessment Plan (IAP) and conduct of the assessments. The OM will develop the final OUA report. The National Geospatial-Intelligence Agency (NGA) will develop and implement a Transition Plan to transition successful Op3D technologies into programs of record. However, the ultimate responsibility for transition rests with the Services of JCTD stakeholders and their production centers including USSOCOM and the SOFPREP Production Center. The transition strategy for the Op3D JCTD is to spiral off capabilities throughout the JCTD into Agency and Service Production Centers. Residuals from the effort will include data archiving and management tools, data processing software, data dissemination capabilities, warfighter/analyst exploitation tools, TTPs, CONOPS, user guides and training packages. *FY 2010 Plans:* Execute, evaluate, and transition Spiral 1 tasks. Develop CONOPs, SOPs, TTPs, user guides, and training packages for successful Spiral 1 processes. *FY 2011 Base Plans:* Execute, evaluate, and transition Spiral 2 tasks. Develop CONOPs, SOPs, TTPs, user guides, and training packages for successful Spiral 2 processes. FY 2012 Planned Output – Execute, evaluate, and transition Spiral 3 tasks. Develop CONOPs, SOPs, TTPs, user guides, and training packages for successful Spiral 3 processes.					
Pre-Positioned Expeditionary Assistance Kit (PEAK)	0.000	2.130	2.505	0.000	2.505

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
The Joint Requirements Oversight Council (JROC) validated the capability need for PEAK in FY 2010. The outcome of PEAK is to demonstrate and transition an array of capabilities that can be pre-positioned to help provide sustainable, essential services of value to partner nations through military-to-military operations. PEAK is a three-year project under sponsorship of USSOUTHCOM, with completion of development and demonstration by end of CY 2012 and transition to US Government Agencies related to USSOUTHCOM and other Regional Combatant Commands and partner nations by FY 2012. The lead service is to be determined. The primary outputs and efficiencies to be demonstrated in the JCTD Military Utility Assessment are (1) To enhance partner nation capabilities to carry out key missions through proactive military-to-military engagement, (2) improve partner nations' ability to provide critical services for targeted purposes during the first days of a natural or man-made crisis through a structured planning process, (3) collaboratively enhance regional stability, (4) Four types of emergency assistance kits focused on power generation, communications and information sharing as the key enablers of distributed essential services, (5) A process for social networking and trust-building that can enhance partnership relationships in many areas, and contingencies, and (6) An international, searchable, knowledge base of cost-effective infrastructures that can be used in HA/DR, BPC and other missions.					
FY 2010 Plans: Develop four types of emergency assistance kits focused on power generation, communications and information sharing as the key enablers of distributed essential services. Conduct Limited Operational Utility Assessment (LOUA) in September 2010 and successfully demonstrate the Peace Keeping Operations (PKO) support prototype kit. Spiral Output – the Peace Keeping Operations (PKO) support prototype kit type left behind for continued use and evaluation by operational users.					
FY 2011 Base Plans: Complete development of Humanitarian Assistance/Disaster Relief, Law Enforcement/First Responder, & Remote operations in a tropical environment kits. Final operational utility demonstration of PEAK emergency assistance kits is scheduled for September 2011 building on the scenario and					

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B. Accomplishments/Planned Program ($ in Millions)

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technical success of the 2010 LOUA. Demonstrate kits in collaboration with nations from the four regions of the USSOUTHCOM AOR; Central America, Caribbean, Andean Ridge, and Southern Cone. Spiral Output – the Humanitarian Assistance/Disaster Relief, Law Enforcement/First Responder, & Remote operations in a tropical environment kits will be left behind for continuing use and evaluation by operational users. FY 2012 Planned Output - Begin transition to US Government Agencies related to USSOUTHCOM and other Regional Combatant Commands and to partner nations both for purchase and local production. Develop integration and employment CONOP to integrate PEAK capability with other partners. Business Case Analysis (BCA) completed. Transition manager is to be determined.					
Integrated SATCOM-GIG Operations and Management (ISOM)	0.000	3.126	2.624	0.000	2.624
The Joint Requirements Oversight Council (JROC) validated the need for ISOM in FY 2010. The ISOM JCTD outcome is to demonstrate real-time Internet Protocol (IP) satellite communications (SATCOM) situational awareness (SA) and a scalable and policy-based management system that enables dynamic allocation and provisioning of SATCOM resources. The JCTD will streamline existing SATCOM resource management tools which will greatly improve the ability to make the most of underutilized SATCOM resources or to resolve complex warfighter communications outages. The lead agency is DISA. The primary outputs and efficiencies to be demonstrated are: (1) integrated, real-time situational awareness of SATCOM resources that provides a single, over-arching view of current SATCOM allocations and the load on these links, and (2) an automated ability to act on this SA information by dynamically re-allocating or re-provisioning the SATCOM resources given to IP SATCOM networks. ISOM JCTD plans for a final demonstration and assessment in the third quarter of FY 2012. ISOM is a multi- year JCTD sponsored by USSTRATCOM. *FY 2010 Plans:* Develop Implementation Directive and Management and Transition Plan. Begin development of Concepts of Operations (CONOPs), Tactics, Techniques, and Procedures (TTPs) and Training documents. Conduct initial technical and operational demonstration. Complete Spiral 1 - the					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
implementation of Web Services and the integration of a data exchange model via industry standards within the ISOM lab test bed architecture. Demonstrate an integrated, real-time SA of IP modem hub and terminal information, within the ISOM lab testbed architecture. Technical manager is DISA. *FY 2011 Base Plans:* Continue development of Complete CONOPS, TTPs, and Training documents. Conduct second technical and operational demonstration. Complete Spiral 2 – the integration of ISOM SA server and policy-based management system. Development of a common information exchange schema for integration with Defense Information Systems Network. Transition manager is DISA. FY 2012 Planned Output: Conduct operational utility assessment in operational network environment. Demonstrate a scalable and policy-based management system that enables dynamic allocation and provisioning of SATCOM resources in an end-to-end over the air architecture. Complete CONOPS, TTPs, and Training documents. Prepare for initial deployment. Transition to configuration management for sustainment. Complete the JCTD					
Battlespace Awareness - Long Endurance UAS ISR Capability Additional, persistent Intelligence, Surveillance and Reconnaissance capability is critically needed across the Combatant Commands. Unmanned air systems provide the bulk of our persistent ISR capability. New generation UAS capabilities are needed for affordability and increased flexibility. The next leap in capability is envisioned to be a medium altitude long endurance UAS capability. The outcome of this effort will endeavor to demonstrate 120 hour sortie endurance with nominal 1000 puonds payload (maximum of 2600 lbs) at 15,000 feet with modular design allowing for integration of a myriad of payloads including EO/IR, SIGINT, Ground Moving Target Indication, wide area surveillance, and communications relay. The demonstration of this 5-day capability will validate decreased manning levels necessary to operate autonomous systems thereby reducing life-cycle costs. Additionally, the integration of advanced avionics, commercially available propulsion, and standards based (open-architecture) interfaces will allow the Department an affordable, flexible solution to the CoCom ISR demands. This project will initially demonstrate 5-day endurance and reliability. Subsequent efforts will	0.000	5.000	10.000	0.000	10.000

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evaluate payload flexibility and modularity. The lead service/agency is the Air Force. The plans are for a final demonstration and assessment in 2011. This project is sponsored by USCENTCOM. *FY 2010 Plans:* Develop Implementation Directive and Management Plan with Transition Strategy. Assessment Organization Identified and develop Integrated Assessment Plan (IAP). Develop TTPs and CONOPS. Develop Training Support Packages. Assess propulsion controls and flight controls. Complete Assessments and System Critical Design Review. *FY 2011 Base Plans:* Integrate first air vehicle and demonstrate first flight. Integrate a representative payload and demonstrate flight endurance. Demonstration schedule: First flight: Spring FY 2011, First 5-day flight: Fall FY 2011. Planned Transition Strategy: 1) Develop and validate manning for long-endurance, autonomous ISR platforms. 2) Capability to provide flexibility of configuration with open-architecture design. 3) Provide Orion UAS to USAF (303rd AESW) for theater deployment.					
Improved Nuclear Forensics Capability The Joint Requirements Oversight Council (JROC) validated the need for this capability in FY 2010. This project will strengthen strategic nuclear deterrence by enhancing nuclear forensics capabilities supporting attribution after release of nuclear materials. Classified details of the problem can be provided upon request. The outcome and efficiencies will be to integrate advanced air and ground debris sample collection technologies in both manned and unmanned platforms, and develop and assess a joint interagency concept of operations for advanced sample collection with global applicability. The project will also demonstrate enhanced integrated yield estimation methods for	0.000	1.750	4.950	0.000	4.950

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nuclear events. The techniques to be employed will increase capabilities to collect nuclear debris, while enhancing safety for federal and local incident responders. Details of collection capabilities and concepts of operation are classified and can be provided upon request. The lead service/agency is the Air Force and Defense Threat Reduction Agency (DTRA). The project plans for a final demonstration and assessment in 2012. The CoCom sponsor is USSTRATCOM. *FY 2010 Plans:* Capability outputs are CLASSIFIED. *FY 2011 Base Plans:* Capability outputs are CLASSIFIED. Planned Transition Strategy: 1) Sample collection technologies, incident mapping capability, yield estimation software; 2) Training packages, concepts of operation, tactics/techniques/procedures; 3) Transition to US Air Force and Joint programs of records to be determined.					
Emerging Technologies Joint enabling technologies that are either directed by Congress or initiated by the Rapid Fielding Directorate. Over the past several years' congressional committees have highlighted the potential of mature, joint technologies and provided resources to the JCTD program to investigate the military utility of these technologies. The Rapid Fielding Directorate also becomes aware of promising technologies which may have transformational application to JCTDs. The need for these technologies may not be realized until an JCTD is mid-way through its development or after a final demonstration. In most cases, these enabling technologies have broader application across several functional capabilities addressed by various JCTDs. This funding is used to assist in the rapid of development emerging capabilities that are deemed most critical to the combatant commanders where agility and rapid fielding are the most important criteria or issues of extreme national interest. These issues are of high interest by the warfighter that are deemed most urgent. A frequent result of emerging technologies investment	3.000	8.602	8.097	0.000	8.097

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is rapid maturation of key technologies that can be integrated into JCTD's addressing CoCom urgent needs. Recent examples of emerging technologies funded are Mini PTDS and Next Generation Over the Horizon Radar and Netted Iridum. *FY 2009 Accomplishments:* NEXGEN OTH and Mini PTDS: A portion of these funds aided the development of the Next Generation Over the Horizon Radar (NEXGEN OTH) which is a project that is critical to USNORTHCOM and homeland defense. It is also being developed in partnership with Austrailia. The US has limited homeland defense capability to track cruise and ballistic missiles and other low-altitude, small sized air targets. NORTHCOM has no 24/7 wide-area maritime surface surveillance capabilities. The solution is to install a small-scale two-dimensional antenna array(s) at a CONUS site with established infrastructure and environmental clearances using digital, two dimensional (2D) transmit and receive arrays; advanced waveforms and adaptive processing array processing equipment – demonstrate noise and clutter mitigation. The objective if to review design, cost and performance implications of a full-scale system and determine business case to follow up. If feasible, Next Gen OTHR could become a contributing element to Next Generation Gap Filler capability. Participants in NEXGEN are: N-NC, USAF, USN, DHS, OSD, ROTHR, FFRDCs, Universities, Industry consultants, Australia. Additionally a portion of the funds went to the rapid fielding of the Mini-PTDS capability to be fielded in Afganistan in 2010. The funds will be used toward the planned Phase II Mini-PTDS Persistent Ground Surveillance System (PGSS) integration and assessment. The efforts include demonstrations/ assessments of maturing aerostat systems, affordable payloads and integration concepts. Slew-to-cue integration techniques and modular, open architecture payload integration concepts for PGSS will be developed. Demonstrations and assessments will be conducted at Yuma Proving Grounds, Yuma, AZ.					

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	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2010 Plans: Additional funding will be put into Mini PTDS to provide the initial capability in Afghanistan in 2010. In FY10 funding will assist the delivery of the Netted Iridium communication capability in Afghanistan. It will provide the warfighter with netted “one to many”push-to-talk tactical voice and data service to small units (Co & below) that is small (handheld), lightweight, easy to use both in mounted and dismounted roles with no reliance on ground infrastructure. It will provide a simple to use, on the movesupplementto TacSat for small tactical units and convoys; true global coverage(pole-to-pole); Mitigate decreasing UFO availabilityduring MUOS start-up. Additional potential emerging technologies in FY10 are Next Generation Over the Horizon Tech Risk Reduction Phase 1, Laser Vibrometry, Infection control assessment, Irregular Warfare Applications explotation of USAF special capabilities, stand-in low cost jammer, sky wave radar maritime awareness demonstration, RADARSAT embedded vessel detection and classification, and medium altitude long endurance UAS CoCom scenario study. *FY 2011 Base Plans:* FY11 funding will assist the delivery of the Netted Iridium communication capability in Afghanistan. It will provide the warfighter with netted “one to many”push-to-talk tactical voice and data service to small units (Co & below) that is small (handheld), lightweight, easy to use both in mounted and dismounted roles with no reliance on ground infrastructure. It will provide a simple to use, on the movesupplementto TacSat for small tactical units and convoys; true global coverage(pole-to-pole); Mitigate decreasing UFO availabilityduring MUOS start-up. Additional potential emerging technologies for FY 11 include PACFLT network defense demonstration and assessment, System integration for in-theater FOBs (Force protection system integration), infection control application for collective bio agent protection, all terrain vehical (M-ATV) integrated SIGINT, vertical takeoff (A160T) integrated with moving target indication capability, and signals overlay onto streaming video for rapid targets.					
Site Explotation for Combat Forensics	0.000	0.000	3.000	0.000	3.000

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603648D8Z: *Joint Capability Technology Demonstration (JCTD)*	**PROJECT** P648: *Joint Capability Technology Demonstration (JCTD)*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
This capability will employ innovative combat site collection and explotation capabilities with a web portal to rapidly recognize, collect, analyze, share, track, and manage collected materials. Site explotation will include biometrics document and media and other combat forensic materials. A web portal will link key information sources maintained by multiple US government organizations. Intent is to shorten site collection times from hours to minutes and speed forensic analysis from days to hours. *FY 2011 Base Plans:* Provide integrated site explotation kits and prototype web portal interface, interoperable with biometric, forensic, and document/media explotation enterprizes. Conduct initial utility assessment.					
Accomplishments/Planned Programs Subtotals	187.176	166.977	206.917	0.000	206.917

	FY 2009	FY 2010
Congressional Add: Distributed Network Switching (DNS)	2.000	1.600
FY 2009 Accomplishments: Congress appropriated funds to integrate a maturing high-speed optical switching capability into operational environment(s) to demonstrate significantly improved network robustness, reliability and availability. The outcome of DNS is to integrate existing US-produced switching technology for interoperable IP-based, high-capacity data transfer through secure networking functionality. FY 2010 Output: Conduct field trial implementation in Marine Corps training venue to evaluate applicability, robustness and supportability of the emergent high-speed switching technology in realistic operational environment. Navy evaluate application of the technology to existing shipboard environment in land-based laboratory pending report results. FY 2011 Planned Output: None, pending Congressional support.		

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603648D8Z: *Joint Capability Technology Demonstration (JCTD)*	**PROJECT** P648: *Joint Capability Technology Demonstration (JCTD)*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
FY 2010 Plans: Congress appropriated funds to integrate a maturing high-speed optical switching capability into operational environment(s) to demonstrate significantly improved network robustness, reliability and availability. The outcome of DNS is to integrate existing US-produced switching technology for interoperable IP-based, high-capacity data transfer through secure networking functionality. FY 2010 Output: Conduct field trial implementation in Marine Corps training venue to evaluate applicability, robustness and supportability of the emergent high-speed switching technology in realistic operational environment. Navy evaluate application of the technology to existing shipboard environment in land-based laboratory pending report results. FY 2011 Planned Output: None, pending Congressional support.		
Congressional Add: Maritime UAS Demonstration for the SOUTHCOM Region *FY 2009 Accomplishments:* Demonstrate current “off-the-shelf” Medium Altitude Long Endurance (MALE) Unmanned Air System (UAS) to support counter illicit trafficking and maritime domain awareness operations in the SOUTHCOM Area of Focus (AOF). Intent is to provide a evaluation OCONUS in the SOUTHCOM AOF in real world operations, integrated with ongoing efforts under Tactical Control (TACON) to the Joint Interagency Task Force South (JIATF-S). US SOUTHCOM will work in conjunction with the Counter Narcotics Terrorism Program Office (CNTPO) to advertise an open competition for any UAS MALE system to demonstrate effectiveness of real time detection and monitoring of air, land and maritime targets associated with illicit traffickers	3.000	0.000
Congressional Add: Simultaneous Field Radiation Technology (SFRT) *FY 2009 Accomplishments:* Congress appropriated funds to apply emerging research to a new type of antenna for use on radio-frequency (RF) communications devices. The emergent research proposed use of cylindrical RF	2.300	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
antenna forms to reduce antenna profile and length while improving antenna gain. The outcome of Simultaneous Field Radiation Tech (SFRT) is to develop and demonstrate improved antennas for tactical radios in the High Frequency, Very high Frequency and Ultra High Frequency radio bands. The capabilities proposed for development in this technology program will improve communications capabilities while reducing antenna visibility. Navy is participating in developing and demonstrating the new antenna functionality. The primary outputs and efficiencies to be demonstrated are improved tactical communications. SFRT output is certified antennas for at least two classes of tactical radios. The efficiency is that mobile users will have improved communications while enjoying more covert antenna profiles. FY 2010 Output: Develop, demonstrated and productized new antenna technology. Apply the antennas to legacy radios to demonstrate improved gain and reduced physical profiles. Demonstrate improved coverage for tactical radios in urban environments. Introduce new antenna technology and configuration to original equipment radio (OEM) producers, for potential adoption within existing radio product lines. FY 2011 Planned Output: None, pending Congressional support.		
Congressional Add: Spartan Advanced Composite Technology *FY 2009 Accomplishments:* Spartan is a modular, multi-mission, unmanned surface vehicle (USV) used to deploy sensors and weapons as low-cost force multipliers with integrated expeditionary sensor and weapon systems for use against asymmetric threats. The expanded range provides a layered defense, early warning/ intercept capability for incoming threats, thereby improving protection of surface combatants and noncombatants. Missions - 1) Conduct critical missions Antisubmarine Warfare (ASW); Mine Warfare (MIW); Intelligence, Surveillance, and Reconnaissance/Force Protection/precision Engagement (ISR/ FP/PE); 2) Prepare the waterspace for Amphibious and Sealift Ops; and 3) Provide port-protection when launched/operated from shore. These funds are to develop composite technologies for Spartan.	1.600	0.000
Congressional Adds Subtotals	8.900	1.600

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603648D8Z: *Joint Capability Technology Demonstration (JCTD)*	**PROJECT** P648: *Joint Capability Technology Demonstration (JCTD)*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
• Line Item #48/ PE 0603750D8Z: *ACTD*	1.169	0.000	0.000		0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• Line Item #96/ PE 0604648D8Z: *JCTD Transition*	10.856	18.557	18.570		18.570	19.517	19.959	19.838	20.159	Continuing	Continuing

D. Acquisition Strategy

The strategy for JCTDs has always been to rapidly develop technologies, conops and TTPs that answer a validated joint/coalition warfighter need and provide a transition path into an existing program of record or to establish a new program for those projects that show significant military utility in the demonstration phase. The following questions are used for the selection of compelling JCTD capability projects:
- Does the action address CoComs needs?
- Is a Joint capability or military advantage gained?
- Do we have a clearly stated and attainable goal?
- Have risks and costs been fully and frankly analyzed?
- Have all other DOTMLPF means been fully explored?
- Is there an exit strategy to avoid endless development?
- Have consequences of inaction been fully considered?
- Can genuine support be garnered from interested partners?
- Are experienced people available to execute the effort?
- Can results be demonstrated to the project champion?

Under the new JCTD program, only the JCTDs that demonstrate the highest military utility will be considered for the transition funding in the JCTD BA4 Transition PE. Many JCTDs will transition smoothly into a well identified program of record and not require funding from the transition PE (the transition arm of the JCTD model). Promising ongoing ACTDs may also receive transition funding from the JCTD Transition arm as the remaining few ACTD projects complete. Some initiatives that are successful but have smaller "sustainment of residual capabilities" issues may receive "pre-transition" funding from the JCTD BA3 PE to aid transitioning the capability to an identified program of record or to the warfighter. JCTD metrics and guidelines are:

- Capability Based: Greater CoCom influence looking at nearer term joint/coalition needs.
- Provide Spiral Technologies - 25 percent will provide an operationally relevant product demonstration within 24 months of Implementation Directive (ID) signature.

- Agile Demonstration - 75 percent complete final demonstration within three years of ID signature.
- JCTDs not necessarily tied to an exercise. Greater flexibility to establish military utility via operational "real-world" demonstration or specifically designed test/venue.
- 80 percent of JCTDs transition at least 50 percent of their products to sustainment.

E. Performance Metrics

Strategic Goals Supported FY 2011:
- Project Selection Focus
- Spiral Technologies
- Time to Final Demonstration
- Adequately Shared Funding and Visibility
- Independent Assessment Capability
- Successful Military Utility Assessment (MUA)

The majority of funding from this Program Element is forwarded to the Services/Defense Agencies that execute the individual JCTD projects. The Rapid Fielding Directorate (RFD) maintains and provides overall programmatic oversight for the JCTD program, to include the individual JCTD projects. The JCTD performance metrics center on how fast relevant joint and/or transformational technologies can be demonstrated and provided to the joint warfighter. These metrics are driven by the overall business process which includes six parts: (1) selection focus; (2) ability to spin-off spiral technologies; (3) time necessary to complete a final demonstration; (4) adequately resourced projects with appropriate oversight; (5) capability to complete an independent assessment of the technology; and (6) the number of successful capabilities that are actually transitioned to the warfighter. The table below defines the metrics of the JCTD business process model.

MEASURABLE OUTCOMES: The JCTD model is capability based, not threat based, serving U.S. Combatant Command priorities by focusing on near-term joint needs. Stated metrics include: 50 percent of JCTDs will provide an operationally relevant product demonstration within 12 months and 75 percent will complete final demonstration within 30 months of Implementation Directive signature. JCTDs will spiral products and deliverables during the demonstration. Since inception in 2006, the JCTD program is exceeding all metrics including faster completion times and increased transition rate to Programs of Record (PORs).

Transition Achievement: The JCTD program has been achieving actual transition rates in excess of the stated goal. The JCTD Program defines transition as a project's product or products going to new or existing Programs of Record (PoR) and/or providing residual products in direct support of the Warfighter that satisfies a specific requirement. Fourteen of 15 completed JCTDs have transitioned to programs of record (POR) and/or operational sustainment (93% successful transition). As of FY09, out of 184 total AC/JCTDs, 64 have deployed in support of OEF/OIF covering the following Functional Areas: Battlespace Awareness: 26, Command & Control: 11, Force Application: 9, Logistics: 14, Protection: 13, Net-Centric: 2. CENTCOM-sponsored AC/JCTDs deployed in OEF/OIF: 13. This exceeds the objective of 30 percent for demonstration programs (Draft Strategic Objective 4-2, Office of the Under Secretary of Defense, Acquisition, Technology & Logistics (OUSD (AT&L)).

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603662D8Z: *Networked Communications Capability*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	27.826	27.984	30.035	0.000	30.035	35.287	40.712	46.060	46.498	Continuing	Continuing
P662: *Airborne Network Gateway*	13.969	6.160	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
P663: *Network Communications Analysis*	13.857	21.824	30.035	0.000	30.035	35.287	40.712	46.060	46.498	Continuing	Continuing

A. Mission Description and Budget Item Justification

Warfighters today rely more and more on communications networks to support and enable actions from targeting and shooting weapons to video-conferencing. Though military basic infrastructure capabilities follow the mainstream commercial internet, for many reasons (security, mobility, robustness), commercial telecommunications especially commercial wireless (tactical edge) communications are not well-matched with the requirements of today's warfighter. These trends will continue as the military data load becomes more diverse and heavy. The National Research Council's Network Science Report (2005) and Army Mobile Ad-hoc Network (MANET) Jason Report (January 2006) state that the type of networking projected to meet military tactical requirements are not supported by network theory, network design nor analysis tools. These tactical edge technology challenges cut across all warfare domains (space, air, ground, sea). In response to recognized technical problems today, as well as anticipated problems in the future, this research will focus on two key problems in networked technologies: the need for expanded wireless reach where no communications infrastructure exists, and the need to create ways to manage diverse wireless communications load and heterogeneous network types. Airborne Network Gateway will expand the wireless communications and networking reach for the tactical force in the form of an airborne network gateway capability. Network Communications Analysis will establish the scientific foundations for military tactical mobile networking with a specific emphasis on the integrated network management of tactical networks. This research will provide the technical basis to standardize the implementation of military network communications capabilities in the areas of airborne network gateways and network communications analysis across the military services, joint staff, OSD, and defense agencies.

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B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	39.923	28.212	0.000	0.000	0.000
Current President's Budget	27.826	27.984	30.035	0.000	30.035
Total Adjustments	-12.097	-0.228	30.035	0.000	30.035
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	-1.475	0.000			
• SBIR/STTR Transfer	-0.458	0.000			
• Program Adjustments	-10.164	-0.228	30.035	0.000	30.035

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense											DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603662D8Z: *Networked Communications Capability*				PROJECT P662: *Airborne Network Gateway*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P662: *Airborne Network Gateway*	13.969	6.160	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

Airborne Tactical Relay - An airborne tactical relay capability enables Beyond Line of Sight (BLOS) range extension for tactical mobile communications. Within the current deployed forces there is no airborne network tier to support locally distributed ground and naval forces at lower tactical levels. The need to increase the capability to support tactical forces at lower levels is highlighted in the 2006 Naval Research Advisory Committee (NRAC) Distributed Operations Study. The current lack of an airborne tactical relay limits BLOS tactical communications to available satellite communications. This research will develop, integrate and demonstrate airborne tactical relay technology to support locally distributed tactical forces and achieve improved near-term networked communications capability. Focus will be placed on the transition from research to acquisition for accelerated fielding. Several candidate payloads and platforms will be investigated to meet the needs of the tactical military user at the lower tactical network tiers, for example, small unit relay. Upon the selection of candidates, the technologies will be integrated, matured and demonstrated to support transition. Research and development will include the development and integration of the payload to include Single Channel Ground and Airborne Radio System (SINCGARS), Enhanced Position Location and Reporting (EPLRS), and Soldier Radio Waveform (SRW) for example; the payload to platform integration to support demonstration; and the development of a small unit Concept of Operations (CONOPS) to demonstrate operations supported by the range extension for tactical units. Demonstrations will be used to support technology maturation and verify technology transition criteria.

Airborne Network Gateway - An airborne network gateway interconnects dissimilar networks among tactical forces and also interconnects tactical forces with higher headquarters and command centers. In general, gateways interconnect networks with different, incompatible communications protocols. Gateways are commonly used commercially in the wired internet world to bridge between different networks. The US Air Force has fielded the Battlefield Airborne Communications Node (BACN) and Rapid Attack Information Dissemination Execution Relay (RAIDER) in response to the need for high altitude airborne relay. This research program will leverage on-going projects, to develop and demonstrate a small tactical airborne gateway to support small units in distributed operations. The Airborne Network Gateway research will develop, integrate and demonstrate airborne network gateway technology to facilitate near term networked communications capability that will be transitioned to the field. Specifically, this research will investigate the data links (eg. Link-16, 1553), networks (eg. SRW, SINCGARS, EPLRS, HNW), and voice (eg. Cellular and UHF voice) candidates for an airborne network gateway, assess technology issues and maturity, and develop enhancements that will overcome shortfalls that preclude the ability to more broadly network the force through an airborne network gateway. One specific area of emphasis will be the analysis of the airborne network gateway effectiveness across sensor to weapon scenarios. Demonstrations will be used to support technology maturation and verify technology transition criteria.

Gateway Interoperability - Gateway functions on the ground and in the air are becoming common across the tactical battlefield to integrate disparate networks. Gateways as a general term include relays (range extension), bridges (connect across networks), message translation (connect across data links), and guards/cross

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domain security (connect across security domains). This research will define, develop, integrate, demonstrate, and assess technology that provides standards to perform gateway functions from the tactical edge to the core Global Information Grid (GIG) network. Many technologies and components exist to perform the variety of gateway functions discussed. These would be assessed to identify desirable aspects to be leveraged as the foundation for providing improved interoperability. Emphasis will be placed on demonstrating capabilities to support airborne tactical relays and airborne network gateways. The research will be expanded to provide the technical basis for standards and policies that can be applied across DoD, specifically in support of the GIG.

Airborne Network Gateway Open Call – A percentage of the Airborne Network Gateway funding will be dedicated to supporting new research initiatives in this technical area. Each fiscal year, a RFP will be sent out with specific technical focus area and evaluation criteria for each project. The proposals will be graded by a peer review team who score each proposal in each of predetermined criteria. Proposals are then selected based on total score.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Airborne Tactical Relay	6.289	3.465	0.000	0.000	0.000
Current program plan calls for the development and maturation of an airborne communications relay suitable for flight on a UAV. The relay will be demonstrated in an operational environment by the end of 2009 and transitioned in 2010. The first year's effort will be executed by the Marine Corps (Office of Naval Research) and the second year's effort will be executed by the Marine Corps (Office of Naval Research) and Army (Communications-Electronics Research, Development, and Engineering Center). Plans call for a common, joint airborne relay supporting tactical small units developed jointly by the Marine Corps and Army, to include development of the payloads and concepts of operation and transition directly to the Services. Research efforts include BTCR and Advanced Tactical Data Link. Overall goal: Increase the understanding of airborne tactical relays. Demonstrate the network communication technology required to support small unit distributed operations. Establish the concept of operations for how these technologies will be operationally used and supported. *FY 2009 Accomplishments:* BTCR: Procured (bought) platforms. Developed additional concepts of operation and conducted military utility assessment. Experimented with different payloads.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2010 Plans: FY2010 Accomplishments: Advanced Tactical Data Link: Navy initiated research effort to create models for advanced tactical network scenarios. FY2010 Plan BTCR: Continue the development for follow on assessment and technology maturation. Complete demonstration of operational relay capability. Transition to Marine, Army and CENTCOM partners. Incorporate integration of legacy waveforms in new platforms. Advanced Tactical Data Link: Bring in and incorporate models of existing systems and manipulate scenarios based on proposed Navy ConOps.					
Airborne Network Gateway *FY 2009 Accomplishments:* Improvement plan for Link 16 capability was terminated along with the related acquisition program.	4.095	0.000	0.000	0.000	0.000
Gateway Interoperability Current plan calls for initiation of this project in 2009 as a joint all service effort. Increase understanding of gateways, a complex area of networking within DoD. Establish the technical basis for DoD policy and standards for the Global Information Grid (GiG), specifically in the area of the tactical edge attachment to the GiG core networks. Research efforts include Enhanced Performance for HNW including Net Entry at Extended Range, GCIC Airborne Network Management Analysis, and Advanced Waveform Support.	3.585	1.188	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: Evaluated gateway technologies and program candidates. Defined the criteria for acceptable gateway technical and operational performance criteria. Enhanced Performance for HNW including Net Entry at Extended Range: Navy demonstrated initial gateway extended range capability at the C4ISR-OTM demonstration (in conjunction with the Army) and began to seek potential transition opportunities with in the Navy. Implemented concept to increase data rate and extend communications range. Advanced Waveform Support: Delivered reports on the evaluation and options for improvements to advanced airways forms. *FY 2010 Plans:* FY2010 Plan - Produce initial technical report for gateway standardization and interoperability. Build prototype gateway for Army and Marine Networks. Identify additional transition opportunities into programs of record. Enhanced Performance for HNW including Net Entry at Extended Range: Define interface spec for Type-1 extension to HNW. Advanced Waveform Support: Conduct research and create publications in the following areas: UHF waveforms, application coding, spectrum reuse, and antenna technology.					
Airborne Network Gateway Open Call A percentage of the Airborne Network Gateway funding will be dedicated to supporting new research initiatives in this technical area. Each fiscal year, a RFP will be sent out with specific technical focus area and evaluation criteria for each project. The proposals will be graded by a peer review team who score each proposal in each of predetermined criteria. Proposals are then selected based on total score.	0.000	1.507	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Overall goal: To add innovative research projects in the area of airborne networking to the program *FY 2010 Plans:* Distributed RFP. Create Peer Review Team. Evaluated and selected FY10 Proposals. Evaluate and select proposals and announce awards. Integrate new performers into the existing program.					
Accomplishments/Planned Programs Subtotals	13.969	6.160	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Strategic Goals Supported: Net-Centric Warfare/Joint Interoperable Communication

Existing Baseline: Prototype relays and gateways; initial federated, laboratory test beds; prototype joint network management tools

Planned Performance Improvement / Requirement Goal: Link expansion in prototype relays and gateways; continued integration in federated test beds; demonstration of prototypes and software tools

Actual Performance Improvement: Prototype and transition able relays and gateways; usage federated test beds; demonstration of prototypes and software tools

Planned Performance Metric / Methods of Measurement : Utilization of federated test beds; demonstration of prototypes and software tools

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense		**DATE:** February 2010
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Actual Performance Metric / Methods of Measurement : Progress on testbed development; prototype software demonstrated; prototype architectures developed

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense											DATE: February 2010
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COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P663: *Network Communications Analysis*	13.857	21.824	30.035	0.000	30.035	35.287	40.712	46.060	46.498	Continuing	Continuing

A. Mission Description and Budget Item Justification

Tactical Mobile Networking - As studies have suggested, for instance, the National Research Council's Network Science Report (2005) and Army Mobile Ad-hoc Network (MANET) Jason Report (January 2006), the type of networking projected to meet military tactical requirements are not supported by network theory, network design and analysis tools. This research will define those technical parameters important to military tactical mobile networking environments, investigate the status of network design and analysis tools, and evaluate how modeling and simulation is conducted to support tactical mobile networking environments. The role of network experimentation with respect to network modeling will be explored. Further development and analysis will be conducted to improve the awareness of the condition of tactical mobile networking technologies. Design tools, architectures and technical approaches will be recommended to acquisition programs as a result of this research.

Network Management Tools and Analysis - Network management in the commercial world is a highly organized, synchronized activity that has excellent tools to monitor activity and repair disrupted networks as needed. These same tools are ill-matched for management in the wireless world, and specifically for military tactical mobile networking. In addition, the military tactical mobile networking environment lacks the infrastructure (connectivity) and support (helpdesk) because resources (spectrum, people, equipment) are scarce (not in harms way). As the complexity of networking grows and as network capabilities are introduced, improved network management is required. For military operations, assured delivery may be needed for specific information and operations. This requires management tools to be in place to ensure continued secure and robust operations, which is not achieved with commercial wireless technologies. This research will assess network management tools in place for the military tactical mobile networking environment; develop technology and tools to address shortfalls with the goal to transition technology to operational systems.

Spectrum Management Tools and Analysis - For wireless, tactical mobile networking, the management of the use of spectrum effects network operations. The demand for spectrum is increasing due to the expanded use of sensors, imagery and voice. This demand increases the pressure on the limited shared radio frequency (RF) spectrum for military tactical networking. The current DoD frequency planning and management infrastructure will have a limited ability to cope with this demand through operational planning, Coalition Joint Spectrum Management Planning Tool (CJSMPT) Joint Capability Technology Demonstration (JCTD) and the Global Electromagnetic Spectrum Information System (GEMSIS). Advanced spectrum management concepts such as sense and adapt, spectrum sharing, and dynamic reallocation are under investigation but not yet mature support operations. This research will evaluate opportunities for more efficient and effective use of the frequency spectrum within DoD. Technology advances are expected to advance the concept of cognitive radio and cognitive antenna devices to sense and adapt operations based on spectrum policy and usage, the management of multi-band and multifunction apertures, and the use of spectrum efficient waveforms for use in military

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environments. This research will develop the models and tools to demonstrate capabilities for operational planning and monitoring of spectrum as these technologies are introduced.

Integrated Network Management Capability - Network management becomes more complex as more and different types of networking capability become available. Integrated network management across heterogeneous systems, especially wireless systems, requires definition, design and development. Operationally, network management assumes all functions required to share networking resources and ensure proper operation for participants. This research will define integrated network operations tools for all aspects of network resource management and to prioritize across operational spectrum management, security management, network management, and information management. This research will also develop testbeds specially to validate models and simulations used to develop and test network management tools, and conduct experimentation on approaches developed.

Networked Communications Analysis Open Call – A percentage of the Networked Communications Analysis funding will be dedicated to supporting new research initiatives in this technical area. Each fiscal year, a RFP will be sent out with specific technical focus area and evaluation criteria for each project. The proposals will be graded by a peer review team who score each proposal in each of predetermined criteria. Proposals are then selected based on total score.

Tactical Networking Evolution and Expansion – Fielded and about-to-be-fielded tactical networks can be vastly expanded and evolved from their current capabilities by developing and applying new techniques (or existing techniques developed in basic research) to the existing systems, providing modern capability to the warfighter without the large expense to the DoD of developing new systems. This research will focus on developing and applying new DoD specific techniques to create leap-ahead approaches to Anti-Jam resistance of tactical networks, larger, more fully exploited networks, and expanded capabilities for signal/data processing and data compression in radios and across the networks. This research will take advantage of new software defined radios about to be fielded by the Department, as well as focus on the existing legacy systems, using the successful approach we developed when fielding the Netted Iridium capability.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Tactical Mobile Networking	3.229	4.356	4.510	0.000	4.510
This project is for the development of new applications and standards that can be used on existing tactical networks to improve data retrieval and discovery by the tactical warfighter. In addition, research is being conducted into tactical communications architectures to develop models useful for optimizing and exploiting tactical networks. New applications and architectures will be tested in a joint federated experimental emulation test bed being developed within this program. Project collaboratively executed					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
by the Navy and Air Force. Plan for transition to programs of record as maturity of models allow. Research efforts include Wireless Computational Networking Architecture, Heterogeneous Intelligent Filtering Extensions (HIF), Cooperative Heterogeneous Comms, Inter-domain Routing, and Tactical Edge Group Wise Networking. Overall goal: Increase understanding of the condition of tactical mobile networking technologies. Improve specification of technical standards and policy for tactical mobile networking. Finer fidelity modeling and simulation to support operations analysis and the articulation of operational requirements and performance parameters. *FY 2009 Accomplishments:* Began research in cognitive networking (architecture and antenna related work). Continued the development of an improved set of tools. Developed testbeds (VAN, eMANE) and began demonstrating tools in a laboratory testbed environment. Wireless Computational Networking Architecture: Conducted WCNA unmanned aerial vehicle tests at the AFRL outdoor testbed. Developed new wireless transport and routing protocols. HIF: Conducted a demonstration of initial HIF capabilities for NRL. Integrated HIF components with JTRS HMS radio platforms and upper echelon surrogate platforms for C4ISR-OTM demonstration. Tactical Edge Group Wise Networking: Navy deployed experimental infrastructure and worked with the Army to implement and extended a tactical edge scenarios in the Army's TITAN tool. *FY 2010 Plans:* Wireless Computational Networking Architecture: Using transport protocols to develop a software infrastructure that supports application development. Develop spectral clustering method. HIF: Begin development of more detailed filtering capabilities. Inter-domain Routing: Define study scenario and approaches. Tactical Edge Group Wise Networking: Initiate development of CORE group-oriented networking protocols.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Continue work in cognitive networking. Demonstrate architectures and tools in testbeds and operational evaluations. Explore areas for cross-service collaboration. Explore potential transition opportunities for tools. Begin work on an advanced tactical network scenario modeling and simulation environment. HIF: Begin test in conjunction with Army JINX effort to filter network management traffic. Create a policy management interface for HIF tool. Develop multiple HIF gateways. Integrate HIF into the Army VAN testbed. Inter-domain Routing: Obtain study results using Lincoln Labs emulation testbed. Extend research into other network communications capability testbeds (Navy eMANE, Army VAN testbed) Wireless Computational Networking Architecture: Explore TCP routing and AHFS using the developed spectral clustering method. Perform additional indoor and outdoor field tests. Tactical Edge Group Wise Networking: Create advance metrics and analytics to study dynamic group structures. Continue to investigate DTN as it relates to supporting group and distributed operational use. Create and transition emulation scenarios to be used in evaluations. Cooperative Heterogeneous Comms: Work to improve network communications protocol. Simulate more general and dynamic topologies. Conduct research using the MIT Lincoln Lab emulation facilities. *FY 2011 Base Plans:* Begin development of early prototypes for field testing. Identify transition opportunities.					
Network Management Tools and Analysis This project is for the development of joint standards and tools for policy-based and measurement-based tactical network management. New standards and applications will be tested in a joint federated experimental emulation test bed being developed within this program. Project jointly executed by the Navy, Air Force and Army, with technology transition agreements being pursued with programs of record. Research efforts include Network Agent Technology for Management (NATM), Joint	3.670	5.209	5.709	0.000	5.709

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Integrated Network Management System Exchange (JINX), Small Form Factor Cross Domain Solution (SFF CDS), Cyber Security Metrics Trust Model, Explicit Congestion Network (ECN) Message Based Admission Control (MBAC), Tactical Resource Management and Control, NEEMO, and High Performance Information Assurance for Wireless Applications. Goals: Increase understanding of the complexity of the tactical network management. Determination of the support required for tactical network operations. Evaluation of technology to support transition and fielding to operational capability. Overall goal: Increase understanding of the complexity of tactical network management. Determination of the support required for tactical network operations. Evaluation of technology to support transition and fielding to operational capability. *FY 2009 Accomplishments:* Developed tools to address joint network management interoperability across network management systems and conducted required capability demonstrations. Continued to refine both policy-based and measurement based network management tools. Initiated technology transition planning. Began validation of developed tools in testbed facilities. NATM: Developed inter-network management system messaging adaptive middleware system security and enhanced data within Army DRAMA tool. Demonstrated capabilities at Networks program review. JINX: Designed and built prototype for JINX Small Form Factor Cross Domain Solution: Completed market survey of SFF CDS. ECN MBAC: Completed Phase 1 prototype NEEMO: Navy identified and transitioned tool to Deep Lightning Bolt and CABLE. High Performance Information Assurance for Wireless Applications: Prototyped crypto module and host board. Tested prototype with various algorithm crypto applications.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2010 Plans: Further develop and demonstrate management tools to evaluate technical maturity and military utility. Transition tools to existing programs; Initiate selection and evaluation of next generation Network Management tool set. NATM: Extend NATM framework beyond the domain of network performance to address network security. Adjust the NATM framework to ensure information adaptability to varying distribution requirements, mission situations, and management information. JINX: Produce final whitepaper. Small Form Factor Cross Domain Solution: Create a remote management/situational awareness architecture. Cyber Security Metrics Trust Model: Create security metrics assessment tool. Create computer network defense and attack models. ECN MBAC: Plan to submit whitepaper to MILCOM 2010. Conduct test in the Army network-in-the-loop testbed. Create an ECN MBAC Phase 2 report and software library. Coordinate efforts with ARL. Tactical Resource Management and Control: Create design for emulating research management and conduct test in Lincoln Labs emulation testbed. Produce final report on test results. NEEMO: Add features to support NEEMO to include automatic correlation of flow records from multiple sources, on-way delay measurements, export of alerts and alarms to other management systems, develop control channel for remote filtering/control options, integrating NORM delivery service, and time synchronization. Work to compress overhead. High Performance Information Assurance for Wireless Applications: E-model tactical edge crypto device based on PEIP. Finalized COMSEC red and black interfaces needed for tactical systems. Demonstrate capabilities. *FY 2011 Base Plans:* Incorporate additional NetOps/Situational Awareness components by specifically integrating security management and IA.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Spectrum Management Tools and Analysis	2.498	3.185	3.190	0.000	3.190

This project is for the development of measurement-based spectrum management tools. Applications will be developed and tested in a laboratory environment. Project executed by the Army with results available to the Navy and Air Force through the Joint NETOPS Integrated Collaborative Working Group. Transition planned for the GEMSIS program in 2010-2011 as maturity allows, and to other existing tactical network programs as appropriate. Research efforts include CERDEC Spectrum Management, Cognitive Networking Radio Platform, SIGINT-assisted Spectrum Management, Cognitive Radio Architecture Research, and Networking for Spectrum Aware Cognitive Radios.

Overall goal: Develop the technical basis to support changes regarding the operational use of spectrum both within the military and among spectrum regulatory bodies.

FY 2009 Accomplishments:
Began development of a functional cognitive radio architecture and interfaces specification. Completed demonstrations of a baseline cognitive radio framework. Began work on spectrum sensing interfaces for cognitive radios. Initiated collaborative cognitive radio research among the Services (Army and Navy). Began investigation of transition areas. Completed and submitted research publications.
CERDEC Spectrum Management: Standardized dynamic spectrum access (DSA) policy language capability. Created a realistic electromagnetic environment (EME) specification. Completed first release of DSA policy generation tool.
Cognitive Networking Radio Platform: Developed a functional cognitive radio architecture and interfaces specification. Identified software and hardware interfaces for the cognitive radio architecture. Developed and implemented base-line JTRS SCA cognitive radio framework.
SIGINT-assisted Spectrum Management: Created spectrum management architecture description.
Cognitive Radio Architecture Research: Surveyed industry, DoD, and academia to create report on existing cognitive radio technology. Conducted cognitive research GNU radio and Matlab.

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Networking for Spectrum Aware Cognitive Radios: Studied spectrum-based minimum length scheduling. Published finding on frequency utilization in wireless networks. Published findings on interference modeling research ACM MobiHOC 2009.					
FY 2010 Plans: Demonstrate and transition technologies for spectrum management. Initiate identification and evaluation of next generation Spectrum Management tool set. CERDEC Spectrum Management: Creating a software library for DSA policy generation. Generating propagation models for DSA policy software analysis. Creating a DSA policy dissemination mechanism. Creating an electronic warfare DSA coexistence policy report. Cognitive Networking Radio Platform: Expand cognitive radio framework specifications to include cognitive networking specifications that allow the insertion of current and future algorithms and models from Joint Services. SIGINT-assisted Spectrum Management: Use SIGNT data to track interference emitter location and frequencies to allow the capability to mitigate interference and outages. Create better SIGNT modeling data. Create better models for spectrum management. Explore alternative concepts (distributive spectrum sensing and alternate SIGNT modalities). Cognitive Radio Architecture Research: Created standard environmental profile and/or models. Collaborate, document, and share test results with CERDEC through integration with CERDEC's emulation testbed. Networking for Spectrum Aware Cognitive Radios: Develop algorithms that improve node cooperation via the use of relay nodes. Study the impact of heterogeneity in the available spectrum at different locations of the network. Explore collaboration with Virginia Tech on studying capacity scaling laws for cognitive radio networks.					
FY 2011 Base Plans: Integrate next generation Spectrum Management tool set in existing operational environments (ie. Spectrum management centers).					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Integrated Network Management Capability	3.580	7.568	7.821	0.000	7.821

This project is for the development of joint integrated network management tools, and three federated experimental test beds for the development and evaluation of integrated tactical network management and spectrum management. Project executed jointly by the Navy, Army and Air Force. Plans also establish a Joint Network Operations (NETOPS) Integrated Collaborative Working Group for the establishments of standards and joint development in support of all projects in this program. Membership includes the research community from the Navy, Marine Corps, Army and Air Force as well as developers from acquisition programs such as Future Combat Systems (FCS), Warfighter Information Network-Tactical (WIN-T) and Joint Tactical Radio System (JTRS). Future plans call for further joint infrastructure test bed development to include DoD PlanetLab as well as joint networking tools in support of NETOPS. The results of this research will transition to future increments of JTRS and WINT, and if successful, to the field through a joint integrated tactical NETOPS program. Research efforts include Joint Network Management Interoperability, Wireless Networking Library (WNL), Network Emulation and Experimentation, and Tactical Edge Wireless Experimentation.

Overall goal: Common integrating framework to support interoperability among various aspects of developmental network operations and management to include: spectrum management, network management, security management and information management. Reduce the cost to develop, procure and support networks through the integration across networks and functions within networks.

FY 2009 Accomplishments:
Completed initial Spiral development on joint federated test beds (between Army and Navy). Continued to define an integrated network management framework. Demonstrated tools that provide integrated network management (Navy eMANE and NEEMO; Army NITL and SITL; AF NATM). Joint Network Management Interoperability: Completed Spiral One of the virtual ad hoc network testbed (VAN). Completed Spiral Two of the Network-in-the-Loop (NITL) testbed adding dynamic routing mobility. Completed a policy analysis detection trade study. Completed a policy meta language study.

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Wireless Networking Library: Began to populate datasets in the network management data library and obtained an initial user set for the tool. Network Emulation and Experimentation: Improved network emulation environment. Conducted a joint experiment with AFRL. Supported external programs including IRIS, JTRS, and WIN-T. Tactical Edge Wireless Experimentation: Conducted mobile networking modeling workshop. Continued eMANE development. Created max-eMANE facility which includes 200 plus hardware nodes of emulation capability and demonstration and presentation space. *FY 2010 Plans:* Joint Network Management Interoperability: Integrate Army VAN testbed with the Navy's eMANE by creating an eMANE to VAN adaptor. Wireless Networking Library: Work to increase participation (submission and usage) of network management data library. Create advertising article for WNL and conduct additional advertising events. Create WNL usage and summary report. Network Emulation and Experimentation: Create interconnected emulation capability with CERDEC and NRL and conduct a joint experiment with each. Tactical Edge Wireless Experimentation: Integrate Army VAN testbed with the Navy's eMANE by creating an eMANE to VAN adaptor. Create eMANE developer training. Conduct additional mobile networking workshop. Add high performance optimizations to eMANE. Create detection and jamming models. Transition test beds to Services. Initiate DoD PlanetLab test and development facility. Demonstrate tools in an operational environment, transition tool set. Perform a joint Service lab inter-connection specifically using a "chat" capability to validate experimentation. Initiate selection and evaluation of next generation integrated network management software tools.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: Integrate next generation integrated network management software tools in existing operational environments (ie. TNOCs, JTF-GNO).					
Networked Communications Analysis Open Call	0.000	1.506	4.000	0.000	4.000
A percentage of the Networked Communications Analysis funding will be dedicated to supporting new research initiatives in this technical area. Each fiscal year, a RFP will be sent out with specific technical focus area and evaluation criteria for each project. The proposals will be graded by a peer review team who score each proposal in each of predetermined criteria. Proposals are then selected based on total score. Overall goal: To add innovative research projects, in the area of networked communications, to the program *FY 2010 Plans:* Distributed RFP. Create Peer Review Team. Evaluated and selected FY10 Proposals. Evaluate and select proposals and announce proposal awards. Integrate new performers into the existing program. *FY 2011 Base Plans:* Create and distribute FY11 RFP. Conduct a Peer Review Conference where proposal candidates will present their work to the Peer Review teams.					
Tactical Networking Evolution and Expansion	0.000	0.000	4.805	0.000	4.805
This project is for the development of new applications and approaches that can be used on existing tactical networks to improve the physical- and networking layers for the tactical warfighter. It will					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
explore new ways to build architectures, antennas, signal and data processing or exploit waveforms to improve Anti-Jam resistance, network throughput and scale, or network packet routing to improve these metrics, at low cost and without sacrificing interoperability. Overall goal: Next generation tactical networking in the fielded tactical systems, with vastly increased capabilities, at the lowest cost possible to the DoD. *FY 2011 Base Plans:* Begin development of early prototypes for Anti-Jam improvements field testing. Identify transition opportunities. Goal is to demonstrate capabilities in FY2012. Begin planning for additional improvements to increase throughput, scale and IP-networking capability. Identify other candidate improvements. Evaluate operational impact of potential improvements.					
Netted Iridium DTCS - JUON Deliver an Over-the Horizon (OTH), on-the-move, Beyond-Line-of-Sight (BLOS) communications and network management capability to disadvantaged users operating in overseas combat areas. Productize the experimental Netted Iridium (NI) radio capability in order to provide OTH and BLOS to the CENTCOM Area of Responsibility (AOR). *FY 2009 Accomplishments:* Completed production ready prototypes, network gateway, satellite upgrades, training and sustainment packages. Delivered network of approximately 50 radios, and delivered training to field. Initiated transition to Army for production of additional radios, as required. *FY 2010 Plans:* Upgrade satellite software and network management gateway software (moving from a SVSB to an SVMB architecture) to double network range and increase number of networks by a factor of 5. Integrate higher level security classification (NSA Type 1) in the radios.	0.880	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Accomplishments/Planned Programs Subtotals	13.857	21.824	30.035	0.000	30.035

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

The Netted Iridium (NI) capability will be transitioned directly to production and sustainment to the DTCS-Army program by the Army for use in the CENTCOM AOR. Other program capabilities will be transitioned to acquisition programs as successful and appropriate.

E. Performance Metrics

Strategic Goals Supported: Net-Centric Warfare/Joint Interoperable Communication. Meet current needs of tactical warfighter

Existing Baseline: Prototype relays and gateways; initial federated, laboratory test beds; prototype joint network management tools

Planned Performance Improvement / Requirement Goal: Link expansion in prototype relays and gateways; Continued integration in federated test beds; demonstration of prototypes and software tools

Actual Performance Improvement: Prototype and transition able relays and gateways; Usage federated test beds; demonstration of prototypes and software tools

Planned Performance Metric / Methods of Measurement: Utilization of federated test beds; demonstration of prototypes and software tools

Actual Performance Metric / Methods of Measurement: Progress on test bed development; prototype software demonstrated; prototype architectures developed

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COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	0.000	4.895	6.289	0.000	6.289	10.636	11.177	10.852	10.737	Continuing	Continuing
P366: *Joint Data Management Advanced Development*	0.000	4.895	6.289	0.000	6.289	10.636	11.177	10.852	10.737	Continuing	Continuing

A. Mission Description and Budget Item Justification

This is a new start program.

(U) As the Department of Defense increases the capability and capacity to generate increasing amounts of data from numerous sensors in the battlespace, the issue of handling very large data sets has become more challenging. This is in part due to Department of Defense response to a changing threat environment where there is an expansion of the types of sensors deployed, new types of information collected, and different features used to classify these new threats. From a technical perspective, sensor processing speeds have outpaced the speed and ability to transport, store and process the data created. Science and technology investigation into new and novel ways to manage and exploit this data is required to more efficiently use sensor assets and effectively use information in a timely fashion.

This program will establish the demonstration and experimentation environment to conduct independent evaluations of research efforts that have the most potential of minimizing the impact of the increasing amount of information required within military operational decision-making. The intent is to leverage existing research investments within defense Science & Technology and provide proper evaluations and assessments to facilitate technology transition. These objective assessments will be conducted and coordinated across the defense research base and with other parts of government to include Director, National Intelligence and Department of Homeland Secutity.

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B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	0.000	4.895	0.000	0.000	0.000
Current President's Budget	0.000	4.895	6.289	0.000	6.289
Total Adjustments	0.000	0.000	6.289	0.000	6.289
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Program Adjustments	0.000	0.000	6.289	0.000	6.289

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COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P366: *Joint Data Management Advanced Development*	0.000	4.895	6.289	0.000	6.289	10.636	11.177	10.852	10.737	Continuing	Continuing

A. Mission Description and Budget Item Justification

This is a new start program.

(U) As the Department of Defense increases the capability and capacity to generate increasing amounts of data from numerous sensors in the battlespace, the issue of handling very large data sets has become more challenging. This is in part due to Department of Defense response to a changing threat environment where there is an expansion of the types of sensors deployed, new types of information collected, and different features used to classify these new threats. From a technical perspective, sensor processing speeds have outpaced the speed and ability to transport, store and process the data created. Science and technology investigation into new and novel ways to manage and exploit this data is required to more efficiently use sensor assets and effectively use information in a timely fashion.

This advanced technology demonstration program will establish the demonstration and experimentation environment to conduct independent evaluations of research efforts that have the most potential of minimizing the impact of the increasing amount of information required within military operational decision-making. The intent is to leverage existing research investments within defense Science & Technology and provide proper evaluations and assessments to facilitate technology transition. These objective assessments will be conducted and coordinated across the defense research base and with other parts of government to include Director, National Intelligence and Department of Homeland Security.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Novel Information Architectures	0.000	1.468	1.884	0.000	1.884
(U) Both the size of the data to be transferred and the growing size of databases require novel architectural approaches to provide the adaptability and usability. Current databases, file systems and network protocols will not keep pace. Additionally, the level of automation required will necessarily impact the expectation of man/machine interaction and their performance. Research areas to be explored may include reconfigurable, scalable, and dynamic systems; re-indexing, association, and					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603663D8Z: *Joint Data Managment Advanced Development*	**PROJECT** P366: *Joint Data Management Advanced Development*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
ontological representation for distributed and streaming data; many core file and operating systems, management and scheduling, and optimized algorithms; operationally relevant metrics and figures of merit for architecture performance, security, and vulnerability. Program Outputs and Efficiencies – (U) Improved knowledge regarding system and network component performance which can be leveraged across Defense S&T and development communities. *FY 2010 Plans:* (U) Initiate research activities in candidate areas. Establish assessment methods of candidate approaches. Evaluate candidates for inclusion in experimentation and demonstration. *FY 2011 Base Plans:* (U) Continue research activities in candidate areas. Evaluate projects in experimentation and demonstration.					
Experimentation and Demonstration Program	0.000	3.427	4.405	0.000	4.405
Examine relevant DoD problem domains such as Wide Area Surveillance and Biometrics where recommended research solutions for handling large data can have the most impact. In order to conduct experimentation and assessments, test data sets and methodologies will be collected and developed. Assessment methods and performance metrics will be used to compare research options and solution potential. Several factors will be considered during these evaluations, to include; the basis of making a decision or taking an action; how access to this data has operational impact; make a difference, can the data feature be detected and processed (e.g. extracted) from the large data set and can the data be accessed and processed to support the decision, action or analysis. Program Outputs and Efficiencies – (U) Data to support potential solutions for handling large amounts of data.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603663D8Z: *Joint Data Managment Advanced Development*	**PROJECT** P366: *Joint Data Management Advanced Development*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2010 Plans: (U) Collect data sets used for experimentation. Plan and conduct experiment and demonstration event in one problem domain. Evaluate results. *FY 2011 Base Plans:* U) Refine experiment and assessment methodology. Conduct experiment and demonstration event covering a second large data problem domain.					
Accomplishments/Planned Programs Subtotals	0.000	4.895	6.289	0.000	6.289

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603665D8Z: *Biometrics Science and Technology*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	9.651	10.904	11.416	0.000	11.416	11.568	14.259	14.491	14.751	Continuing	Continuing
P665: *Biometrics Science and Technology*	9.651	10.904	11.416	0.000	11.416	11.568	14.259	14.491	14.751	Continuing	Continuing

A. Mission Description and Budget Item Justification

In Oct 2006, the Deputy Secretary of Defense designated the Director for Defense Research and Engineering (DDR&E) as Principal Staff Assistant (PSA) for biometrics with responsibility to fully address and exercise control over all facets of the Department's biometrics programs, initiatives, and technologies. Biometrics technologies have unique potential to provide the Department with the capability to take away an adversary's anonymity. The Biometrics Science and Technology (S&T) program provides focused investment to fill current biometrics technology gaps.

Biometrics technologies can be used to both verify an individual's claimed identity and, when combined with additional intelligence and/or forensic information, biometrics technologies can establish an unknown individual's identity. Biometrics technologies have been used effectively in Iraq and Afghanistan in identifying individuals and in forensic applications. The Biometrics S&T program addresses the technology gaps that preclude our ability to quickly and accurately identify anonymous individuals who threaten our interests, in whatever domain they operate.

This program develops a comprehensive biometrics science and technology plan and implements multiple projects to advance capabilities to identify anonymous individuals using individual biometrics.

Exhibit R-2, **RDT&E Budget Item Justification:** PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603665D8Z: *Biometrics Science and Technology*

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	10.521	10.993	0.000	0.000	0.000
Current President's Budget	9.651	10.904	11.416	0.000	11.416
Total Adjustments	-0.870	-0.089	11.416	0.000	11.416
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	-0.089			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	-0.605	0.000			
• SBIR/STTR Transfer	-0.265	0.000			
• Other Program Adjustments	0.000	0.000	11.416	0.000	11.416

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense											DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				**R-1 ITEM NOMENCLATURE** PE 0603665D8Z: *Biometrics Science and Technology*				**PROJECT** P665: *Biometrics Science and Technology*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P665: *Biometrics Science and Technology*	9.651	10.904	11.416	0.000	11.416	11.568	14.259	14.491	14.751	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program will develop technologies to improve the quality of biometric derived information provided to the operational forces for the purpose of identifying and classifying anonymous individuals and for forensic applications. It will enable execution of a Department of Defense and interagency coordinated biometrics science and technology plan that supports technology transition to acquisition programs in FY 2010 and out-years.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Biometrics Science &Technology Planning	0.501	0.500	0.495	0.000	0.495
A comprehensive Biometrics Science and Technology (S&T) Strategic Plan was developed and will be continually refined to guide component level investment in biometrics technology. *FY 2009 Accomplishments:* Completed Biometrics S&T plan and roadmap to guide component biometrics S&T investments. Developed beta version of a biometrics “dashboard” to assess performance metrics and return on investment. The S&T roadmap was developed in consideration of the recently completed Joint Staff Biometrics Capability-Based Assessment (CBA) which is part of the process of defining formal biometrics requirements. *FY 2010 Plans:* Sponsor a Biometric and Forensic S&T Workshop with interagency participation to review current S&T projects and provide visibility on DoD S&T efforts. Leverage membership in the Center for Identity Technology Research (CITeR) to support research in priority biometrics areas relevant to DoD.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603665D8Z: *Biometrics Science and Technology*	**PROJECT** P665: *Biometrics Science and Technology*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
(Multimodal fusion vulnerability to imposters, Iris segmentation quality analysis prediction and rectification, Impact of age and aging on iris recognition, Detecting, restoring and matching altered fingerprints) Continued maintenance of the Biometrics S&T roadmap to incorporate emerging technologies and evolving capability requirements and gaps. Develop Biometric S&T Implementation Plan to inform and guide the Department's S&T investment. Transition the biometrics "dashboard" to the Executive Agent (Army) for continued refinement and maintenance. *FY 2011 Base Plans:* Continually review biometrics strategy, plan, roadmap and model to ensure currency and relevance to emerging biometrics related needs.					
Biometrics Technology Projects Biometrics capabilities and gaps are continually evaluated though the planning process addressed previously and gaps will be addressed through the competitive solicitation of focused proposals. Broad Agency Announcements (BAA), technical proposal reviews, selections and awards will recur annually. *FY 2009 Accomplishments:* -Completed multiple demonstrations of various technologies to improve standoff collection, quality and matching accuracy of facial and iris images. Results provided to Army to inform development of their FY 2010 new start acquisition program for tactical biometrics collection devices. -As a follow-up to the FY 2008 BAA, solicited focused proposals to (1) develop innovative means to capture fingerprint, face and iris images in all conditions with a single sensor (3 of 19 submissions selected for this focus area), and (2) to demonstrate the Ability to leverage matching across multiple modalities (3 of 27 submissions selected for this focus area). -Evolutionary Approach to Adaptive Fusion: Developed a functional model/tool of the multimodal biometric system that leverages an evolutionary approach to biometric fusion and can dynamically	6.600	6.911	7.200	0.000	7.200

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603665D8Z: *Biometrics Science and Technology*	**PROJECT** P665: *Biometrics Science and Technology*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
update the biometric system. This capability provides the warfighter with a more effective means to recognize and identify individuals operating in uncontrolled environments common to DOD. -Robust Image Sanity Check and Age Estimation: Developed and delivered three integrated components to provide an intelligent multimodal fusion engine that incorporates quality measures from soft biometrics, automatic robust image sanity checks and age estimation. This project provides Warfighters with a tool to mitigate terrorist tactics of using disguises by leveraging multimodal fusion and using soft biometrics to improve matching capabilities. -Robust Multimodal Face, Iris & Ear Acquisition: Developed and delivered a single-sensor system designed to simultaneously capture face, iris (and possibly ear) biometric data at stand-off distances between 8 – 15 meters using recently released COTS camera hardware. This system provides warfighters the ability to enroll or match a suspect at longer and safer stand-off distances without having to lay down their weapons to operate handheld systems. -Joint Iris / Face Identification Camera: Developed and delivered a Joint Iris/Face Identification Camera (JIFI-Cam) to collect and process multimodal biometric data and operate with unprecedented ease-of-use. This project offers the warfighter a significant improvement over current technology in that it will enable an operator to image cooperative subjects from a safe “beyond-arm’s-reach” distance with one-handed point-and-shoot simplicity. -Grapheme-Based Universal Biometric Fusion Engine: Developed and delivered a biometric fusion engine that assigns grapheme-based data structures to fingerprints, face and voice captures, leveraging a common set of algorithms for template creation and matching. This project allows warfighters to use biometrics in more tactical situations with better results. -Multimodal Biometric Fusion Handheld Device: Developed and delivered a multimodal biometric fusion handheld device that collects fingerprint, face, iris and voice and to more effectively identify individuals. This project automates the evaluation and selection of biometric samples by the warfighter, simplifies and hastens the capturing process, and increases the chance of obtaining biometric samples of good quality.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603665D8Z: *Biometrics Science and Technology*	**PROJECT** P665: *Biometrics Science and Technology*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2010 Plans: Release Broad Agency Announcement (BAA) and select projects based on the identified technology gaps. Continue to review the results of technology demonstrations and focus technology development solicitations on achieving technology readiness levels needed to transition to FY 2010 new start programs of record. Complete data call of Department of Defense Biometric Science and Technology (S&T) requirements and gaps to derive the focus areas used to inform the FY 2010 BAA. Coordinating focus areas with interagency S&T partners to minimize redundancies and leverage others' S&T investments. *FY 2011 Base Plans:* Continue to refine priorities and focus projects on transition opportunities to biometrics program of record. Expand modalities beyond face, finger and iris to include expanded development of voice and DNA.					
Forensics Commercially available forensics technologies have been developed for use in permissive law enforcement operations and fixed site laboratories. The Department of Defense (DoD) has a requirement to collect, preserve, exploit and analyze forensics materials from site exploitations in forward deployed expeditionary operations and with field hardened equipment suitable for use by military personnel. The forensics projects under this program will develop expeditionary forensic collection, processing and exploitation systems capable of operating in all tactical environments. *FY 2009 Accomplishments:* Completed development of a forensics Science and Technology (S&T) strategy and solicited focused proposals consistent with identified gaps. Leveraged forensics technology development efforts of other US government activities to include the Department of Homeland Security (DHS), Federal Bureau of Investigation (FBI) and the National Institute of Justice (NIJ). Initial investments focused on technologies that enhanced the testing for the presence of specific explosives, drugs, and heavy	2.550	3.493	3.721	0.000	3.721

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603665D8Z: *Biometrics Science and Technology*	**PROJECT** P665: *Biometrics Science and Technology*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
metals/gunshot residue for the war-fighter in the field; developing a prototype device that interrogates cell phones with cameras to determine if stored images were captured by the cell phone's integrated camera or were received into memory from some other source, such as a website; and, developing an automatic feeding capability to capture digital images of latent prints from paper documents to identify, locate, and capture digital images of individual latent prints from an original document, or from a larger, parent digital image of that document. -Accelerated Nuclear DNA Equipment (ANDE) Project: Co-sponsored (with JIEDDO) a field-deployable rapid DNA profiling system using advanced micro-fluidic technologies to demonstrate accelerated DNA sequencing and matching in a field deployable system. This project provides the warfighter with a much faster methodology to analyze DNA samples. -Four additional Forensics projects have been solicited through the Director, Defense Research and Engineering (DDRE) Open Business Cell (OBC). As of this submission, the results of the OBC solicitation process is not yet finalized. *FY 2010 Plans:* Continue to review results of technology demonstrations and focus technology development solicitations on achieving improved technology readiness levels for expeditionary forensics capabilities. *FY 2011 Base Plans:* Continue to refine priorities and focus projects on transition opportunities to forensics programs of record and interagency partnerships.					
Accomplishments/Planned Programs Subtotals	9.651	10.904	11.416	0.000	11.416

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603665D8Z: *Biometrics Science and Technology*	**PROJECT** P665: *Biometrics Science and Technology*

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Defense Biometrics S&T strategy is to annually assess technology gaps in the Department's combined S&T portfolio, and sponsor projects that help close those gaps. These projects are designed to advance immature technologies and deliver a prototype. This strategy was initiated in FY 2008, and the first five projects each delivered prototypes in October 2009.

Additional development is required for these first prototypes prior to selection for production. It is anticipates that the first five prototypes will transition in FY 2010. Due to the relative newness of the Biometrics S&T program, the DoD Strategic Objective 4-3 (transition 30% of completing demonstrations program per year) will not be a measurable performance metric until FY 2010 closeout.

In the interim, project performance metrics are specific to each effort and include measure identified in the project plan. In addition, program completion and success will be monitored against program schedule and deliverables stated in the proposals. The metrics include items such as target dates from project work break down schedules, production measures, production goals, production numbers and demonstration goals and dates.

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603668D8Z: *Cyber Security Advanced Technology Development*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	0.000	0.000	10.000	0.000	10.000	20.000	30.000	30.000	40.000	Continuing	Continuing
P113: *Cyber Security Advanced Technology Development*	0.000	0.000	10.000	0.000	10.000	20.000	30.000	30.000	40.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

This is a new start program.

The urgency and criticality of improving Cyber Security for the Department of Defense (DoD) and Intelligence Communities (IC) is highlighted by the release of the President's Cyberspace Policy Review. Our cyber defenses must provide mission assurance during cyber attacks on our operations throughout the world. Adversaries are increasingly sophisticated and growing in number, and the DoD and IC need more options to operate and fight in cyberspace.

This PE will investigate and conduct advanced development of new and novel game-changing ways to address all aspects of cyber operations. It will plan and develop demonstrations of cyber capabilities such as the ability to harden military networks, attribute and disrupt adversary attacks in order to provide increased levels of mission assurance. It will focus on capabilities to minimize the impact of the increasing cyber threats and to increase the military capabilities to fight and survive in cyberspace. A focus will be to transition the results of the Cyber Security Research PE into capabilities that can be demonstrate and provide technical options and approaches to support full spectrum cyber operations.

Exhibit R-2, **RDT&E Budget Item Justification:** PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603668D8Z: *Cyber Security Advanced Technology Development*

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	10.000	0.000	10.000
Total Adjustments	0.000	0.000	10.000	0.000	10.000
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Program Adjustments	0.000	0.000	10.000	0.000	10.000

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense											DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				**R-1 ITEM NOMENCLATURE** PE 0603668D8Z: *Cyber Security Advanced Technology Development*				**PROJECT** P113: *Cyber Security Advanced Technology Development*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P113: *Cyber Security Advanced Technology Development*	0.000	0.000	10.000	0.000	10.000	20.000	30.000	30.000	40.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

This is a new start program.

The urgency and criticality of improving Cyber Security for the Department of Defense (DoD) and Intelligence Communities (IC) is highlighted by the release of the President's Cyberspace Policy Review. Our cyber defenses must provide mission assurance during cyber attacks on our operations throughout the world. Adversaries are increasingly sophisticated and growing in number, and the DoD and IC need more options to operate and fight in cyberspace.

This PE will investigate and conduct advanced development of new and novel game-changing ways to address all aspects of cyber operations. It will plan and develop demonstrations of cyber capabilities such as the ability to harden military networks, attribute and disrupt adversary attacks in order to provide increased levels of mission assurance. It will focus on capabilities to minimize the impact of the increasing cyber threats and to increase the military capabilities to fight and survive in cyberspace. A focus will be to transition the results of the Cyber Security Research PE into capabilities that can be demonstrate and provide technical options and approaches to support full spectrum cyber operations.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Cyber Security Advanced Technology Development	0.000	0.000	10.000	0.000	10.000
FY 2011 Base Plans: This is a new start program and project plans for FY 2011 and beyond will be developed by the Director, Defense Research & Engineering (DDR&E) for execution by DoD components. This process will be conducted using the established Information Assurance and Computer Security Steering Council chartered by DDR&E which has representation from DoD components conducting cyber operations research.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603668D8Z: *Cyber Security Advanced Technology Development*	**PROJECT** P113: *Cyber Security Advanced Technology Development*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Accomplishments/Planned Programs Subtotals	0.000	0.000	10.000	0.000	10.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
• PE 0602668D8Z, BA 2: *Cyber Security Research*			10.000		10.000	10.000	20.000	20.000	10.000	Continuing	Continuing

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603670D8Z: *Human, Social and Culture Behavior (HSCB) Modeling Advanced Development*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	8.443	10.395	11.510	0.000	11.510	19.187	21.765	22.119	22.513	Continuing	Continuing
P370: *Human, Social and Culture Behavior (HSCB) Modeling Advanced Development*	8.443	10.395	11.510	0.000	11.510	19.187	21.765	22.119	22.513	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program is focused on demonstrating general-use, cross-domain capabilities/tools to support all HSCB application areas. It will demonstrate: computational modeling capabilities; visualization software toolsets; and training/mission rehearsal systems that provide forecasting capabilities for socio-cultural (human terrain) responses at the strategic, operational and tactical levels. The resulting technologies will provide, 1) cultural understanding/overlays in existing intelligence, influence operations, and operations planning systems; 2) training and mission rehearsal capabilities that go beyond strategic level planning tools (to the operational and tactical levels), providing broader, more in depth training/retention capability. A technical assessment capability is established across all program line items and is a means for assessment of discrete technologies as they are developed. Modeling capabilities generate and technically demonstrate validated adversaries to populate "what if" analyses for forecasting reactions of a defined class of adversaries to U.S./ coalition actions. Strategic decision making tools are technically demonstrated to highlight political, religious, cultural, and related factors. Training/mission rehearsal systems are capable of using flexible underlying cultural models to train at the operational/ tactical level. Integration and demonstration of social, cultural and human behavior/cognition skills training systems for operational and strategic planning personnel in a coalition force context. Visualization software toolsets are used as strategic decision making tools that will account for political, religious, cultural, and other factors. A common architecture visualization tool vertically integrates cultural information into a military operational environment.

Exhibit R-2, **RDT&E Budget Item Justification:** PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603670D8Z: *Human, Social and Culture Behavior (HSCB) Modeling Advanced Development*

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	9.381	11.480	0.000	0.000	0.000
Current President's Budget	8.443	10.395	11.510	0.000	11.510
Total Adjustments	-0.938	-1.085	11.510	0.000	11.510
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	-0.231	0.000			
• SBIR/STTR Transfer	-0.170	0.000			
• Other Program Adjustments	-0.537	-1.085	11.510	0.000	11.510

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense											**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				**R-1 ITEM NOMENCLATURE** PE 0603670D8Z: *Human, Social and Culture Behavior (HSCB) Modeling Advanced Development*				**PROJECT** P370: *Human, Social and Culture Behavior (HSCB) Modeling Advanced Development*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P370: *Human, Social and Culture Behavior (HSCB) Modeling Advanced Development*	8.443	10.395	11.510	0.000	11.510	19.187	21.765	22.119	22.513	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program is focused on devoloping cross-domain capabilities/tools to support all HSCB application areas. It will demonstrate: computational modeling capabilities; visualization software toolsets; and training/mission rehearsal systems that provide forecasting capabilities for socio-cultural (human terrain) responses at the strategic, operational and tactical levels. The resulting technologies will provide, 1) cultural understanding/overlays in existing intelligence, influence operations, and operations planning systems; 2) training and mission rehearsal capabilities that go beyond strategic level planning tools (to the operational and tactical levels), providing both broader and more in depth training/ retention capabilities. Technical assessment processes are established across all program line items and enable for assessment of discrete technologies as they are developed. Modeling capabilities generate and technically demonstrate validated adversaries to populate "what if" analyses for forecasting reactions of a defined class of adversaries to U.S./ coalition actions. Strategic decision making tools are technically demonstrated to highlight political, religious, cultural, and related factors. Training/mission rehearsal systems are capable of using flexible underlying cultural models to train at the operational and tactical levels. Social, cultural and human behavior/cognition skills training systems are integrated and demonstrated for operational and strategic planning personnel in a coalition force context. Visualization software toolsets are used as strategic decision making tools that will account for political, religious, cultural, and other factors. A common architecture visualization tool vertically integrates cultural information into a military operational environment.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	**FY 2010**	**FY 2011 Base**	**FY 2011 OCO**	**FY 2011 Total**
Modeling Capabilities	2.706	3.575	3.957	0.000	3.957
Generation and technical demonstration of validated synthetic adversaries driven by underlying HSCB computational models will be the key to "what if" analyses for forecasting reactions of a defined class of adversaries to U.S./coalition military, economic, or political actions.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Integrate and demonstrate decision making support tools useful within programs of record and operational user Planning/Execution/Re-Planning systems for political, religious, cultural and other factors. Develop tools and software products to integrate socio-cultural models and information into existing intelligence, training, operational planning, and Command and Control systems. *FY 2009 Accomplishments:* Synthetic forces are useful for doing 'what if' exercises for planning purposes during Phase 0, and during ongoing contingency planning. The synthetic forces used for these wargames/planning exercises are often not an accurate representation of adversary or green forces, and their reactions to U.S./coalition actions. In FY09, to overcome the limitations of synthetic forces the program demonstrated regional/cultural models in planning exercises through the use of a comprehensive technology evaluation plan tied to warfighter relevant mission threads. *FY 2010 Plans:* Support specific operational planning tasks for selected government partners via limited technical demonstration in user settings and by leveraging: other models; work performed in visualization; cultural understanding; the development of specific and generalized cultural models. Demonstrate the work done in the development of data frameworks to demonstrate a partial end to end process that uses the aspects described above. In addition, working with operational partners HSCB models will be tested in realistic environments by representative users. *FY 2011 Base Plans:* Integrate and demonstrate decision making support tools within Planning/Execution/Re-Planning systems, and socio-cultural models and information into existing intelligence, training, operational planning, and Command and Control systems.					
Training/Mission Rehearsal Systems	2.049	2.352	2.614	0.000	2.614

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Current methods and procedures for integrating cultural information into military operations do not satisfy the requirements for ongoing operations and are not flexible enough to rapidly deliver just-in-time training for complex new regions of interest, and relatively new mission areas (e.g. transition and reconstruction). Training systems capable of using flexible underlying cultural models to train at the operational/tactical level is a requirement. When combined with socio-cultural operational planning tools, they allow users to understand the socio-cultural environment. It is then possible to plan, and potentially rehearse non-kinetic actions prior to execution and make changes based on outcomes. *FY 2009 Accomplishments:* Demonstrated training technologies to deliver socio-cultural understanding and skills needed by individuals, small units, and coalitions in current and future military operations. Initiated socio-cultural theory based training tool projects that leverage commercial investments in Internet-based technologies and DoD investments in training technologies to support HSCB training and mission rehearsal objectives. *FY 2010 Plans:* Demonstrate distributed training technologies to speed the development of socio-cultural skills in coalitions in current military operations. *FY 2011 Base Plans:* Demonstrate socio-cultural training directly supported by hybrid modeling approaches. Capabilities to include automated scenario generation for red, white, gray side experimentation, based on validated mission rehearsal content.					
Visualization Software Toolsets This program demonstrates a first generation decision-making toolset that includes HSCB factors. Visualization software toolsets and integration of a common architecture visualization tool that will	3.688	4.468	4.939	0.000	4.939

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
be used in operational/strategic decision making is the goal. These tools are required to account for political, religious, cultural, and other factors as well as to vertically integrate cultural information into a military operational environment. *FY 2009 Accomplishments:* Developed an implementation plan for prototype geospatial/socio-cultural collection; modeling and visualization technologies that focus on automated extraction of cultural data demonstration in support of operational users. Developed a visualization tool to support enhanced visualization of hybrid intelligence and socio-cultural data. *FY 2010 Plans:* Common, generalized (strategic to tactical) tools for visualization of Diplomatic Infrastructure Military Economic - Political Military Economic Social Information Infrastructure (DIME-PMESII) or HSCB factors on the battlefield, or during Security, Stability, Transition and Reconstruction phases do not exist. HSCB will focus on providing visualization capabilities that support a richer understanding of socio-cultural data in concert with other warfighter data. *FY 2011 Base Plans:* Demonstrate visualization tool sets that can access underlying geospatial and socio-cultural data, evidentiary information, and associated uncertainty in the same visualization. Demonstrate visualization methods that can deal with sparse data sets.					
Accomplishments/Planned Programs Subtotals	8.443	10.395	11.510	0.000	11.510

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense		**DATE:** February 2010
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C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
• PE 0602670D8Z BA 2: *HSCB Applied Research*	8.063	7.882	9.499		9.499	15.843	17.991	18.322	18.662	Continuing	Continuing
• PE 0604670D8Z BA 4 : *HSCB Research & Engineering*	5.392	6.950	7.459		7.459	12.206	14.759	14.983	15.206	Continuing	Continuing

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
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COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	17.142	23.546	18.916	0.000	18.916	18.855	23.499	23.880	24.308	Continuing	Continuing
P680: *Manufacturing Science and Technology Program*	17.142	23.546	18.916	0.000	18.916	18.855	23.499	23.880	24.308	Continuing	Continuing

A. Mission Description and Budget Item Justification

Defense Wide Manufacturing Science and Technology (DMS&T) provides the Department with a comprehensive manufacturing program to achieve the strategic goals of focused technology, improved acquisition across the life cycles, and cost-effective logistics. By designing for manufacturability early in development, anticipated results will have an impact on increasing reliability and decreasing the life cycle burden of weapon systems.

DMS&T will: 1) address manufacturing enterprise issues beyond a single Component or platform and, 2) establish and mature cross-cutting manufacturing processes required for transitioning emerging technologies which impact the timelines, affordability, and producibility of acquisition programs and shorten the deployment cycle times.

The DMS&T program is fundamental to a coordinated development process. Concurrent development of manufacturing processes with the technology prototype enables the use of emerging technologies such as ceramic matrix composites for advanced turbine engines, affordable low observables materials for increased survivability in the kill chain of high value targets, and system-on-chip electronics for communication platforms.

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
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B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	11.981	14.638	0.000	0.000	0.000
Current President's Budget	17.142	23.546	18.916	0.000	18.916
Total Adjustments	5.161	8.908	18.916	0.000	18.916
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	-0.192			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	-0.727	0.000			
• SBIR/STTR Transfer	-0.512	0.000			
• R&DFY09: Congressional Distributed Actions	6.400	0.000	0.000	0.000	0.000
• Congressional Adds	0.000	9.100	0.000	0.000	0.000
• Other Program Adjustments	0.000	0.000	18.916	0.000	18.916

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

	FY 2009	FY 2010
Project: P680: *Manufacturing Science and Technology Program*		
Congressional Add: *High Performance Manufacturing Technology Initiative*	6.400	7.500
Congressional Add: *California Enhanced Defense Small Manufacturing*	0.000	1.600
Congressional Add Subtotals for Project: P680	6.400	9.100
Congressional Add Totals for all Projects	6.400	9.100

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense											DATE: February 2010
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COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P680: *Manufacturing Science and Technology Program*	17.142	23.546	18.916	0.000	18.916	18.855	23.499	23.880	24.308	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Defense Wide Manufacturing S&T program has a two-pronged approach: 1) technology initiatives and 2) single specific projects. Technology initiatives, in collaboration with the Joint Defense Manufacturing Technology Panel (JDMTP) and industry, identify and develop investment strategies to advance the manufacturing processes needed to support the specific technology. Above-the-shop-floor investments focus on new manufacturing processes that have potential to significantly improve manufacturing efficiencies. Single specific projects address investment opportunities not associated with selected technology initiatives and enable the program to respond to urgent, compelling manufacturing needs and provide seed funding to more high risk-high payoff technologies.

Data calls will be 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, Missile Defense Agency (MDA) and Office of Secretary of Defense (OSD). The call will be distributed through the ManTech Directors to the three JDMTP sub panels: Metals Processing and Fabrication Subpanel, Composites Processing and Fabrication Subpanel, and Electronics Processing and Fabrication Subpanel. Potential candidates will be evaluated by the JDMTP based on criteria set forth in the call and announcements and down-selected for further development prior to final selection. The other method is through a Broad Agency Announcement to industry. Priority will be given to investments that support affordability and producibility of critical enabling manufacturing technologies that cut across multiple platforms. Investments will 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 in collaboration with the JDMTP and in consultation with the Office of Deputy Under Secretary of Defense (Director, Research) and the Director, Defense Research & Engineering. Technology initiatives and projects will be executed at the Component level.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Ceramic Matrix Composite (CMC) Manufacturing Initiative	4.167	0.567	0.000	0.000	0.000
Turbine engines are the main propulsion system for virtually all DoD aircraft and helicopters and also power an array of ships and tanks. Improvements in manufacturing process technology must be					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
achieved with each new generation of engines for these challenging new designs to be manufactured with acceptable quality, cost, and delivery rate to meet the warfighters' needs. This initiative seeks to advance and establish the manufacturing technologies for CMCs needed to support the development, production and sustainment of advanced gas turbine engines. Successful efforts will enable the use of CMCs for defense systems, resulting in significant life cycle cost avoidance through improved fuel efficiencies and greatly reduced maintenance costs over metallic flaps and seals and vanes for turbine engines. Program Outputs: demonstrate the advancement of CMC manufacturing technologies that result in: 1) improved non-destructive evaluation (NDE) techniques 2) reduced production time, 3) consistent performance of the CMC materials, and 4) reduced unit cost such that CMC materials can be incorporated Advanced Turbine Engines resulting in 1) reduced weight, 2) increased engine performance, 3) decreased maintenance, 4) increased production flow through, and 5) increased safety. Advanced manufacturing material processes will reduce re-work, increase production capacity, and enable production rate requirements for engine components. Life cycle cost avoidance for this initiative is projected in the billions, with technology maturity within three to five years. *FY 2009 Accomplishments:* 1) In-line tow coating equipment modified and it demonstrated a 3.5x increase in fiber coating length, 2) 3-D airfoil inspection sensor-rotor tilt table developed and completed with follow-on system testing and integration. 3) optimization of production-scale coating of Silicon Carbide (SiC) fabrics for Ceramic Matrix Composite (CMC) material handling, and 4) Non-destructive evaluation (NDE) Phase 2 specimen design and fabrication refined and completed with NDE process optimized. *FY 2010 Plans:* 1) Full scale concept validation on modified tow coating, finalize real time process metrology, 2) 3-D airfoil inspection system process and functionality demonstration with measurement of new process key characteristics, 3) demonstration of 80m capability of SiC fabric coating with reduction					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
of acceptance time/cost and next generation equipment definition, and 4) Non-destructive evaluation (NDE) - Procure material (panels) with 3 porosity levels, machine final process test specimens, inspect and conduct mechanical tests, correlate NDE with test results then develop conclusions and recommendations.					
Low Observable Material Manufacturing Initiative Manufacturing Scale-up for Low Observable (LO) Materials and Platforms Program Outputs: Three key areas: 1) precision component fabrication; 2) multi-spectral LO integration; and 3) minimization of sustainment cost and cycle time drivers. Investment in the three key areas is projected to have a significant multi-million dollar payback throughout the Future Years' Defense Plan and beyond. Technology is expected to mature beginning in FY 2010. *FY 2009 Accomplishments:* Completed initial scale-up of the key project to meet near-term flight demonstration. Completed producibility assessment to establish process control, quality goals, and variability reductions. Initial evaluation of pertinent key performance parameters was conducted. *FY 2010 Plans:* Final scale-up of the key project to meet initial DoD-level needs. Additional testing. Overall goal of 50 times increase in throughput and ten times reduction in cost.	1.339	0.889	0.000	0.000	0.000
System-On-Chip (SOC) Enable smaller, less costly Global Positioning Systems (GPS) for artillery platforms by developing the manufacturing technologies to enable reduced weight, size and power consumption to provide leap-ahead communication and sensor capability by maturing technologies that move heavy, high volume/ power demand systems to small, power efficient System-On-Chip (SOC) packaging technology.	1.159	1.446	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Program Outputs: Move the basic packaging technology from Manufacturing Readiness Level (MRL) 3 to qualification for application in the Ground-Based GPS Receiver Application Module (GB-GRAM) 105mm Smart artillery round (PKG II) as the initial adopter. Defense Wide Manufacturing S&T investments will refine the fabrication process, develop design rules for complex integration of non-optimized mixed devices on same silicon, and accelerate the development and integration of the transmit and receive module that can be used for downstream system application. *FY 2009 Accomplishments:* Approved Jaguar ASIC (Rockwell Collins proprietary version) security architecture. First pass RF (Radio Frequency) module design was completed and module Printed Wiring Boards were delivered. For Phase 2, the first-pass RF module build was successful. Preliminary testing on first pass RF module was moderately successful. Jaguar stable netlist was completed. Second pass RF module design was completed. *FY 2010 Plans:* Complete the RF module development and testing. Prepare for the GPS module build. Complete GB-GRAM development and integration. Make go/no go decision on use of the new packaging for the GB-GRAM.					
Prosthetics and Orthotics Manufacturing Initiative This project was previously titled "Custom Composite Orthotics and Prosthetics" in the FY 2009 President's Budget. New manufacturing technologies are required for the development of custom composite orthotics and prosthetics for injured men and women of the armed services. Orthotics and prosthetics present a two-fold challenge in that they contain a high degree of customization in design and a labor intensive means of manufacturing. Recent advances in solid modeling, reconfigurable tooling, room temperature resin chemistry, automated fabrication of custom fiber architectures, and novel resin infusion methods	1.632	1.012	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
have created the potential to develop a highly integrated, low cost, custom orthotic and prosthetic technology to address the unique requirements and needs of the armed services. Rapid prototyping technologies and new composite manufacturing solutions have shown the potential to provide a 24-hour turnaround time for component fabrication. The current state of the art for orthotics is to thermoform plastic materials such as polypropylene to create a custom fit orthotic. New manufacturing techniques integrated with advanced polymer composite technologies have allowed for initial prototyping work using woven glass reinforced adiprene. These new materials are compliant, but sufficiently rigid for use with prosthetics. The integration of composite materials could provide up to a 20 percent weight savings and an approximate 40 percent reduction in skin contact over current thermoform plastic solutions. Outcome: New rapid prototyping and affordable manufacturing processes resulting in 20 percent weight savings and 40 percent reduction in skin contact. Improved reliability of new composite prosthetics. *FY 2009 Accomplishments:* Materials were identified to improve comfort and facilitate post fabrication modifications that compliment the newly developed rapid prototyping and manufacturing solutions. *FY 2010 Plans:* Evaluate materials for their strength compared to traditional prosthetic resins. Once qualified, these will be used at Navy Medical Center San Diego, allowing both users and prosthetists to evaluate these materials and proposed manufacturing solutions.					
Direct Digital Manufacturing Inspection and Distortion Control Develop methods to enable inspection of electron beam free form fabrication (EBFFF) of metallic components prior to rough machining for air, sea, and land based systems to ensure quality parts. Develop thermal control strategies to alleviate thermal residual stresses built up via EBFFF that would	0.595	0.889	1.107	0.000	1.107

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
put the part out of dimensional tolerances and sacrifice structural properties required for service applications. *FY 2009 Accomplishments:* Initiated efforts in inspection and distortion control of EBFFF metallic components. *FY 2010 Plans:* Explore several inspections and several distortion control methods for their suitability with EBFFF metallic components and down select to the top approach. *FY 2011 Base Plans:* Demonstrate 90% probability of detection of defects at a 95% confidence level on EBFFF deposits that are several inches thick.					
Emerging Manufacturing Emerging Manufacturing is a series of new efforts addressing advanced manufacturing technologies and enterprise business practices for defense applications. Initiatives and projects under development will continue to identify and transition advanced manufacturing processes/technologies that will achieve significant productivity and efficiency gains in the defense manufacturing base. The key focus areas are: power and energy, disruptive green and electronic technology, survivability, directed energy, manufacturing technologies 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. In directed energy, manufacturing improvements are sought for ground, sea, air, and space based directed energy weapons to enable fielding of these weapons on cost and schedule In addition, manufacturing improvements are also sought for human and sensor protection against directed energy threats	1.619	4.199	4.025	0.000	4.025

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
In survivability, manufacturing improvements are sought for ballistic protection for both personnel and weapon systems, for low observables, and for countermeasures so that our personnel and systems can be protected affordably and on schedule. In disruptive green and electronic technology, manufacturing improvements are sought for improvements in power and energy sources such as lithium ion batteries, solar cells, and fuel cells to enable affordable and reliable fielding of these energy sources, in green technologies such as lead free solder, nanotechnology for electronics, and other environmentally friendly manufacturing methods to reduce the hazardous waste stream in the industrial base and in the logistics depots, and in fuel efficiency through lightweight structures and advanced propulsion for ground, sea, air, and space structures, in electronics for chip scale atomic clock manufacturing throughput improvements. *FY 2009 Accomplishments:* Initiated the Emerging Manufacturing program and coordinated for rapid start-up of FY 2010 projects. Awarded phase 2 of out of Autoclave Bismaleimide program to develop out of autoclave aerospace composites with service temperature uses of up to 350F. Released requests for proposal for Carbon Nanotube Cables to develop a lightweight alternative to copper wire and Extreme Breakover Diode (XBOD) Solid State Switches to develop more reliable and cheaper switches for use with directed energy weapon. *FY 2010 Plans:* Complete Solder-Free Electronics program and developed copper and copper/aluminum nanoparticle based pastes to replace traditional leaded solder which is being phased out due to environmental concerns . Launch programs in the areas of Carbon Nanotube Cables and XBOD Solid State Switches. Develop process control methods for carbon nanotube cable fabrication. Optimize manufacturing processes for XBOD switches. Demonstrate large scale fabrication with typical aerospace features on the Out of Autoclave Bismaleimide program.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: Demonstrate the use of carbon nanotube cables as a replacement for coaxial cables. Demonstrate the capability of the XBOD switches. Launch programs in directed energy, survivability, and disruptive green and electronic technology.					
Chip Scale Atomic Clock	0.082	2.963	8.576	0.000	8.576
Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) systems require precise timekeeping even when the Global Positioning System (GPS) is unavailable. The size, weight, power, and cost components of conventional atomic clocks are too high for tactical applications. Chip Scale Atomic Clock (CSAC) provides improved long-term frequency stability that gets integrated into long-term time accuracy. The focus of this project is to leverage DARPA investments in the CSAC technology to reduce operational costs and transition beyond custom fabrication of the current CSAC. Mass manufacturing capabilities will be enabled with the development of batch processes, manufacturing tools, and automated assembly and test. Development of a network of multiple vendors to foster competition and ensure a viable supply base is a complementary goal. Successful performance will enable an environment of continued operation of critical C4ISR systems, regardless of the presence or absence of GPS. The ability to rapidly reacquire GPS military code in a hostile Electro Magnetic Interference (EMI) environment is an additional targeted benefit. *FY 2009 Accomplishments:* Coordinated project roadmap with DARPA. Drafted Request for Proposal. *FY 2010 Plans:* Award contract in February 2010. Increase manufacturing readiness by improving current manual assembly in a lab environment to mass manufacturing capability. Focus will be on developing batch processes, manufacturing tools, and automated assembly and test of the physics package.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603680D8Z: *Defense Wide Manufacturing Science and Technology Program*	**PROJECT** P680: *Manufacturing Science and Technology Program*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: Demonstrate a production ready manufacturing process for resonance cell and physics package fabrication on chip scale atomic clocks.					
Fiber Placement of Out of Autoclave Composites	0.149	1.333	0.000	0.000	0.000
An alternative to the traditional use of autoclaves in the production of large carbon fiber composites is Out of Autoclave (OOA) processing, which uses far less expensive ovens. Fabrication of large carbon fiber composite parts is limited by the small number of existing large autoclaves that are currently tied up with Boeing 787 and F-35 production. In addition, the high capital cost of buying large autoclaves is prohibitive. The ability to use less expensive ovens, coupled with the use of resins at lower cure temperatures, will allow more suppliers to enter the market and fabricate a greater number of larger carbon fiber composite parts at lower costs. Outcomes: The initial phase of this project focuses on the development of the fiber placement process. The goal is to demonstrate the lay down rates required to meet projected requirements and the fabrication of quality laminates with autoclave-equivalent mechanical performance. Candidate aircraft for this technology are: Air Force/Army Joint Future Theatre Lift (C-130 successor) – 180' wingspan and 140' fuselage; National Aeronautics and Space Administration (NASA) Ares V - 33' diameter; Navy P-8 Raked Wing Tip. *FY 2009 Accomplishments:* Initial contract awarded. *FY 2010 Plans:* Develop the manufacturing methods for the use of fiber placement with out of autoclave composites. Demonstrate the ability to fabricate a full scale aerospace component.					
Rapid Manufacturing of Structures	0.000	1.148	2.230	0.000	2.230

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Allow faster and more affordable access to low-volume, state-of-the-art production capabilities for acquisition of defense unique technologies for low density, high demand systems. Rapid prototyping includes many different fabrication technologies. Stereo Lithography (SL), selective laser sintering (SLS), laminated object manufacturing (LOM), and fused deposition modeling (FDM) are a few examples. These Rapid Prototyping processes have already had the effect of both improving products and reducing their development time. Rapid Manufacturing is an attempt to transition these prototyping techniques to the manufacturing floor. This form of manufacturing can be incredibly cost-effective and the process is far more flexible than conventional manufacturing. Rapid Prototyping processes have been shown to be economically feasible for use in the manufacture of non structural parts in quantities. This Rapid Manufacturing effort will focus on the use of these Rapid Prototyping processes in the fabrication and/or assembly of Aerospace Structures. *FY 2009 Accomplishments:* Broad Area Announcement call for Rapid Manufacturing released to industry. *FY 2010 Plans:* Initiate programs to demonstrate the use of rapid manufacturing in the fabrication and/or assembly of aerospace structures. Examples of parts that could be fabricated include but are not limited to control surfaces, edges, and ducting. *FY 2011 Base Plans:* Develop demonstration articles to validate the ability of rapid manufacturing techniques to fabricate timely affordable structural components.					
High Performance Manufacturing Technology Initiative Identify, advance, and accelerate manufacturing processes and technologies and business practices that will achieve productivity and efficiency gains in the defense manufacturing base. Activities include	0.000	0.000	2.978	0.000	2.978

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
maturing manufacturing process development, strategic planning and roadmapping, development of prototypes and test beds, workshops, incentives, and outreach, model based enterprise, supply chain management, and technical data package development. FY 2009 and FY 2010 funded through congressional add (as adjusted for DoD Appropriation General Provisions). FY 2011 and beyond funded out of President's budget. *FY 2009 Accomplishments:* See congressional add identified below. *FY 2010 Plans:* See congressional add identified below. *FY 2011 Base Plans:* Launch programs in supply chain analysis, advanced system cost modeling, and model based enterprise.					
Accomplishments/Planned Programs Subtotals	10.742	14.446	18.916	0.000	18.916

	FY 2009	FY 2010
Congressional Add: High Performance Manufacturing Technology Initiative	6.400	7.500
FY 2009 Accomplishments: Broad Area Announcement (BAA) call released to industry. Established additional network centric manufacturing pilot demonstrations in conjunction with other services and agencies. Delivered model based enterprise tools for: integration of design models with analysis tools; identification of critical design features based on technology and manufacturing maturity, cost, quality, reliability or schedule risk; visualization of assembly operations at multiple levels of detail; integration of high fidelity cost		

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
models at all levels of design and system integration; and, prediction and analysis of supply chain risks. Description: This effort is to extend the state of the art in modeling and simulation as it is applied during the systems acquisition process. This includes, but is not limited to: integration of design models with analysis tools; identification of critical design features based on technology and manufacturing maturity, cost, quality, reliability or schedule risk; visualization of assembly operations at multiple levels of detail; integration of high fidelity cost models at all levels of design and system integration; and, prediction and analysis of supply chain risks. The effort will specifically seek to improve the following processes: cost modeling & analysis, composites cost modeling, producibility analysis, preservation and manufacturing of legacy components, tool integration, visualization environments, and supply chain simulation / war gaming. In addition, the effort will improve the ability to move, share, and manipulate data between different 3D technical data packages. *FY 2010 Plans:* FY 2010 Congressional: Develop and demonstrate modeling and simulation tools that address the project goals. Promote the increased use of such tools.		
Congressional Add: California Enhanced Defense Small Manufacturing *FY 2010 Plans:* Implement congressional add for California Enhanced Defense Small Manufacturing	0.000	1.600
Congressional Adds Subtotals	6.400	9.100

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
• (BA3) 0603680F: *Air Force ManTech*	56.376	39.913								Continuing	Continuing

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense		**DATE:** February 2010
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C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
• (BA7) 0708045A: *Army ManTech*	90.782	68.466								Continuing	Continuing
• (BA7) 0708011N: *Navy ManTech*	61.713	56.691								Continuing	Continuing
• (BA7) 0708011S: *DLA ManTech*	55.130	20.514								Continuing	Continuing

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 project performance metrics are specific to each effort and include measures identified in the project plans. The metrics include items such as target dates from project work break down schedules, production measures, production goals, production numbers and demonstration goals and dates. In addition, generic performance metrics applicable to the Manufacturing Science and Technology (MS&T) program includes attainment of Strategic Objective 4-3 approved, "Speed technology transition focused on warfighting needs". The metrics for this objective and the objective of MS&T is to transition 30% of completing demonstrations program per year. Due to the relatively new time frame of the MS&T program, transition rates for completed efforts for this new project are not available yet.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603711D8Z: *Joint Robotics Program/Autonomous Systems*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	8.385	11.020	9.943	0.000	9.943	11.048	11.343	11.526	11.733	Continuing	Continuing
P710: *Joint Robotics Program/ Autonomous Systems*	8.385	11.020	9.943	0.000	9.943	11.048	11.343	11.526	11.733	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program supports the technology development activities of the Joint Ground Robotics Enterprise (JGRE) with a focus on the development of subsystems and components, and efforts to integrate subsystems and components into system prototypes for field experiments and/or tests in simulated environments. Projects deliver advanced technology with direct relevance to enhancing warfighters' capabilities that have been identified during operational assessments and field feedback of current unmanned systems. By exercising its oversight role through a Technology Advisory Board, O-6 Council and Senior Steering Group (Flag level), Joint Ground Robotics applies this program to enable coordination between the Services and places emphasis on interoperability and commonality among unmanned ground systems.

The primary purpose of this program is to support efforts to overcome technology barriers in the thrust areas of unmanned ground system technologies to include Autonomous & Tactical Behaviors, Manipulation Technologies, Collaborative Operations, Interoperability, Man-portable Unmanned Ground Systems, and Technology Transition/Transformation. Development and integration of technologies within the thrust areas of unmanned ground system technologies will expedite technology transition from the laboratory to operational use. The technologies are generally at Technology Readiness Levels (TRL) of 3 or 4 with the intent to mature them through JGRE efforts to TRL 6.

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
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B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	8.449	9.110	0.000	0.000	0.000
Current President's Budget	8.385	11.020	9.943	0.000	9.943
Total Adjustments	-0.064	1.910	9.943	0.000	9.943
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		2.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	-0.717	0.000			
• SBIR/STTR Transfer	-0.147	0.000			
• Congressional Distribution	0.800	0.000	0.000	0.000	0.000
• Other Adjustments	0.000	-0.090	9.943	0.000	9.943

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2009	FY 2010
Project: P710: *Joint Robotics Program/Autonomous Systems*		
Congressional Add: *Joint Ground Robotics Enterprise Modeling, Simulation, Analysis Project*	0.800	0.000
Congressional Add: *Autonomous Control and Video Sensing for Robots*	0.000	0.800
Congressional Add: *Battle-Proven Packbot*	0.000	1.200
Congressional Add Subtotals for Project: P710	0.800	2.000
Congressional Add Totals for all Projects	0.800	2.000

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense											DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				**R-1 ITEM NOMENCLATURE** PE 0603711D8Z: *Joint Robotics Program/ Autonomous Systems*				**PROJECT** P710: *Joint Robotics Program/Autonomous Systems*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P710: *Joint Robotics Program/ Autonomous Systems*	8.385	11.020	9.943	0.000	9.943	11.048	11.343	11.526	11.733	Continuing	Continuing

A. Mission Description and Budget Item Justification

This Joint Robotics program/Autonomous Systems program supports the technology development activities of the Joint Ground Robotics Enterprise (JGRE) with a focus on the development of subsystems and components, and efforts to integrate subsystems and components into system prototypes for field experiments and/ or tests in simulated environments. Projects deliver advanced technology with direct relevance to enhancing warfighters' capabilities that have been identified during operational assessments and field feedback of current unmanned systems. By exercising its oversight role through a Technology Advisory Board, O-6 Council and Senior Steering Group (Flag level), Joint Ground Robotics applies this program to enable coordination between the Services and places emphasis on interoperability and commonality among unmanned ground systems. The primary purpose of this program is to support efforts to overcome technology barriers in the thrust areas of unmanned ground system technologies to include Autonomous & Tactical Behaviors, Manipulation Technologies, Collaborative Operations, Interoperability, Man-portable Unmanned Ground Systems, and Technology Transition/Transformation. Development and integration of technologies within the thrust areas of unmanned ground system technologies will expedite technology transition from the laboratory to operational use. The technologies are generally at Technology Readiness Levels (TRL) of 3 or 4 with the intent to mature them through JGRE efforts to TRL 6.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Autonomous & Tactical Behaviors	3.297	2.490	2.945	0.000	2.945
Development of vehicle onboard intelligence and tactical behaviors for greater autonomy. These technologies will increase the warfighters' ability to accomplish military task with greater effectiveness, while simultaneously reducing their risk to exposure and harm.					
FY 2009 Accomplishments: Supported the development of platform onboard intelligence and tactical behaviors to allow the fielding of advanced autonomous Unmanned Ground Vehicles (UGV) support. Baselined user					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
identified mission scenarios to develop operational behaviors enabling unmanned operations. Accomplishments include: - Successful evaluation of the utility of unmanned ground vehicle to conduct supply distribution and casualty evacuation for small units. - Autonomous Control Development. - Program delivered software for automonous control of high speed navigation, mission planning and execution, and world model capabilities. *FY 2010 Plans:* Increase the warfighter's capability by transferring and developing technologies that will have an immediate impact on the autonomy and functional capabilities of current and future robotic systems. Examples of the systems that will be matured are: - Long Range Vision for Obstacle Detection. - High Speed Small Teleoperation Robotic Command & Control. *FY 2011 Base Plans:* Develop and assess technology to provide greater fidelity of autonomous behaviors for unmanned systems. Will build upon past technical performance and provide the warfighter with higher level resolution with regard to visual capabilities. New autonomous capabilities will be pursued and developed. - Long Range Vision for Optical Detection. - Autonomous navigation for small UGVs. - 3D Visualization for Explosive Ordanance Disposal.					
Collaborative Operations	0.760	1.200	1.194	0.000	1.194

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Integrate communication, mission planning, interface technologies, and advanced intelligence capabilities to support collaborative operations between manned and unmanned systems. Develop and assess several strategies to enhance tele-operation of current Unmanned Ground Vehicles (UGV) and collaborative Unmanned Air Vehicles (UAV) teams. Development of these technologies will enable unmanned systems to support Warfighter concepts of operation that are envisioning unmanned systems working in collaboration across domains (air, ground, and maritime) to execute tactical missions and complex military tasks. *FY 2009 Accomplishments:* Improved repeatability of the increased interoperability of unmanned systems through integration of Joint Architecture for Unmanned Systems teaming messages. Participated in definition and planning process for warfighter experiment. *FY 2010 Plans:* Integrate communication, mission planning, interface technologies, and advanced intelligence capabilities to support collaborative operations between manned and unmanned systems. - Night Operations for Unmanned Ground Vehicles. - Combat ID for Unmanned Robotic Systems. *FY 2011 Base Plans:* Develop and assess technologies to enable greater collaborative operations in Unmanned Ground Vehicle (UGV) and Unmanned Airial Vehicle (UAV) teams. Collaborative operations and tactical behaviors include system convoying, teamed obstacle avoidance, area perception and relative position information sharing. Plans for developing specific technologies include: - Metric Map In Rough Urban Terrain. - Counter Tunnel Mapping & Characterization.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- 3D Spatial Phase Sensors.					
Interoperability	0.745	1.027	1.233	0.000	1.233

Software algorithms and interface technologies will facilitate sharing of data across unmanned platforms and domains, and with C2 systems as well as interchangeability of mission payloads and unmanned chassis. Such interoperability will enable collaborative operations between manned and unmanned systems as well as among unmanned systems in differing domains.

FY 2009 Accomplishments:
Promoted and guided technology development meeting joint requirements and promote ground as well as air unmanned systems interoperability. Optimized best features of prior/ongoing architecture efforts into a maturing, standardized system that can be easily ported to robotic platforms used DoD-wide. Software algorithms and interface technologies will facilitate sharing of data across unmanned platforms and domains, and with C2 systems as well as interchangeability of mission payloads and unmanned chassis. Such interoperability will enable collaborative operations between manned and unmanned systems as well as among unmanned systems in differing domains.

Automated Payload Deployment System has developed deployment modules that carry a variety of payloads and can drop relays that can transmit radio signals back to command and control stations.

FY 2010 Plans:
Support the bridging of currently incompatible robots and controllers from various manufacturers, using different communications channels and hardware. Promote the adoption of these standards by commercial standards organization.

FY 2011 Base Plans:
Promote and demonstrate the collaborative operations of unmanned systems across domains.

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Combat ID for Unmanned Robotic Systems.					
Man-Portable UGS Technologies	1.410	1.200	1.000	0.000	1.000

Increase warfighter capability by transferring and developing technologies of immediate impact on man-portable robotic systems - e.g., obstacle detection/obstacle avoidance (ODOA) and collaborative behaviors for small vehicles. Certain missions and mission environments (urban, unimproved surface, mountainous, subterranean) require the use of man-portable robots in support of dismounted operations. Technologies that can be scaled to low size, weight, space, and power density will enable robotic solutions to capability needs in dismounted operation areas and challenging environments.

FY 2009 Accomplishments:
Enabled transitioning of technologies appropriate for small robots from the technology transfer program to fielded systems, including support to the identification of a modeling & simulation (M&S) architecture and specifications with EOD robot specific mission-application. Specific technologies include obstacle detection/obstacle avoidance (ODOA), collaborative behaviors for small vehicles, and the ability to transport equipment and supplies through various terrains and environments.

FY 2010 Plans:
Evaluate performance and effectiveness of alternative power sources, communication, methods, and platform/mobility alternatives through user trials and conduct of warfigthter experimentation.

FY 2011 Base Plans:
Continue to develop technologies for Man-portable systems funded in previous years. Focus will be on transitioning transport capabilities to programs of record. Plans include:

- Remote Checkpoint.
- Robotic Gripper with Adjustable Passive Compliance.
- High Speed Small Tele-Operation Robotic Command and Control.

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Manipulation Technologies	0.526	1.890	2.276	0.000	2.276
Incoroporate existing technologies, enable greater range of robotic manipulation, support the develpment of mobile manipulation, and inprove manipulator performance. Development of these technologies will enable unmanned systems to conduct highly dexterous tasks that today are accomplished manually, but currently place warfighters in extremely vulnerable and dangerous situations. *FY 2009 Accomplishments:* This effort improved the end-effecter control capabilities and verified the performance of the BEAR robot for stable opperation on and safe object/personnel recovery from a variety of terrains. As an interim check, algorithm verifications were done on low-cost Cyton arm integrated on the M2v2 biped platform. *FY 2010 Plans:* Incorporate existing technologies into systems representative to those in use, demonstrate ease of robotic manipulation, support the development of mobile manipulation, expedite the transition and integration of corresponding robotic technologies to enhance the current fielded systems with more functionalities, autonomy and advanced behavior. *FY 2011 Base Plans:* Continue to incorporate existing technologies into systems representative to those in use, demonstrate ease of robotic manipulation, support the development of mobile manipulation, expedite the transition and integration of corresponding robotic technologies to enhance the current fielded systems with more functionalities, autonomy and state-of-the-art behavior.					
Technology Transition/Transformation	0.847	1.213	1.295	0.000	1.295
Facilitate integration of technologies to ongoing programs: exploit best features of past and ongoing efforts, e.g., interface technologies (Human Robot Interaction) and autonomous operations. Robotics					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
technologies are being matured with the express intent of transitioning them out of the laboratory to either development programs of record, licensing to industry to foster COTS solutions, or integration into fielded systems. *FY 2009 Accomplishments:* Completed system design, modular payload framework, control module, hardware interface definition, and software interface definition. *FY 2010 Plans:* Will initiate IR illuminator payloads, sensor payloads, deployer modification, base station software mod, demonstrations, documentation, and reporting. Perform a task-oriented analysis of the human robot interface for the next generation Explosive Ordanance Disposal system leading to transition for a common controller for the next generation family of systems. *FY 2011 Base Plans:* Continue to transition previously funded programs into higher TRL levels such as: - Human Presence and Detection. - Modeling and Simulation for Explosive Ordanance Disposal (EOD) Robot Tactics Development. - Human Robot Interface for EOD Unmanned Ground Vehicles.					
Accomplishments/Planned Programs Subtotals	7.585	9.020	9.943	0.000	9.943

	FY 2009	FY 2010
Congressional Add: Joint Ground Robotics Enterprise Modeling, Simulation, Analysis Project	0.800	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
FY 2009 Accomplishments: This project intends to provide a rapid, focused, cost effective, Modeling and Simulation (M&S) capability supporting unmanned system (UMS) development with autonomous tactical behaviors. M&S products will support Concept of Operations development; Tactics, Techniques, and Procedures (TTP) development; Joint Capabilities Integration and Development System requirements and analyses; Systems Development and Engineering; and Basis of Issue Planning. The current state-of-the-art in sensor perception and autonomous navigation fall short due to technology limitations in evaluating, fusing, and simulating the interaction of UMS ground vehicles with geoenvironmental factors for the development and assessment of intelligent autonomous navigation, tactical behaviors, and 360-degree situational awareness. Future UMS ground vehicles will require more from current sensor perception and onboard intelligent navigation capabilities than the current state-of-the-art for avoiding obstacles. The U.S. Army Engineer Research and Development Center (ERDC) recently initiated research to pursue the development of a Virtual Autonomous Navigation Environment (VANE) Computational Testbed (CTB). The Virtual Autonomous Navigation Environment (VANE) will facilitate virtual testing of unmanned systems for evaluation of autonomous navigation systems and their associated hardware/software subsystems.		
Congressional Add: Autonomous Control and Video Sensing for Robots *FY 2010 Plans:* Add details not yet provided	0.000	0.800
Congressional Add: Battle-Proven Packbot *FY 2010 Plans:* Add details not yet provided	0.000	1.200
Congressional Adds Subtotals	0.800	2.000

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C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
• (BA4) PE 0603709D8Z : *Joint Robotics Program*	11.782	15.279	9.878		9.878	12.175	12.392	11.675	11.299	Continuing	Continuing
• (BA5) PE 0604709D8Z : *Joint Robotics Program*	5.420	5.086	4.155		4.155	3.126	2.986	3.028	3.157	Continuing	Continuing

D. Acquisition Strategy

N/A

E. Performance Metrics

1. Technologies to be funded & developed are reviewed by Joint Capabilitiy Area focused working groups and the Joint Staff Functional Capabilities Boards to determine progress, transition plans, and relevance of each project.
2. Project plans are submitted, evaluated and analyzed by the Joint Robotics Ground Enterprises managment and technical staff for risk and progress.
3. Project progress toward goals and milestones is assessed during mid-year and end-of-year reviews.
4. Technologies developed by the Joint Robotics Ground Enterprises (JGRE) are tracked and documented using the DoD Technology Readiness Level (TRL) scale for developing TRL 3 or 4 technologies to TRL 6 and adhearing to the integrated baselines with regard to cost and schedule.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603716D8Z: *Strategic Environmental Research and Development Program (SERDP)*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	63.914	67.128	68.021	0.000	68.021	68.695	69.487	70.614	71.878	Continuing	Continuing
P470: *Strategic Environmental Research and Development Program (SERDP)*	63.914	67.128	68.021	0.000	68.021	68.695	69.487	70.614	71.878	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 Management, Sustainable Infrastructure, 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.

Exhibit R-2, **RDT&E Budget Item Justification:** PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603716D8Z: *Strategic Environmental Research and Development Program (SERDP)*

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	69.038	69.175	0.000	0.000	0.000
Current President's Budget	63.914	67.128	68.021	0.000	68.021
Total Adjustments	-5.124	-2.047	68.021	0.000	68.021
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		-2.047			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	-3.246	0.000			
• SBIR/STTR Transfer	-1.365	0.000			
• Other Program Adjustments	-0.513	0.000	68.021	0.000	68.021

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense			**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603716D8Z: *Strategic Environmental Research and Development Program (SERDP)*	**PROJECT** P470: *Strategic Environmental Research and Development Program (SERDP)*	

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
P470: *Strategic Environmental Research and Development Program (SERDP)*	63.914	67.128	68.021	0.000	68.021	68.695	69.487	70.614	71.878	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 Management, Sustainable Infrastructure, 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. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Environmental Restoration	18.756	18.327	17.589	0.000	17.589
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.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603716D8Z: *Strategic Environmental Research and Development Program (SERDP)*	**PROJECT** P470: *Strategic Environmental Research and Development Program (SERDP)*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: Science and technology advancements were made to address DoD's emerging groundwater issues, sediment contamination, sustainment of test and training ranges, managing persistent DoD contamination, and improve the monitoring and optimization of DoD remediation efforts. SERDP continued to improve scientific understanding and develop innovative cost effective methods in support of DoD's remediation efforts and the sustainment of DoD ranges. A major accomplishment was the development of new insights into the mechanisms underlying phytoremediation of explosives and propellants in the field as well as the development of a variety of new grasses with unique abilities to detoxify TNT and degrade RDX. These plants promise to provide a self-sustaining, inexpensive, and environmentally friendly method of range restoration that can be used over large areas of land for preventing groundwater contamination. New initiatives begun in FY 2009 are addressing the management of large dilute plumes of contaminated groundwater, improved identification of munitions constituent source zones on DoD ranges, improved understanding of vapor intrusion pathways from chlorinated solvent contaminated groundwater, improved understanding of the fate and transport of munitions constituents, and improved understanding of environmental parameters and sampling methods on measured groundwater contaminant concentrations. A description of all new FY 2009 ER projects can be found at www.serdp.org. *FY 2010 Plans:* New research initiatives will focus on innovative risk assessment approaches for military unique compounds, the options and limitations for treatment of persistent contaminated groundwater plumes, and bioavailability of contamination found on DoD ranges and sediments. New FY 2010 ER selected projects briefed the Scientific Advisory Board in September and October 2009. Details are available at www.serdp.org. *FY 2011 Base 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,					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603716D8Z: *Strategic Environmental Research and Development Program (SERDP)*	**PROJECT** P470: *Strategic Environmental Research and Development Program (SERDP)*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
and remediation of contamination in soil, sediments, and water. Specific Statements of Need were released in October 2009 in the following areas: assessing the environmental impacts of munitions compounds in the marine environment; in-situ remediation of perfluoroalkyl contaminated groundwater; improved understanding of impacts to groundwater quality post-remediation; improved assessment of munitions constituent source terms on operational ranges; and in-situ remediation of contaminated aquatic sediments. Details are available at www.serdp.org.					
Munitions Management (MM)	13.201	13.613	14.260	0.000	14.260
Munitions Management (MM) develops detection, discrimination, 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 reduced generation of UXO during live fire testing and training operations. *FY 2009 Accomplishments:* Investment in munitions management yielded new technologies to address the difficult and persistent issues faced by the Military Munitions Response Program. Technology advancements continued in the areas of ground based detection and discrimination, wide area assessment, detection of underwater UXO, and advanced planning and assessment tools. Investigators continued to use the two standardized test sites for the evaluation of UXO detection technologies and continued efforts to improve sensor designs and improve detection and discrimination methods. A major accomplishment was an innovative structural-acoustics sonar system for wide-area identification of UXO using structural acoustic features from proud and buried underwater objects providing DoD with a new capability for locating underwater UXO. New initiatives begun in FY 2009 will continue to focus on advanced sensors, signal processing, supporting technologies and protocols. Notably is the development of more capable hand held sensors for detecting and discriminating buried UXO and systems for the detection and discrimination of underwater munitions. In addition, projects will be funded to analyze data obtained from recent live site discrimination tests to improve current algorithms					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
and develop new discrimination approaches. A description of all new FY 2009 MM projects can be found at www.serdp.org. *FY 2010 Plans:* New research initiatives will focus on advancements in underwater UXO detection and discrimination, advanced sensors, signal processing, supporting technologies, and protocols to reduce the costs associated with detecting and remediating UXO. New FY 2010 MM selected projects briefed the Scientific Advisory Board in September and October 2009. Details are available at www.serdp.org. *FY 2011 Base Plans:* New research initiatives will focus on the highest priority DoD requirements in underwater UXO detection and discrimination, advanced sensors, signal processing, supporting technologies, and protocols to reduce the costs associated with detecting and remediating UXO. Specific Statements of Need were released in October 2009 in the following areas: the development of advanced technologies for detection, discrimination, and remediation of military munitions on land and underwater and tools to support informed decisions on munitions response sites. Details are available at www.serdp.org.					
Sustainable Infrastructure Sustainable Infrastructure (SI) develops the science and technologies required to sustain training and testing ranges and installation infrastructure as well as the base camps required for deployed forces. *FY 2009 Accomplishments:* Science and technology advancements were made to improve DoD's ecosystem-based management, protection of threatened and endangered species and marine mammals, management of cultural resources on DoD lands, and protection of watersheds to sustain military test and training lands. Continued investments were made to address issues of noise, air quality, and energy to support the long term cost effective sustainability of military installations. SERDP continued efforts to address	18.293	20.161	20.206	0.000	20.206

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
persistent issues that severely impact installation readiness and the ability to support training and testing. A major accomplishment was the successful development of a remotely operated vehicle (ROV) for mapping and monitoring coral reefs under a range of conditions. The results of this work are an essential component of the legally mandated environmental documentation necessary for conducting military operations and will provide decision makers with critical information to maintain compliance with relevant statutes, regulations, and executive orders. New initiatives begun in FY 2009 are developing an understanding of the mechanisms of forest decline on installations in the Southeast, assess the impacts of potential sea level rise on military infrastructure across the United States and climate change on coastal ecosystems on military lands in the southeast, and develop tools to predict the impact of military training activities on archeological resources on DoD lands. A description of all new FY 2009 SI projects can be found at www.serdp.org *FY 2010 Plans:* New research initiatives will assess the impact of climate change on military lands in the southwest and improve our understanding and develop tools to manage the generation of dust due to military activities on our ranges. New FY 2010 SI selected projects briefed the Scientific Advisory Board in September and October 2009. Details are available at www.serdp.org. *FY 2011 Base 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 installation infrastructure as well as the base camps required for deployed forces. Specific Statements of Need were released in October 2009 in the following areas: assessing the impacts of climate change on Alaskan ecological systems; ecological forestry and carbon management; ecology and management of source-sink populations; and studying the behavioral ecology of cetaceans. Details are available at www.serdp.org.					
Weapons Systems and Platforms	13.664	15.027	15.966	0.000	15.966

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
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 2009 Accomplishments:* The Weapons Systems and Platforms program continued to focus on development of 'green' energetics, munitions, and weapons systems components as well as innovative life-cycle-based coating systems for military aircraft and land based platforms that eliminates volatile organic compounds, heavy metal constituents, and associated hazardous air pollutants. A significant accomplishment was the development of a environmentally benign, perchlorate-free pyrotechnic formulations based on novel oxidizers and fuels. The primary benefit of this effort will enable the development of new perchlorate-free pyrotechnic formulations for incendiary munitions, which are more environmentally benign than the present perchlorate-containing formulations. A subsidiary outcome will be reductions in the occurrence of bush fires on training ranges. New efforts begun in FY 2009 included advanced methods for removing solid waste from shipboard waste streams, characterization of open burn/open detonation of energetics, environmentally benign aircraft deicing and anti-icing, new techniques to predict corrosion protection, and the science behind military paint strippers. A description of all new FY 2009 WP projects can be found at www.serdp.org *FY 2010 Plans:* New initiatives are planned to develop alternatives to perchlorate for missile systems, replacement for the military uses of the global warming gas SF6, new military cleaners and paint stripping techniques, sustainable materials and processes for military composites, and a scientific understanding of the impacts of lead free electronics in military hardware. New FY 2010 WP selected projects briefed the Scientific Advisory Board in September and October 2009. Details are available at www.serdp.org.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base 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 in October 2009 in the following areas: the development of alternatives to copper-beryllium and aluminum-beryllium alloys for military applications; environmentally benign, insensitive, castable, high-performance, minimum-smoke rocket propellant; understanding the corrosion protection requirements for adhesive bond primers; combustion science to predict emissions from military platforms burning alternative fuels; environmentally benign removal processes for low observable weapons systems; and replacement of hexachloroethane in handheld obscurants. Details are available at www.serdp.org.					
Accomplishments/Planned Programs Subtotals	63.914	67.128	68.021	0.000	68.021

C. Other Program Funding Summary ($ in Millions)

N/A

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 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.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603727D8Z: *Joint Warfighting*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	10.244	11.045	10.966	0.000	10.966	11.074	11.202	11.384	11.588	Continuing	Continuing
P727: *Joint Warfighting*	10.244	11.045	10.966	0.000	10.966	11.074	11.202	11.384	11.588	Continuing	Continuing

A. Mission Description and Budget Item Justification

The OSD Joint Warfighting Program (JWP) account supports two related activities supporting the Department's Joint Experimentation. The Joint Advanced Warfighting Program (JAWP) captures lessons learned and assessments from contingency operations to inform resource allocation, and Combatant Command Experimentation Cells which enable Combatant Commands to examine operational needs and capability gap alternatives via limited objective experiments and concept development.

The Joint Advanced Warfighting Program (JAWP) is supported by the Office of the Secretary of Defense (OSD) Policy and AT&L, with the continuing concurrence of the Joint Staff (J7) to serve as a catalyst for critical analysis and development of innovative concepts on an accelerated basis. The JAWP provides an independent capability for joint warfare analysis and bridges operational lessons learned in the Combatant Commands with joint experimentation conducted at US Joint Forces Command and the other Combatant Commands. This program fuses a team of civilian operational analysis experts with mid-grade and senior military officers to provide first-hand research into topics of pivotal importance to current and future joint campaigns. These analyses serve as a basis for formulation and assessment of advanced concepts and capabilities, identifying enabling technologies and operational integration options for the Department. Resultant concepts drive changes in the doctrine, organization, training, materiel, leadership, personnel, and facilities (DOTMLPF) of the Services. The JAWP serves an essential, expert, and independent feedback role in identifying, exploring and evaluating breakthrough war fighting capabilities. It captures and builds on lessons learned from joint contingency operations and earlier joint and Service experimentation. From that foundation, it identifies and helps formulate advanced joint concepts, explores their effectiveness by recommending design and conduct of joint experiments, and helps streamline implementation processes. Its work complements and supports the activities of Joint Forces Command, the Joint Staff, CoComs and OSD.

The Combatant Command Experimentation Cells activity invigorates Combatant Command staffs participation in joint experimentation as a fundamental element of joint capability development. In this activity, JWP underwrites small grants to joint Combatant Comands to invigorate employment of experimentation and analyses, and stimulate participation in the larger Joint Experimentation Enterprise. This activity assists CoComs to specify operational needs and examine capability gap alternatives. Through this activity, JWP also directly funds CoComs specific operational needs and examines capability gap alternatives. The process assesses military contingency operations and formulates advanced joint concepts to be tested and refined via experiments, doctrine development, and demonstrations. The JWP directly enfranchises the CoComs to employ capabilities for mission needs analysis and joint experimentation. It aims to reinvigorate CoCom staff capabilities to employ rigorous analysis and experimentation methodologies in support of their specific mission assignments. By empowering CoCom staffs to critically assess their own needs and examine viable capability gap solutions, the JWP aims to focus larger research and development investments, like Joint Experimentation and Joint

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603727D8Z: *Joint Warfighting*

Capability Technology Demonstrations to specific warfighter requirements. The JWP enables joint commanders to conduct limited objective experiments in theater that explore capability gaps and potential capability solutions unique to their mission set. The JWP is intended to be seed funding encouraging leveraged employment of existing defense analysis and experimentation infrastructure such as networked access to the centralized Joint Futures Laboratory facilities at U.S. Joint Forces Command. This approach minimizes redundant investment, strengthens the relevance of defense analysis and experimentation projects, and diversifies the range of solutions considered for pursuit by the department.

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	11.098	11.135	0.000	0.000	0.000
Current President's Budget	10.244	11.045	10.966	0.000	10.966
Total Adjustments	-0.854	-0.090	10.966	0.000	10.966
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	-0.517	0.000			
• SBIR/STTR Transfer	-0.337	0.000			
• Other Program Adjustments	0.000	-0.090	10.966	0.000	10.966

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense											DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603727D8Z: *Joint Warfighting*				PROJECT P727: *Joint Warfighting*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P727: *Joint Warfighting*	10.244	11.045	10.966	0.000	10.966	11.074	11.202	11.384	11.588	Continuing	Continuing

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The Joint Advanced Warfighting Program (JAWP) is supported by the Office of the Secretary of Defense (OSD) Policy and AT&L, with the continuing concurrence of the Joint Staff (J7) to serve as a catalyst for critical analysis and development of innovative concepts on an accelerated basis. The JAWP provides an independent capability for joint warfare analysis and bridges operational lessons learned in the Combatant Commands with joint experimentation conducted at US Joint Forces Command and the other Combatant Commands. This program fuses a team of civilian operational analysis experts with mid-grade and senior military officers to provide first-hand research into topics of pivotal importance to current and future joint campaigns. These analyses serve as a basis for formulation and assessment of advanced concepts and capabilities, identifying enabling technologies and operational integration options for the Department. Resultant concepts drive changes in the doctrine, organization, training, materiel, leadership, personnel, and facilities (DOTMLPF) of the Services. The JAWP serves an essential, expert, and independent feedback role in identifying, exploring and evaluating breakthrough war fighting capabilities. It captures and builds on lessons learned from joint contingency operations and earlier joint and Service experimentation. From that foundation, it identifies and helps formulate advanced joint concepts, explores their effectiveness by recommending design and conduct of joint experiments, and helps streamline implementation processes. Its work complements and supports the activities of Joint Forces Command, the Joint Staff, CoComs and OSD.

The Combatant Command Experimentation Cells activity invigorates Combatant Command staffs participation in joint experimentation as a fundamental element of joint capability development. In this activity, JWP underwrites small grants to joint Combatant Comands to invigorate employment of experimentation and analyses, and stimulate participation in the larger Joint Experimentation Enterprise. This activity assists CoComs to specify operational needs and examine capability gap alternatives. Through this activity, JWP also directly funds CoComs specific operational needs and examines capability gap alternatives. The process assesses military contingency operations and formulates advanced joint concepts to be tested and refined via experiments, doctrine development, and demonstrations. The JWP directly enfranchises the CoComs to employ capabilities for mission needs analysis and joint experimentation. It aims to reinvigorate CoCom staff capabilities to employ rigorous analysis and experimentation methodologies in support of their specific mission assignments. By empowering CoCom staffs to critically assess their own needs and examine viable capability gap solutions, the JWP aims to focus larger research and development investments, like Joint Experimentation and Joint Capability Technology Demonstrations to specific warfighter requirements. The JWP enables joint commanders to conduct limited objective experiments in theater that explore capability gaps and potential capability solutions unique to their mission set. The JWP is intended to be seed funding encouraging leveraged employment

of existing defense analysis and experimentation infrastructure such as networked access to the centralized Joint Futures Laboratory facilities at U.S. Joint Forces Command. This approach minimizes redundant investment, strengthens the relevance of defense analysis and experimentation projects, and diversifies the range of solutions considered for pursuit by the department.

Centralized funding for Defense Joint Experiment (JE) was established in FY 2000 in Navy PE 060372N. US Joint Forces Command (USJFCOM) was designated as executive agent for this funding. A smaller residual analysis and experimentation support account for was deliberately maintained under the aegis of the Office of the Director, Defense Research & Engineering (DDR&E) to provide leverage over the larger USJFCOM account, and to establish an independent capability for joint warfare analysis. This OSD Joint Warfighting Program (JWP) account supports the Joint Advanced Warfighting Program (JAWP) and directly empowers joint commanders' ability to conduct analysis and experimental concept development.

The Joint Advanced Warfighting Program (JAWP) is strongly supported by the OSD Policy and AT&L, with the continuing concurrence of the Joint Staff (J7) to serve as a catalyst for critical analysis and development of innovative concepts on an accelerated basis. This program fuses a team of civilian operational analysis experts with mid-grade and senior military officers to provide first-hand research into topics of pivotal importance to current and future joint campaigns. These analyses serve as a basis for formulation and assessment of advanced concepts and capabilities, identifying enabling technologies and operational integration options for the department. Resultant concepts drive changes in the doctrine, organization, training, materiel, leadership, personnel, and facilities (DOTMLPF) of the Services. The JAWP serves an essential, expert, and independent feedback role in identifying, exploring and evaluating breakthrough war fighting capabilities. It captures and builds on lessons learned from joint contingency operations and earlier joint and Service experimentation. From that foundation, it identifies and helps formulate advanced joint concepts, explores their effectiveness by recommending design and conduct of joint experiments, and helps streamline implementation processes. Its work complements and supports the activities of Joint Forces Command, the Joint Staff, CoComs, and the OSD.

An invigorated defense enterprise for joint experimentation is a fundamental element of joint capability development. Elements of the JWP assist CoComs to specify operational needs and examine capability gap alternatives. The JWP also directly funds CoComs experimentation cells to address specific operational needs and examine capability gap alternatives. The processes assess military contingency operations and formulate advanced joint concepts to be tested and refined via experiments, doctrine development, and demonstrations. The JWP directly enfranchises the CoComs to employ capabilities for mission needs analysis and joint experimentation. It aims to reinvigorate CoCom staff capabilities to employ rigorous analysis and experimentation methodologies in support of their specific mission assignments. By empowering CoCom staffs to critically assess their own needs and examine viable capability gap solutions, the JWP aims to focus larger research and development investments, like Joint Experimentation and Joint Capability Technology Demonstrations to specific warfighter requirements. The JWP enables joint commanders to conduct limited objective experiments in theater that explore capability gaps and potential capability solutions unique to their mission set. The JWP is intended to be seed funding encouraging leveraged employment of existing defense analysis and experimentation infrastructure such as networked access to the centralized Joint Futures Laboratory facilities at U.S. Joint Forces Command. This approach minimizes redundant investment, strengthens the relevance of defense analysis and experimentation projects, and diversifies the range of solutions considered for pursuit by the department.

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603727D8Z: *Joint Warfighting*	**PROJECT** P727: *Joint Warfighting*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Support for Combatant Command Experimentation Cells	5.800	5.435	5.367	0.000	5.367

JWP supports CoComs by promoting the use of joint experimentation to address challenges specific to their theater or functional missions. It aims to reinvigorate CoCom staff capabilities to employ rigorous analysis and experimentation methodologies in support of specific mission assignments. It allows CoCom staffs to identify capability gaps and explore potential solutions "trial and error" limited objetive experiments experiment sto understand a concept or technology that addresses a specific CoCom challenge. CoCom activities are selected through an annual candidate nomination review and selection process.

FY 2009 Accomplishments:
FY09 Planned Output:
Address Irregular warfare issues through limited objective experiments (LOEs) to define capability gaps and inform IW concept development and capability based assessments (CBAs) (USSOCOM)
Define National level policies, procedures, and technologies to address command and control interoperability policies in Homeland Defense and Civil Support operations through a series of limited objective experiments (USNORTHCOM)
Investigate and define potential / promising technologies through limited objective experiments in field environments during TermnalFury &Northern Edge Exericies (USPACOM)
Investigate options for cooperative security engagement in the region; build partnership capacity through a series of crisis management limited objective experiments (LOEs)(USSOUTHCOM)

FY 2010 Plans:
FY 2010 Planned Output - Continue to provide resources to CoComs to enable experimentation cells to employ joint experimentation that identifies and addresses regional capability gaps, explores potential solutions, and improves understanding of new technologies and concepts. Empower the CoCom staffs to employ rigorous analysis and experimentation methodologies in support of their specific mission assignments, to critically assess their own needs and to examine viable capability

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
gap solutions. Focus areas for CoCom limited objective experiments and participation: Cyberspace/ Missile Defense/Combating Weapons of Mass Destruction(USSTRATCOM); Joint Integrated Persistance Surveillance (USCENTCOM); Direct Heavy Lift and Cooperative Security Engagement (USEUCOM); Cooperative Security Engagement and Building Partnerships (USSOUTHCOM); Command and Control in Homeland Defense and support to civil authorities (USNORTHCOM); Building partnerships/ Command and Control in Irregular Warfare operations (USSOCOM); Globil Mobility (USTRANSCOM) *FY 2011 Base Plans:* FY11 Planned Output -Continue to provide resources to CoComs to enable experimentation cells to employ joint experimentation that identifies and addresses regional capability gaps, explores potential solutions, and improves understanding of new technologies and concepts. Empower the CoCom staff s to employ rigorous analysis and experimentation methodologies in support of their specific mission assignments, to critically assess their own needs and to examine viable capability gap solutions.					
Joint Advanced Warfighting Program (JAWP) JAWP serves as a catalyst for innovation and change. This effort focuses on formulation and assessment of advanced concepts and capabilities, plus identifying enabling technologies and integration options for the Department. Annual JAWP activities are reviewed and approved by a Board of Directors chaired by USJFCOM, including Joint Staff (J7), and OUSD-Policy. *FY 2009 Accomplishments:* Balancing Capabilities-Delivered operational approaches and major force category lists to OfSD (Policy) priority scenario challenges to support QRD efforts; Developed Blue operational approaches and associated force lists for existing surge scenario challenges. Training and Education- Codified Live-Virtual-Constructive (L-V-C) immersion training tools for Joint Professional Military Education(JPME); reviewed JPME to identify gaps in conveying lessons from on-	4.444	5.610	5.599	0.000	5.599

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
going wars ; developed adaptation approaches with Joint Special Operations University, and National Defense University Support to Ongoing Operations- Provided on-site and on-call analytical support to joint and multi-national force commanders in Iraq and Afghanistan (MNF-I). Basing for Distributed Operations- Review basing and operations in Afghanistan to understand distribution of US footprint; developed framework for analysis, concentrating on smaller-footprint alternatives for resupply and fires. Economic Campaign Planning- Identified the range of economic assets available to military forces and draw on lessons learned to highlight their “smart use”; Examined needs and options for 3 provinces of Afghanistan (Jawzjan, Khost and Helmand) with widely differing security environments as illustrative cases					
FY 2010 Plans: FY 2010 Planned Output - The JAWP will continue support of full spectrum transformation objectives addressing irregular, catastrophic, and disruptive challenges. It will design, conduct, and support joint experimentation, joint concept development, and analysis of joint operations, with the intent to inform and effect resource allocation and acquisition. It will continue efforts to align department processes in ways that make them more responsive to the needs of CoComs and their subordinate forces and coalition partners. Final workplan to be determined by JAWP Board of Directors. Proposed projects include: Project Distributed Joint Operations for Irregular Warfare ; mitigate the effect of down-graded space; operate when global positioning system is down graded or absent; integrating strategic communications into campaign planning; training and education; support to ongong operations; and rule of law.					
FY 2011 Base Plans: TFY 11Planned Output- The JAWP will continue support of full spectrum transformation objectives addressing irregular, catastrophic, and disruptive challenges. It will design, conduct, and support joint experimentation, joint concept development, and analysis of joint operations, with the intent to inform					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
and effect resource allocation and acquisition. It will continue efforts to align department processes in ways that make them more responsive to the needs of CoComs and their subordinate forces and coalition partners.					
Accomplishments/Planned Programs Subtotals	10.244	11.045	10.966	0.000	10.966

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance of Joint Experimentation systems is measured through metrics including (1) objective validation of enhanced CoCom 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: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603745D8Z: *Synthetic Aperture Radar (SAR) Coherent Change Detection (CDD)*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	7.296	4.825	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
P745: *Synthetic Aperture Radar (SAR) Coherent Change Detection (CDD)*	7.296	4.825	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Synthetic Aperture Radar (SAR) Coherent Change Detection (CCD) Initiative encompasses four phases to develop deployable systems capable of achieving SAR with real time Coherent Change Detection for tactical intelligence. The first phase, completed in FY 2008, validated utility of existing small SAR sensors for use as a CCD platform. CCD post processing was used to establish current SAR capabilities for change detection thresholds. Phase Two demonstrated real-time CCD on a manned, SAR-equipped, platform. This real time enhancement is capable of being retro fitted on existing manned SAR platforms. Phase Three has developed the engineering enhancements necessary to integrate a real time SAR CCD capability on a small Unmanned Aerial Vehicle (UAV). All necessary software has been developed during Phase Three. The fourth phase (FY 2010) will extend the capability to an affordable small unmanned aircraft with a miniaturized SAR system. The goal is to develop a deployable system with a SAR sensor capable of achieving near real time CCD on a small UAV to be operated by the tactical commander and at a cost goal of $500K per SAR CCD sensor package.

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	7.940	4.864	0.000	0.000	0.000
Current President's Budget	7.296	4.825	0.000	0.000	0.000
Total Adjustments	-0.644	-0.039	0.000	0.000	0.000
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	-0.039			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	-0.428	0.000			
• SBIR/STTR Transfer	-0.216	0.000			

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense											DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				**R-1 ITEM NOMENCLATURE** PE 0603745D8Z: *Synthetic Aperture Radar (SAR) Coherent Change Detection (CDD)*				**PROJECT** P745: *Synthetic Aperture Radar (SAR) Coherent Change Detection (CDD)*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P745: *Synthetic Aperture Radar (SAR) Coherent Change Detection (CDD)*	7.296	4.825	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Synthetic Aperture Radar (SAR) Coherent Change Detection (CCD) Initiative encompasses four phases to develop deployable systems capable of SAR with real time CCD processing to provide over the horizon alerts for terrain changes above a given threshold. The focus is on increasing the situational awareness of small dispersed units operating in large areas.

Phase One validated the performance of existing lightweight SAR systems using CCD for detecting a variety of human activities through rigorous testing.

Phase Two demonstrated near real-time CCD on a manned SAR-equipped platform used to determine functional requirements and developed a system concept of operations (CONOPS).

Phase Three has developed the engineering enhancements necessary to integrate a real time SAR CCD capability on a small UAV. All necessary software was developed during this phase.

Phase Four (FY 2010) will extend the capability to an affordable small unmanned aircraft with a miniaturized SAR system. Phase Four will also decrease procurement costs of a small SAR with a real time CCD capability to a cost goal of $500 thousand per sensor package. This compares to a current cost of approximately $1.2 million for a spot SAR system.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Demonstration of a Manned Platform System	2.146	0.000	0.000	0.000	0.000
Phase Two demonstrated near real-time CCD on a manned SAR equipped platform and accomplished the following:					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Engineering of algorithms necessary to exploit complex SAR imagery - Initial development of a ground based software package to cue user to tactically significant changes in the area of interest - Demonstration of near real-time SAR CCD capability on a manned aircraft - Concept of Operations (CONOPS) development SAR with real-time CCD has the ability to detect the following activities that were determined and verified during Phase One: - Vehicle tracks caused by a vehicle recently driving off-road, such as across a median strip, or the dirt shoulder adjacent to a road. - Signs of human activity through footprints in soil, changes in underbrush having recently traversed a path on soft soil, underbrush or vegetation. - Detection of linear structures newly-emplaced, such as a small diameter pipe. - Ground displacement due to trenching or the movement of dirt along a path. - The addition or subtraction of a significant object visible to the sensor, covering a half square meter, or providing a significant change in radar cross section (reflectivity). - Ground displacement due to digging operations, or digging and soil replacement, or repaving operations, where the ground area of the displaced earth covers a square meter or more. - The displacement of guard barriers, or other objects, due to manual manipulation, or vehicle crashes. - Ground level subsidence due to underground excavation activities when the surface subsidence amounts to a few millimeters. The first phase validated the utility of small SAR sensors for use in CCD processing. Phase One also determined the current actual capabilities of CCD in tactical change detection.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: Demonstrated a near real-time CCD capability on a manned SAR platform system with a radar and processing capability that can produce near real-time SAR CCD, together with a design for a deployable objective system.					
Development of Engineering Enhancements Phase Three accomplished the following engineering enhancements: - Miniaturization of a SAR CCD sensor package capable of deployment on a tactical sized UAV - Further enhancements to the front-end software package user experience - Refinement of the CONOPS initially developed in Phase Two *FY 2009 Accomplishments:* Phase Three has developed the necessary reduction in SAR component size necessary to facilitate integration of near real-time CCD systems into a small UAV.	5.150	0.000	0.000	0.000	0.000
Extend Capability Phase Four will accomplish the following: - A robust CONOPS - A front-end software package with a rich user experience - A near real-time SAR CCD capability integrated on to a tactical sized UAV with a sensor package cost of not more than $500K *FY 2010 Plans:* This phase of the program will integrate a SAR with real time CCD capability onto a small UAV for $500K per sensor package.	0.000	4.825	0.000	0.000	0.000
Accomplishments/Planned Programs Subtotals	7.296	4.825	0.000	0.000	0.000

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense		**DATE:** February 2010
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C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

This project will have developed a deployable system with a SAR sensor capable of achieving real time CCD on a small UAV tested by the tactical commander and at a cost of $500K per SAR CCD sensor package by the end of FY10.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603750D8Z: *Advanced Concept Technology Demonstration (ACTD)*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	1.169	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
P523: *ACTD*	1.169	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Department of Defense (DoD) initiated the Advanced Concept Technology Demonstration (ACTD) program with the purpose of demonstrating new, mature technologies in an operational environment and the goal of getting new technology into the hands of the warfighter as quickly as possible. Early successes included the Predator and Global Hawk unmanned aerial vehicles (UAVs). As of year end FY06, DoD has started 150 ACTDs, a total of 70 ACTDs were in process, and 22 had been returned to the technology base or terminated. However, no ACTD's have been started since FY 2006 with full transition to the JCTD program in FY 2007. By FY 2010 it is anticipated only three remaining ACTD's will not have completed the Miliatry Utilility Assessment (MUA). All funding in the ACTD program officially transferred to the JCTD program element (PE) in FY 2008, however, in 2008 and 2009 one congressional add was placed in the ACTD PE in each year.

The ACTD program demonstrated tremendous success in meeting urgent warfighter needs with 65 ACTDs contributing products that are/were employed in Operation Iraqi Freedom (OIF) and/or Operation Enduring Freedom (OEF). A non-exhaustive list of ACTDs deploying products to either OIF or OEF includes: Language and Speech Exploitation Resources (LASER), Expendable Unmanned Aerial Vehicle (XUAV), and the Joint Explosive Ordnance Disposal (JEOD) projects.

In FY 2006, the Deputy Under Secretary of Defense for Advanced Systems and Concepts (DUSD(AS&C)) initiated a new business process, building on the success of the ACTD program, to support the Department's transformational reform of addressing future threats from a capabilities focus versus the classical threat based viewpoint. The revised ACTD approach is called the Joint Capability Technology Demonstration (JCTD) program, and is based on proven, positive aspects of the ACTD program with new modifications. The JCTD model specifically addresses congressional concerns and recommendations made by the General Accountability Office (GAO) regarding rapid development and transitioning of Combatant Commander (CoCom) relevant capabilities to the joint warfighter in a more cost effective, timely and efficient model. Aligning closely with the thrust of with the Joint Staff's Joint Integration and Development System (JCIDS), JCTDs take a more balanced project candidate identification approach, shifting the overall program's focus to identifying specific warfighter capabilities needs up front (requirements pull), and then finding technology or concepts to address these needs, while maintaining the historical ACTD approach, where new technology is introduced to the warfighter to solve existing operational shortfalls (technology push).

In FY 2008 DUSD (AS&C) shifted all funding to the JCTD program and maintains oversight of the JCTD program. No projects are currently funded in the ACTD PE 0603750D8Z in FY 2008 and there have not been any ACTD new starts since 2006. All remaining ACTDs will be funded through the JCTD program until completion. In

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
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FY 2008 there was one Congressional adjustment in FY 2008, the Power Dozer project. Funding was added to the ACTD for the project in the FY 2008 appropriation and remains the only funding resident in this PE.

FY 2009 Output: One Congressional adjustment in FY 2009 was added, the Advanced Emergency Response Integrated Environment (AIRIE).
FY 2010/2011 Planned Output: Anticipate no funding or projects executed with funding from this Program Element.

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	1.194	0.000	0.000	0.000	0.000
Current President's Budget	1.169	0.000	0.000	0.000	0.000
Total Adjustments	-0.025	0.000	0.000	0.000	0.000
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.025	0.000			

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

	FY 2009	FY 2010
Project: P523: *ACTD*		
Congressional Add: *Advanced Emergency Response Integrated Environment (AERIE)*	1.169	0.000
Congressional Add Subtotals for Project: P523	1.169	0.000
Congressional Add Totals for all Projects	1.169	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense											DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603750D8Z: *Advanced Concept Technology Demonstration (ACTD)*				PROJECT P523: *ACTD*			
COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
P523: *ACTD*	1.169	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

Note

In FY 2008 all ACTD funding transferred to the JCTD program. This completed the transtion to the JCTD model that began in the FY 2006 President's Budget. The new JCTD Program provides a "cradle to grave" path for transformational joint capabilities. The initial funding lines (program elements (PE)) are outlined in the table below. The PEs in the table (with the exception of the ACTD BA3 PE which will fully transfer to the JCTD BA3 PE in FY 2008) represent the JCTD model. Beginning in FY 2007 all new starts will be JCTD only. Refer to the specific Budget Exhibit for more details on each funding line.

A. Mission Description and Budget Item Justification

The Department of Defense (DoD) initiated the Advanced Concept Technology Demonstration (ACTD) program in 1995 with the purpose of demonstrating new, mature technologies in an operational environment and the goal of getting new technology into the hands of the warfighter as quickly as possible. Early successes included the Predator and Global Hawk unmanned aerial vehicles (UAVs). As of year end FY 2007, DoD has started 160 ACTDs, a total of 57 ACTD/JCTDs were in process, and 22 had been returned to the technology base or terminated. However, no ACTD's have been started since FY 2006 with full transition to the JCTD program in FY 2007. By FY 2010 it is anticipated only three remaining ACTD's will not have completed the Miliatry Utilility Assessment (MUA). All funding in the ACTD program officially transferred to the JCTD program element (PE) in FY 2008, however, in 2008 and 2009 one congressional add was placed in the ACTD PE in each year.

The ACTD program demonstrated tremendous success in meeting urgent warfighter needs with 65 ACTDs contributing products that are/were employed in Operation Iraqi Freedom (OIF) and/or Operation Enduring Freedom (OEF). A non-exhaustive list of ACTDs deploying products to either OIF or OEF includes: Language and Speech Exploitation Resources (LASER), Expendable Unmanned Aerial Vehicle (XUAV), and the Joint Explosive Ordnance Disposal (JEOD) projects.

In FY 2006, the Deputy Undersecretary of Defense for Advanced Systems and Concepts (DUSD(AS&C)) initiated a new business process, building on the successful ACTD program, to support the Department's transformational reform of addressing future threats from a capabilities focus versus the classical threat based viewpoint. The revised ACTD approach is called the Joint Capability Technology Demonstration (JCTD) program, and is based on proven, positive aspects of the ACTD program with new modifications. The JCTD model specifically addresses congressional concerns and recommendations made by the General Accountability Office (GAO) regarding rapid development and transitioning of Combatant Commander (CoCom) relevant capabilities to the joint warfighter in a more cost effective, timely and efficient model. Aligning closely with the thrust of with the Joint Staff's Joint Integration and Development System (JCIDS), JCTDs take a more balanced project candidate identification approach, shifting the overall program's focus to identifying specific warfighter capabilities needs up front (requirements pull), and then finding technology or concepts to address these needs, while maintaining the historical ACTD approach, where new technology is introduced to the warfighter to solve existing operational shortfalls (technology push). FY 2006 was the first year of a three to five year transition period from the current ACTD to the improved JCTD program.

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However, in FY 2008 all ACTD funding has transferred to the JCTD program completing the transition more quickly than originally anticipated. Beginning in FY 2007 all new starts were JCTDs.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
Congressional Add: Advanced Emergency Response Integrated Environment (AERIE) *FY 2009 Accomplishments:* The AERIE will integrate force protection and installation infrastructures in the Pentagon, specifically the Integrated Emergency Operations Center (IEOC), enhancing situational awareness (SA) and improving response, addressing Homeland Security issues, Executive Order 133356 and 9/11 Commission recommendations. The methodology used in developing AERIE will allow the exchange of information in any interagency environment. This will significantly enhance the ability to communicate, coordinate, and relay information, while protecting sensitive data. AERIE will be used to provide the Pentagon Force Protection Agency insight into complex day-to-day activities.	1.169	0.000
Congressional Adds Subtotals	1.169	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
• PE 0603648D8Z: *Joint Capability Technology Demonstration (JCTD)*	207.096	198.352	192.140		192.140	194.485	197.041	200.438	204.081	Continuing	Continuing
	13.487	18.577	18.570		18.570	19.517	19.513	19.838	20.159	Continuing	Continuing

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603750D8Z: *Advanced Concept Technology Demonstration (ACTD)*	**PROJECT** P523: *ACTD*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
• PE 0604648D8Z: *Joint Capability Technology Demonstration (JCTD) Transition*											

D. Acquisition Strategy

The strategy for ACTDs has always been to focus on developing a transition path into a program of record or to establish a new program for those projects that show significant military utility in the demonstration phase. Promising ongoing ACTDs may receive transition funding from the JCTD Transition arm as the ACTD program completes. All ACTD funding will transfer to the JCTD program element in FY 2008. Beginning in FY 2007 all new starts were JCTD only. Program metrics:
- Capability Based: Greater CoCom influence looking at nearer term joint/coalition needs
- Provide Spiral Technologies - 25 percent will provide an operationally relevant product demonstration within 24 months of ID signature.
- Agile Demonstration - 75 percent complete final demonstration within three years of ID signature.
- OSD provide significantly more funding (often greater than 30 percent). In some exceptional cases a majority of project funding, especially during the first two years.
- JCTDs not necessarily tied to an exercise. Greater flexibility to establish military utility via operational "real-world" demonstration or specifically designed test/venue.
- 80 percent of JCTDs transition at least 50 percent of their products to sustainment.

E. Performance Metrics

FY2010
Strategic Goals Supported: Project Selection; Ability to spiral technologies; Adequately resourced projects; Complete a final demonstration; Number of successful capabilities transitioned.
Planned Performance Improvement / Requirement Goal: CoCom Capability; Spiral within 24 mos; Fund more than 30 percent; Demo within 3 years; Transition to Program of Record.
Planned Performance Metric / Methods of Measurement: 100; 25; 100; 75; 80 percent.

The majority of funding from this Program Element is forwarded to the Services/Defense Agencies that execute the individual ACTD projects. DUSD(AS&C) maintains and provides overall programmatic oversight for the ACTD program, to include the individual ACTD projects. The JCTD/ACTD performance metrics center on how fast relevant joint and/or transformational technologies can be demonstrated and provided to the joint warfighter. These metrics are driven by the overall business process which includes six parts: (1) selection focus; (2) ability to spin-off spiral technologies; (3) time necessary to complete a final demonstration; (4) adequately resourced projects with appropriate oversight; (5) capability to complete an independent assessment of the technology; and (6) the number of successful capabilities that are

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603750D8Z: *Advanced Concept Technology Demonstration (ACTD)*	**PROJECT** P523: *ACTD*

actually transitioned to the warfighter. The table below defines these metrics and helps compare/contrast the current ACTD program with the new JCTD business process model.

A comparison of ACTD and JCTD metrics are:

1) Project Selection Focus

a. ACTD - Threat based: shared military service and CoCom influence.

b. JCTD - Capability Based: Greater CoCom influence looking at nearer term joint/coalition needs.

2) Spiral Technologies:

a. ACTD - No metric

b. JCTD - 25 percent will provide an operationally relevant product demonstration within 24 months of ID signature.

3) Final Demonstration Completed.

a. ACTD - 3 to 4 years after initiation.

b. JCTD - 75 percent of projects complete final demonstration within three years of ID signature.

4) Shared Funding and Viability of resources:

a. ACTD - OSD provides no more than 30 percent of the budgeted resources. Funding provided form many different program elements.

b. JCTD - OSD provides significantly more funding, greater than 30 percent in some cases a majority of projected funding, especially in the first two years.

5) Military Utility Assessment (MUA):

a. ACTD - MUA traditionally tied to a specific planned exercise for evaluation.

b. JCTD - JCTDs not necessarily tied to an exercise. Greater flexibility to establish military utility via operational "real-world" demonstration or specifically designed test/venue.

6) Transition of Technology:

a. ACTD - 70 percent of ACTDs transition at lease one product to sustainment.

b. JCTD - 80 percent of JCTDs transition at least 50 percent of their products to sustainment.

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603755D8Z: *High Performance Computing Modernization Program*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	209.164	235.486	200.986	0.000	200.986	210.217	216.449	219.770	223.515	Continuing	Continuing
P507: *High Performance Computing Modernization Program*	209.164	235.486	200.986	0.000	200.986	210.217	216.449	219.770	223.515	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Department of Defense (DoD) High Performance Computing (HPC) Modernization Program (HPCMP) supports warfighter needs for technological superiority and military dominance on the battlefield by providing advanced computational services to U.S. weapons system scientists and engineers. Exploiting continuous HPC technology advances, the DoD research, development, test and evaluation (RDT&E) community is able to resolve critical scientific and engineering problems more quickly and with more precision. This feeds directly into the acquisition process by improving weapons system designs through an increased fundamental understanding of materials, aerodynamics, chemistry, fuels, acoustics, signal image recognition, electromagnetics, and other areas of basic and applied research as well as enabling advanced test and evaluation (T&E) environments that allow synthetic scene generation, automatic control systems and virtual test environments. HPC has been identified as a key enabling technology essential to achieving the DoD's science and technology (S&T) and T&E objectives. To emphasize the common missions and responsibilities of DoD high performance computing centers, the Department of Defense undertook administrative actions to designate the Major Shared Resources Centers (Air Force Research Laboratory, Army Research Laboratory, Engineering Research and Development Center, and Naval Oceanographic Office) together with the Maui High Performance Computing Center and the Arctic Region Supercomputing Center collectively as DoD Supercomputing Resource Centers (DSRCs). One center, established by congress does not receive programmed support through HPC Modernization Program funding, but provides supercomputing services to the DoD. The Space and Missile Defense Command, Huntsville, AL, receives support for operations through the Army. Additionally, funding for specialized programs is provided through dedicated HPC project investments (DHPCPIs). DHPCPIs support a one-time need and have no legacy within the HPC Modernization Program. DSRCs and DHPCPIs directly support the DoD S&T and T&E laboratories and test centers and are accessible to local and remote scientists and engineers via high-speed network access. In FY2009 and continuing into FY2010, significant investments will be made in mass data storage systems to replace systems reaching the end of their useful life. An integral part of the program is providing for the adaptation of broadband, widely used applications and algorithms to address S&T and T&E requirements, along with continued training of users in new system designs and concepts. The HPCMP pursues continuous interaction with the national HPC infrastructure, including academia, industry, and other government agencies to facilitate sharing of knowledge, tools, and expertise. HPCMP users average 5,000 scientists and engineers at approximately 180 locations (DoD Laboratories, Test Centers, academic institutions and commercial businesses). The integrated HPCMP consists of Supercompting Resource Centers; the Defense Research and Engineering Network; and Software Application Support. SRCs are responsible for as large a part of DoD`s S&T and T&E computational workload as feasible. SRCs provide extensive capabilities to address user requirements for hardware, software, and programming environments. DHPCPIs augment the SRCs to form total HPCMP computational capability. DHPCPIs address critical HPC requirements that cannot be met at DSRCs, such as real-time, and near real-time computing requirements, and leverage significant HPC and mission expertise located at these remote sites. All

elements of the HPCMP are interconnected with all S&T and T&E user sites via the Defense Research and Engineering Network. The Software Application Support component develops critical common DoD applications programs that run efficiently on advanced HPC systems, supports technology transition activities with academic and commercial institutions, trains users, builds collaborative programming environments, and develops mechanisms to protect high value HPC application codes. The Computational Research and Engineering Acquisition Tools and Environments (CREATE) will produce supercomputer-based engineering design and test tools, improving the acquisition process for major weapons systems across the DoD. Modernization of DoD HPC capability and fulfillment of the program's vision and goals requires an on-going strategy that addresses all HPC aspects. While advancing the level of hardware performance is critical to success, the higher objective is enabling better scientific research, test and evaluation environments, and technology development for superior weapons, warfighting, and related support systems. Program goals are to acquire, deploy, operate and maintain best-value supercomputers; acquire, develop, deploy and support software applications and computational work environments that enable critical DoD research, development and test challenges to be analyzed and solved; acquire, deploy, operate and maintain a communications network that enables effective access to supercomputers and to distributed S&T/T&E computing environments; continuously educate the RDT&E workforce with the knowledge needed to employ computational modeling effectively and efficiently; and promote collaborative relationships among the DoD computational science community, the national computational science community and minority serving institutes.

HPCMP RDT&E funding primarily supports government and contractor labor. Due to a general, multi-year reduction to the HPCMP Budget of ~$5,000,000, it is anticipated that the program will reduce staff positions by 40 to 50 full-time equivalents beginning in FY2011.

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	220.345	221.286	0.000	0.000	0.000
Current President's Budget	209.164	235.486	200.986	0.000	200.986
Total Adjustments	-11.181	14.200	200.986	0.000	200.986
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		14.200			
• Congressional Directed Transfers		0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-5.602	0.000			
• Other Program Adjustments	-5.579	0.000	200.986	0.000	200.986

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense											DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603755D8Z: *High Performance Computing Modernization Program*				PROJECT P507: *High Performance Computing Modernization Program*			
COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
P507: *High Performance Computing Modernization Program*	209.164	235.486	200.986	0.000	200.986	210.217	216.449	219.770	223.515	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Department of Defense (DoD) High Performance Computing (HPC) Modernization Program supports the needs of the warfighter for technological superiority and military dominance on the battlefield by providing advanced computational services to U.S. weapons system scientists and engineers. By exploiting continuous advances in HPC technology, the defense research, development, test and evaluation (RDT&E) community is able to resolve critical scientific and engineering problems more quickly and with more precision. The results of these efforts feed directly into the acquisition process by improving weapons system designs through an increased fundamental understanding of materials, aerodynamics, chemistry, fuels, acoustics, signal image recognition, electromagnetics, and other areas of basic and applied research as well as enabling advanced test and evaluation environments that allow synthetic scene generation, automatic control systems and virtual test environments. As such, HPC has been identified as a key enabling technology essential to achieving the objectives of the DoD's science and technology (S&T) and test and evaluation (T&E) programs.

The program supports six DoD Supercomputing Resource Centers (DSRCs). One center, established by congress does not receive programmed support through HPC Modernization Program funding, but provides supercomputing services to the DoD. The Space and Missile Defense Command, Huntsville, AL, receives support for operations through the Army. Additionally, funding for specialized programs is provided through dedicated HPC project investments (DHPCPIs). DHPCPIs support a one-time need and have no legacy within the HPC Modernization Program. Centers and DHPCPIs directly support the DoD S&T and T&E laboratories and test centers and are accessible to local and remote scientists and engineers via high-speed network access. An integral part of the program is providing for the adaptation of broadband, widely used applications and algorithms to address S&T and T&E requirements, along with continued training of users as new system designs and concepts evolve. The program pursues continuous interaction with the national HPC infrastructure, including academia, industry, and other government agencies to facilitate the sharing of knowledge, tools, and expertise.

HPCMP users average 5,000 scientists and engineers at approximately 180 locations (DoD Laboratories and Test Centers, academic institutions and commercial businesses). The integrated HPC program consists of Supercomputing Resource Centers; the Defense Research and Engineering Network; and Software Application Support. DSRCs are responsible for as large a fraction of DoD`s S&T and T&E computational workload as feasible. SRCs provide extensive capabilities to address user requirements for hardware, software, and programming environments. DHPCPIs augment the DSRCs to form the total HPC Modernization Program computational capability. DHPCPIs address critical HPC requirements that cannot be met at DSRCs, such as real-time, and near real-time computing requirements, and leverage significant HPC and mission expertise located at these remote sites. All elements of the HPC Modernization Program are interconnected with all S&T and T&E user sites via the Defense Research and Engineering Network (DREN). Additionally, the Software Application Support component develops critical common DoD

applications programs that run efficiently on advanced HPC systems, supports technology transition activities with academic and commercial institutions, trains users, builds collaborative programming environments, and develops mechanisms to protect high value HPC application codes.

True modernization of DoD`s HPC capability and fulfillment of the program's vision and goals requires an on-going program strategy that addresses all aspects of HPC. While advancing the level of hardware performance is critical to success, the higher objective is to enable better scientific research, test and evaluation environments, and technology development for superior weapons, warfighting, and related support systems. The Program goals are to (1) Acquire, deploy, operate and maintain best-value supercomputers; (2) Acquire, develop, deploy and support software applications and computational work environments that enable critical DoD research, development and test challenges to be analyzed and solved; (3) Acquire, deploy, operate and maintain a communications network that enables effective access to supercomputers and to distributed S&T/T&E computing environments; (4) Continuously educate the RDT&E workforce with the knowledge needed to employ computational modeling effectively and efficiently; and (5) Promote collaborative relationships among the DoD computational science community, the national computational science community and minority serving institutes.

The Defense Research and Engineering Network (DREN) provides wide area network (WAN) connectivity among the Department's S&T and T&E communities. The DREN is implemented through an Intersite Services Contract awarded to MCI (WORLDCOM) during FY 2002. DREN currently provides services to sites throughout the continental United States, Alaska, Hawaii, and can be extended overseas where necessary. A Secret DREN using common Secret systems high key with NSA certified Type-1 encryptors that can transport classified traffic at OC-3 (155 Mbps) has also been deployed. The HPC Modernization Program employs state-of-the-art WAN security and strong host and user security creating a defense-in-depth security architecture.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Department of Defense Supercomputing Resource Centers	102.922	116.198	100.828	0.000	100.828
The program supports six DoD Supercomputing Resource Centers that are responsible for as large a fraction of DoD's S&T and T&E computational workload as feasible. Dedicated HPC project investments (DHPCPIs) support a one-time need and have no legacy within the HPC Modernization Program. *FY 2009 Accomplishments:* The program sustained and modernized HPC systems, storage, and scientific data analysis and visualization capabilities to fulfill a significant portion of the science and technology (S&T) and test and					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603755D8Z: *High Performance Computing Modernization Program*	**PROJECT** P507: *High Performance Computing Modernization Program*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
evaluation (T&E) community HPC requirements. Six DRSCs were fully supported. DHPCPIs were made at NSWC Carderock, MD; Air Force SEEK EAGLE Tullahoma, TN; AFRL, Sensors Dir WPAFB, OH; and RTTC Huntsville, AL. Also, the program began significant investments in mass data storage systems to replace systems reaching the end of their life cycle. DSRCs and DHPCPIs are planned to continue into future years with no set completion date. Status of FY 2009 Congressional adjustments: $2,800 Naval Research Lab Supercomputing Information Prototype – Distributed and Obligated $3,200 Arctic Regional Supercomputer – Distributed and Obligated $2,480 High Performance Computational Design of Novel Materials – Distributed and Obligated $5,000 MHPCC – Distributed and Obligated *FY 2010 Plans:* Since 1994, the program has sustained and regularly modernized HPC systems, storage, and scientific data analysis and visualization capabilities to fulfill a significant portion of the science and technology (S&T) and test and evaluation (T&E) community HPC requirements. Six DSRCs will be supported in FY 2010 and two to five competitively awarded DHPCPIs are planned. Also, continuing in FY 2010, the program will make significant investments in mass data storage systems to replace systems that will reach the end of their life cycle. These efforts are planned to continue into future years with no set completion date. Status of FY 2010 Congressional adjustments: $3,120 Naval Research Lab prototype - Pending final obligation authority $13,000 HPC Program Adjustments - Pending final obligation authority					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603755D8Z: *High Performance Computing Modernization Program*	**PROJECT** P507: *High Performance Computing Modernization Program*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: Since 1994, the program has sustained and regularly modernized HPC systems, storage, and scientific data analysis and visualization capabilities to fulfill a significant portion of the science and technology (S&T) and test and evaluation (T&E) community HPC requirements. Six DSRCs are programmed for support in FY2011 and two to five competitively awarded DHPCPIs are planned. HPCMP RDT&E funding primarily supports government and contractor labor. These efforts are planned to continue into future years with no set completion date. Due to a general, multi-year reduction to the HPCMP Budget of ~$5,000,000, it is anticipated that the program will reduce staff positions by 40 to 50 full-time equivalents beginning in FY2011. A portion of these reductions will be applied to DSRCs.					
Networking The Defense Research and Engineering Network (DREN) provides wide area network (WAN) connectivity among the Department's S&T and T&E communities. *FY 2009 Accomplishments:* The DREN provided high speed wide area network services to over 130 locations throughout the United States. DREN continued collaborative work with the federal networking community and standards associations. As result of prior year funding reductions the number site specific security assessments declined with more fully automated and remote security tools providing some augmentation. These efforts are planned to continue into future years with no set completion date. *FY 2010 Plans:* Network services to link all elements of the program will be provided by the Defense Research and Engineering Network (DREN) as well as operation of security systems and enhancements. The DREN network services contract is scheduled to be re-competed in FY 2010. Collaborative work with the federal networking community and standards associations will continue to assure that the DREN will	29.847	31.488	29.522	0.000	29.522

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603755D8Z: *High Performance Computing Modernization Program*	**PROJECT** P507: *High Performance Computing Modernization Program*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
remain compatible with future technology change. These efforts are planned to continue into future years with no set completion date. *FY 2011 Base Plans:* Network services to link all elements of the program will be provided by the Defense Research and Engineering Network (DREN) as well as operation of security systems and enhancements. Collaborative work with the federal networking community and standards associations will continue to assure that the DREN will remain compatible with future technology change. These efforts are planned to continue into future years with no set completion date. Due to a general, multi-year reduction to the HPCMP Budget of ~$5,000,000, it is anticipated that the program will reduce staff positions by 40 to 50 full-time equivalents beginning in FY 2011. A portion of these reductions may be applied to DREN.					
Software Applications Software Applications provide for the adaptation of broadband, widely used applications and algorithms to address S&T and T&E requirements, continued training of users as new system designs and concepts evolve, and continuous interaction with the national HPC infrastructure, including academia, industry, and other government agencies to facilitate the sharing of knowledge, tools, and expertise. *FY 2009 Accomplishments:* Development efforts in software programs continued to mature as other projects were completed, and others begun. The HPCMP through the Computational Research and Engineering Acquisition Tools and Environments (CREATE) initiative expanded HPC to the development of supercomputer-based engineering design and test tools to improve the acquisition process for major weapons systems across the Department. Software Institutes and portfolios developed shared scalable applications to exploit scalable HPC assets. Departmental reductions to FY2009 RDT&E funding were partially offset by $1.4M in FY2009 Quick Reaction funding. These funds were used compensate for HPC Modernization Program funds that were unavailable for application to the CREATE initiative.	76.395	87.800	70.636	0.000	70.636

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603755D8Z: *High Performance Computing Modernization Program*	**PROJECT** P507: *High Performance Computing Modernization Program*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
An Academic Outreach Program was supported to encourage and support computational science in universities across the United States. The User Productivity Enhancement and Technology Transfer effort provided computational and computer science support to the DoD HPC user community through both interaction and collaborative projects with academic and industrial partners. Existing contracts supporting the User Productivity Enhancement and Technology Transfer effort was re-competed and a new award made to High Performance Computing Technologies, Inc. in FY2009. Efforts were maintained to develop technologies and methodologies to protect and limit end-use of high performance computing applications software while minimizing the burden on authorized end-users. These efforts are planned to continue into future years with no set completion date.					
FY 2010 Plans: Computational Research and Engineering Acquisition Tools and Environments (CREATE) will continue development of supercomputer-based engineering design and test tools to improve the acquisition process for major weapons systems across the Department. Development efforts in software programs will continue to mature as other projects are completed, and others begun with a greater emphasis on engineering applications. Software Institutes and portfolios will continue to develop shared scalable applications to exploit scalable HPC assets. An Academic Outreach Program will continue be supported to encourage and support computational science in universities across the U.S. The Programming Environments and Training effort will provide computational and computer science support to the DoD HPC user community through interaction and collaborative projects with academic and industrial partners. On-going efforts will be maintained to develop technologies and methodologies to protect and limit end-use of high performance computing applications software while minimizing the burden on authorized end-users. These efforts are planned to continue into future years with no set completion date.					
FY 2011 Base Plans: Computational Research and Engineering Acquisition Tools and Environments (CREATE) will continue development of supercomputer-based engineering design and test tools to improve the					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603755D8Z: *High Performance Computing Modernization Program*	**PROJECT** P507: *High Performance Computing Modernization Program*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
acquisition process for major weapons systems across the Department. Development efforts in software programs will continue to mature as other projects are completed, and others begun with a greater emphasis on engineering applications. Software Institutes and portfolios will continue to develop shared scalable applications to exploit scalable HPC assets. An Academic Outreach Program will continue be supported to encourage and support computational science in universities across the United States. The Programming Environments and Training effort will provide computational and computer science support to the DoD HPC user community through interaction and collaborative projects with academic and industrial partners. On-going efforts will be maintained to develop technologies and methodologies to protect and limit end-use of high performance computing applications software while minimizing the burden on authorized end-users. These efforts are planned to continue into future years with no set completion date. Due to a general, multi-year reduction to the HPCMP Budget of ~$5,000,000, it is anticipated that the program will reduce staff positions by 40 to 50 full-time equivalents beginning in FY 2011. A portion of these reductions will be applied to Software Applications.					
Accomplishments/Planned Programs Subtotals	209.164	235.486	200.986	0.000	200.986

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
• 0902198D8Z: *Major Equipment OSD*	52.410	53.105	53.839		53.839	54.400	55.069	56.098	57.184	Continuing	Continuing

D. Acquisition Strategy

Not applicable for this item.

E. Performance Metrics

Strategic Goals supported are as follows:

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense		**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603755D8Z: *High Performance Computing Modernization Program*	**PROJECT** P507: *High Performance Computing Modernization Program*

Defense Supercomputing Resource Centers - Method of Measurement: Habus (HPCMP standard measurement of computational performance)

FY2009: Existing Baseline – 975.4/ Planned Performance Improvement - Requirement Goal – 585.2/ Actual Performance Improvement – 1048.6
FY2010: Existing Baseline – 2024.0/ Planned Performance Improvement - Requirement Goal – 2000.0
FY2011: Existing Baseline – 4024.0/ Planned Performance Improvement - Requirement Goal – 2100.0

Networking - Method of Measurement: Gigabits per second

FY2009: Existing Baseline – 26.2/ Planned Performance Improvement - Requirement Goal – 1.0/ Requirement Goal/ Actual Performance Improvement – 4.4
FY2010: Existing Baseline – 30.6/ Planned Performance Improvement - Requirement Goal – 1.0
FY2011: Existing Baseline – 31.6/ Planned Performance Improvement - Requirement Goal – 1.0

Software Applications - Methods of Measurement: Customer Satisfaction on a 0-5 scale

FY2009: Existing Baseline – 4.2/ Planned Performance Improvement - Requirement Goal – 4.2/ Actual Performance Improvement – 4.2
FY2010: Existing Baseline – 4.2/ Planned Performance Improvement - Requirement Goal – 4.2
FY2011: Existing Baseline – 4.2/ Planned Performance Improvement - Requirement Goal – 4.2

Comment: All FY2009 actual performance metrics met or exceeded those planned.

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603781D8Z: *Software Engineering Institute (SEI)*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	29.056	31.044	30.910	0.000	30.910	31.252	31.640	32.154	32.729	Continuing	Continuing
P781: *Software Engineering Institute (SEI)*	26.283	23.634	23.294	0.000	23.294	23.601	23.952	24.416	24.934	Continuing	Continuing
P783: *Software Producibility Initiative*	2.773	7.410	7.616	0.000	7.616	7.651	7.688	7.738	7.795	Continuing	Continuing

A. Mission Description and Budget Item Justification

Software is key to meeting DoD's increasing demand for high-quality, affordable, and timely national defense systems. There is a critical need to rapidly transition state-of-the-art technology and best practices to improve the acquisition, engineering, fielding, and evolution of software-intensive DoD systems.

Starting in 2009, Project 781 funds the technology development and transition activities of the Software Engineering Institute (SEI) at Carnegie Mellon University. The SEI is an R&D Laboratory Federally Funded Research and Development Center (FFRDC) sponsored by the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics. It was established in 1984 as an integral part of the DoD's software initiative to identify, evaluate, and transition high-leverage software engineering technologies and practices. The SEI fosters disciplined software engineering practices by DoD acquisition and life-cycle support programs and by the industrial base where the bulk of defense software is produced. The Institute works across government, industry, and academia to: (1) improve current software engineering activities from acquisition, technical, and management perspectives; (2) facilitate rapid, value-added transition of software engineering technology into practice; and (3) evaluate and calibrate emerging software engineering technologies to determine their potential for improving the evolution of software-intensive DoD systems.

The SEI enables the exploitation of emerging software technology by bringing engineering discipline to software acquisition, development, and evolution. The SEI focuses on software technology areas judged to be of the highest payoff in meeting defense needs. FY 2005 focus areas were: Acquisition Practices for DoD Software- Intensive Systems (including pilot demonstrations of new technologies, dissemination of lessons learned, and provision of selected important services to the DoD acquisition community); Software Engineering Technical Practices (including survivable systems practices, software architecture technology, software component technology, performance-critical systems, and integration of software-intensive systems); and Software Engineering Management Practices [including personal and team software development processes, software engineering measurement and analysis, and Capability Maturity Model Integration (CMMI)].

P783 of this funding line includes the Software Produceability Initiative. The role of software in major Defense acquisition programs has been steadily increasing. Much of the mission functionality demanded from programs such as F/A-22, JSF, Future Combat System, and many others is embodied in large, complex software

systems. Shortcomings in software development often lead to schedule slippage, cost growth, and mission compromises. These shortcomings can frequently be traced to underpowered software development technologies not up to the task of developing the scale and complexity of software needed. Despite the large role of the commercial sector in advancing software technology, there are many key aspects of complex, distributed, robust systems crucial to DoD that are not being addressed directly by commercial technology efforts, as our experience over the past decade shows. The Software Produceability Initiative will focus on developing and transitioning more powerful and effective software development science, techniques, tools, and technologies to improve our ability to design, build, test and sustain software and software intensive systems.

This PE also includes support to find, evaluate, and test innovative technologies emerging from non-traditional sources. Private sector investment has created rapid advances in technology primarily in information technology and related electronic components and devices. Obtaining an early, accurate understanding of the technological advances that are emerging from small, innovative companies has been problematic for the Department of Defense (DoD) due to these types of companies either overlooking or even avoiding federal sales opportunities. Further, once such innovative technologies become commercially available they can be rapidly obtained by insurgents for terrorist actions. These funds will be used to discover emerging technologies, evaluate their potential to fit DoD needs, and where appropriate conduct critical tests of the components or software under DoD conditions. T he facilitation of early interactions and meaningful information exchanges between the innovative companies and DoD users will accelerate the application of emerging technical solutions to DoD needs, reduce development costs, and avoid potentially disastrous technological surprises from insurgent use of such new technology. In addition, it is important to understand how developments in commercial technology might impact existing DoD programs and systems. Equally important, new commercial technologies may require new DoD policies on the use of the technology or a modification to existing DoD policy.

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	31.244	31.298	0.000	0.000	0.000
Current President's Budget	29.056	31.044	30.910	0.000	30.910
Total Adjustments	-2.188	-0.254	30.910	0.000	30.910
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	-1.104	0.000			
• SBIR/STTR Transfer	-0.852	0.000			
• Other Program Adjustments	-0.232	-0.254	30.910	0.000	30.910

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense											DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				**R-1 ITEM NOMENCLATURE** PE 0603781D8Z: *Software Engineering Institute (SEI)*				**PROJECT** P781: *Software Engineering Institute (SEI)*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P781: *Software Engineering Institute (SEI)*	26.283	23.634	23.294	0.000	23.294	23.601	23.952	24.416	24.934	Continuing	Continuing

A. Mission Description and Budget Item Justification

Software Engineering Institute is key to meeting the Department of Defense's (DoD's) increasing demand for high-quality, affordable, and timely national defense systems. There is a critical need to rapidly transition state-of-the-art technology and best practices to improve the acquisition, engineering, fielding, and evolution of software-intensive DoD systems.

The SEI enables the exploitation of emerging software technology by bringing engineering discipline to software acquisition, development, and evolution. The SEI focuses on software technology areas judged to be of the highest payoff in meeting defense needs.

Private sector investment has created rapid advances in technology primarily in information technology and related electronic components and devices. Obtaining an early, accurate understanding of the technological advances that are emerging from small, innovative companies has been problematic for the DoD due to these types of companies either overlooking or even avoiding federal sales opportunities. Further, once such innovative technologies become commercially available they can be rapidly obtained by insurgents for terrorist actions. DoD needs opportunities to discover emerging technologies, evaluate their potential to fit DoD needs, and where appropriate conduct critical tests of the components or software under DoD conditions. Facilitating early interactions and meaningful information exchanges between the innovative companies and DoD users will accelerate the application of emerging technical solutions to DoD needs, reduce development costs, and avoid potentially disastrous technological surprises from insurgent use of such new technology. Based on workshops and interactions with these companies and the DoD acquisition community in 2007 and 2008, the need emerged for funding to support rapid evaluation and test of these technologies that can't be accommodated by the normal acquisition program budget process.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	**FY 2010**	**FY 2011 Base**	**FY 2011 OCO**	**FY 2011 Total**
Acquisition Practices for DoD Software Intensive Systems - (Acquisition Support Program - ASP)	2.795	2.780	2.613	0.000	2.613
FY 2009 Accomplishments: * Identified potential areas of focus to address common areas of concern across multiple programs.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
* Explored methods to assist with gathering and organizing information about a program in a way that graphically represents the relationships among key decisions, events, and circumstances that occur on the program. * Investigation of Systems Thinking and research application of that to acquisition in support of development of the archetypes. * Collaboration with University Carlos III in Spain to extend archetype work to solution space * Command and Control Study in collaboration with other FFRDCs to answer whether there were any show-stopper risks in migrating to a common command and control for satellites systems * Updates for and delivery of DAU course *FY 2010 Plans:* * Identify opportunities for the SEI to create, apply, and amplify technologies that respond to customer needs. * Explore new mechanisms for more effective one-to-many dissemination of and collaboration on software acquisition and engineering knowledge. * Accelerate the transition of methods and technologies developed by other SEI technical programs to assist DoD. * Find connections between similar software engineering problems and shared solution sets within and across DoD components and federal agencies. * Document lessons learned, success stories, practical guidance, and tools and techniques that can be used to increase positive project outcomes and reduce program risk. * Facilitate communications between SEI and other external organizations such as industry associations, DoD initiatives, and communities of practice to disseminate successful methods and technologies. * Educate acquisition executives who attend advanced Defense Acquisition University (DAU) training in the challenges of software engineering and acquisition and help them identify improved practices to apply to their programs.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
* Capture knowledge from engagements with acquisition programs and organizations to identify patterns and trends, and then help impart this knowledge to the acquisition community through conferences, workshops, courses, briefings, technical reports, articles, advocacy, and participation in acquisition communities of practice. *FY 2011 Base Plans:* Continuation and expansion of FY2010 Plans: * Identify opportunities for the SEI to create, apply, and amplify technologies that respond to customer needs. * Explore new mechanisms for more effective one-to-many dissemination of and collaboration on software acquisition and engineering knowledge. * Accelerate the transition of methods and technologies developed by other SEI technical programs to assist DoD. * Find connections between similar software engineering problems and shared solution sets within and across DoD components and federal agencies. * Document lessons learned success stories, practical guidance, and tools and techniques that can be used to increase positive project outcomes and reduce program risk. * Facilitate communications between SEI and other external organizations such as industry associations, DoD initiatives, and communities of practice to disseminate successful methods and technologies. * Educate acquisition executives who attend advanced Defense Acquisition University (DAU) training in the challenges of software engineering and acquisition and help them identify improved practices to apply to their programs. * Capture knowledge from engagements with acquisition programs and organizations to identify patterns and trends, and then help impart this knowledge to the acquisition community through conferences, workshops, courses, briefings, technical reports, articles, advocacy, and participation in acquisition communities of practice.					
Software Engineering Technical Practices (Networked Systems Survivability Program - NSS)	3.898	3.977	3.952	0.000	3.952

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: * Transitioned vulnerability analysis and malicious code analysis tools and techniques to response teams with national responsibility. * Expanded pilot opportunities, transitioned resiliency engineering concepts through coursework, and performed independent assessments of organizational competency for select customers. * Transitioned security practices, tools, and methodologies to the DoD information assurance workforce through the Virtual Training Environment. * Expanded on the work initiated with the Air Force Cyber Command Task Force to transition computer network operations, risk management, and force development capabilities to AF Cyber. * Matured and transitioned emerging technologies generated by work in network-centric operations and systems of systems, addressing how to operate effectively in an environment that requires large scale distributed collaboration and is constrained by acquisition practices. * Published new model of insider theft of intellectual property. * Developed the CERT Resiliency Management Model Capability Appraisal methodology and methodology artifacts. *FY 2010 Plans:* * Develop training courses and workshops for the Resiliency Management Model. * Develop functional extraction-based tools for correctness verification and component composition. * Identify and establish techniques and tools needed to embed software and system assurance in all aspects of system development lifecycle; develop prototype measures of the security improvement brought about by each technique and tool. * Work with the DoD's DISA, JTF-GNO, and NSA NTOC to extend, adapt, and apply NSS network situational awareness, malicious code, and forensics tools on adversary activity present on systems running on NIPR Net, SIPR Net, and the DREN. * Improve the effectiveness of the intrusion analysis and response team community by developing cyber defense exercises that are made available through the SEI's Virtual Training Environment and its XNET virtual network exercise platform.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
* Integrate insider threat research analysis and findings into new technologies for the detection and prevention of malicious insider activity. * Create and transition security event detection gap-area tools that provide commercially unavailable capabilities. * Improve the survivability and resiliency of the program's stakeholders by developing and transitioning disciplined improvement approaches including management improvement models (such as the Resiliency Management Model), security assessment methods, compliance validations, and threat analysis, modeling, and mitigation techniques. * Provide practical guidance for identifying and managing insider threats and other risks. * Continue to research and develop secure coding standards for C++ and Java and complete initial version for each. * Automate SQUARE for acquisition and privacy, and transition. *Conduct new research in the areas of evaluating embedded system functionality and security, detecting mutating malware, and using trusted hardware for cyber security. *FY 2011 Base Plans:* * Define a C language software certification process and establish the CERT SCALE (Source Code Analysis Lab). * Develop C language static analysis tool certification process. * Refine the Building Assured Software Framework and associated metrics and initiate transition activities that support adoption by other organizations, designers and developers. * Support FX transition by continuing evolution of the FX/MC system for malware analysis and develop demonstrations of FX application to test and evaluation activities. * Continue to support the DHS software assurance effort and associated working groups and to expand the content for the Build-Security-In website. * Develop and publish an ISO/IEC Type II Technical Report "Secure Coding Guidelines" based on the CERT C Secure Coding Standard to include only analyzable guidelines and targeted towards source code analysis tool vendors.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
* Develop "Annex K Analyzable" for the C1X major revision to the C language standard and prototype using GCC. * Assess the capabilities and limitations of hardware based trusted computing and recommend potential extensions of the trusted computing model * Research national and sector-based practices in critical information infrastructure (CII) asset, threat, and vulnerability identification and analysis. * Continue to collect, codify, and analyze insider threat cases; research and develop predictive threat models and detection strategies. * Research, develop, and apply conceptual frameworks and technologies to train and evaluate cyber workforce mission readiness. * Refine and extend XNET user interface and backend platform infrastructure to support large scale, globally distributed training exercises for the DoD, NATO, and federal and state governmental agencies. * Refine information security risk assessment methodologies to meet broader community and sector needs, conduct assessments and compliance validations, and establish a community of practice for CII. * Develop, facilitate pilot testing, and begin transition of prevention and detection methodologies and tools for insider threat/ espionage. * Transition CERT Forensics tools and technologies.					
Software Engineering Technical Practices (Research, Technology, and Systems Solutions - RTSS) *Also Includes IRAD dollars *FY 2009 Accomplishments:* * Developed a model to determine the benefits of architectural refactoring by correlating change propagation cost to change history (paper to be published).	9.869	13.351	13.223	0.000	13.223

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
* Made modifications to system and Systems of systems (SoS) architecture evaluation methods to accommodate enterprise architecture, and developed a body of anecdotal evidence supporting their effectiveness (applied in customer setting). * Completed an Architecture Competence Reference Model and an associated diagnostic instrument, which can be used to assess the architecture competence of organizations. * Developed an approach for “equation-carrying models’ to be used in the model-based engineering of real-time systems. * Investigated how a “gated” DoD acquisition community can be incentivized to behave like the open source software community and how modularity can provide a catalyst for innovation in this community (white paper written). * Developed linear decision diagrams (LDD) and large-block predicate abstraction for software, both of which combine scalable model checking and static analysis to reason efficiently about the runtime behavior of software (papers published). * Indentified challenges of SoS requirements engineering and developed an initial approach to address these challenges (report published). * Completed SMART transition guidance consisting of process and activity descriptions, questions to elicit data, templates for each of the outcomes, licensing guidelines, and reports describing the process. * Defined a set of Governance and Acquisition methods for SoS. These methods are designed to be ultimately integrated with engineering practices for SoS. * Completed an analysis of the software assurance landscape, including key players and their relationships (paper published). *FY 2010 Plans:* * Investigate architecture approaches for self-regulating and self-adapting behavior in ultra-large-scale (ULS) systems. * Develop an integrated approach for quality attribute specification and evaluation for software, system, and SoS architectures.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
* Develop materials suitable for educating executives and high-level managers on the importance of architecture-centric engineering. * Investigate an approach for quantitative impact and tradeoff analysis among dependent quality attributes. * Develop automated support for detecting architectural violations in source code. * Develop preliminary techniques for evaluating ULS architecture from a socio-technical perspective. * Investigate static verification for safety and security problems that crosscut software implementation and design. * Develop a concept demonstration that applies computational mechanism design and swarm theory to address computationally emergent behavior, intended to be applicable to UAVs. * Analyze security threat and vulnerability data leading to preventative or adaptive architecture design strategies. * Investigate techniques for establishing justified confidence in and-to-end quality attribute behavior in networked systems. * Investigate the feasibility and surrounding issues with emerging SoS technologies, such as cloud computing. *Determine architecture principles for service-oriented systems that can be applied to SoS. *Investigate and report on approaches for testing SoSs. * Expand the SMART family to address the enterprise service portfolio and the infrastructure and environment. * Produce case studies showing impediments to achieving justified confidence in the behavior of SoS. * Develop an approach for using evidence to make architecture-centric arguments throughout the development life cycle. *FY 2011 Base Plans:* * Develop analytic foundations and generalized quality attribute theories for architecture-centric engineering. * Develop a scalable approach for applying static verification techniques.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
* Extend architecture analyses for system evolution by using economic theories. * Develop new theories and analytic techniques that accommodate and exploit emerging and potentially disruptive platforms including multi-core, mesh networking, and other developments. * Develop tools and analytic techniques to detect and eliminate potential security vulnerabilities for mission-critical systems. * Produce customer-oriented proof-of-concept prototypes of innovative ACE technologies and system solutions. * Define what architecture specification, design, representation, evaluation, and evolution mean for systems of increasingly large scale. * Conduct applied research in using mechanism design to align various system stakeholders for large scale system development, and in using computational mechanism design for resource arbitration. * Develop and refine methods for architecture evaluation, comparison, design, implementation, evolution, reconstruction, and documentation. * Develop and refine practicable techniques for performing quantitative and qualitative analyses throughout the development life cycle. * Develop standard architecture specification language in support of performing quantitative analyses. * Develop techniques to narrow the gap between architecture and implementation artifacts. * Integrate methods and tools into a life cycle approach and provide bridges to other processes and architecture efforts. * Develop models, measures and improvement strategies for architecture competence. * Develop and mature methods for evolving architectures.					
Software Engineering Management Practices - SEPM *FY 2009 Accomplishments:* * Improved the efficiency of the CMMI Product Suite's usage in order to increase its utility in all sizes of organizations. * Maximized the interoperability of multiple CMMI constellations including CMMI for Development and CMMI for Acquisition due to the blend of activities seen in many DoD and other agencies.	4.768	3.526	3.506	0.000	3.506

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
* Continued to improve the value and integrity of CMMI appraisals. * Supported a series of user workshops to define the requirements for a CMMI Version 1.3. * Continued to improve the understanding of and guidance on High Maturity. * Addressed full certification of SCAMPI Lead Appraisers. * Released new packaging of the Intermediate Concepts of CMMI to improve understanding and implementations of CMMI levels 2 and 3. * Increased auditing of Level 2 and 3 appraisals. * Released the CMMI for Services constellation. * Developed evaluation criteria in support of the Measurement & Analysis Infrastructure Diagnostic (MAID) method. * Conducted a survey on the adoption, use, and quality and performance outcomes of measurement practices and technologies. * Conducted a survey of high maturity lead appraisers regarding their observations and experiences with high maturity measurement and analysis practices. * Conducted two surveys on the state of the practice for measurement and analysis with one focusing on a broad sample of the community and the other targeted on high maturity organizations and practices. * Led US representation on the development of international software and systems engineering standards addressing quality modeling, evaluation, and measurement. * Completed about 25 of 45 change packages for CMMI V1.3. * Conducted background research into the synthesis of modern requirement development methods and text analysis techniques to create a methodology for more effective elicitation and development of system requirements (partially line funded). *FY 2010 Plans:* * Continue stewardship functions for CMMI.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
* Respond to CMMI Steering Group direction on new activities to support user requirements including additional constellations, improvements to appraisals' effectiveness and efficiency, and improved user understandings and implementation. * Release CMMI v1.3, resolving incompatibilities across the existing constellations and improving the definitions of and guidance on the high maturity level Process Areas. * Create CMMI v1.3 SCAMPI Appraisal Method Definition. * Research modeling and analysis techniques to assist organizations with their use within the acquisition and services domains. * Research options to create more efficient CMMI models and appraisal methods that increase their utility yet maintain their integrity. * Research and characterize new areas of practice that should be covered in CMMI (e.g., security, architecture, SoS stakeholder collaboration). * Research factors that enhance/constrain program performance (e.g., requirements volatility) and mitigations. * Research synergies between emerging technologies and CMMI (e.g., agile principles, team management). * Research candidate new high maturity best practices. * Ensure CMMI architecture permits controlled growth and effective use of CMMI models. * Conduct research into the state of the practice for measurement and analysis practices. * Produce a body of knowledge related to the relationship of CMMI and Six Sigma. *FY 2011 Base Plans:* * Adapt Designing Products and Processes using Six Sigma to CMMI-SVC constellation. *Develop course on quantitative techniques for high maturity project management and adapt it to CMMI-ACQ. * Conduct research via surveys and workshops into effective modeling and analysis practices related to services and operations.					
Technology from Non-Traditional Sources	4.953	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: * Program plans for a new start with FY 2009 funding were developed to find, evaluate, and experiment with innovative technologies emerging from non-traditional sources. * Competitively recruited 10-15 of the country's best venture capitalists to serve as consultants on innovative technologies technologies emerging from non-traditional sources. * Conducted five workshops/roundtables etc with active participation from the operator and requirements communities to discover private sector technologies (information, electronics, and devices) that deliver capability at optimum cost to the warfighter. * Completed Navy workshop at SPAWAR to define Navy needs for emerging innovative IT/electronic technologies. * Established a focused effort at NRL to identify and conduct critical experimentation on revolutionary products emerging from non-traditional sources. Effort transferred to Project 783 in 2010 and beyond.					
Accomplishments/Planned Programs Subtotals	26.283	23.634	23.294	0.000	23.294

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Strategic Goals Supported: Improve ability to acquire systems; Value to taxpayer
Existing Baseline: Value to Customer; Contract Billings; Performance and Cost review.
Planned Performance Improvement / Requirement Goal: Average rating of 4 or higher; All costs are allowable and allocable; Less than 5% of programs unsatisfied.
Actual Performance Improvement: 4.33

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Actual Performance Metric / Methods of Measurement: 1-5

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COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P783: *Software Producibility Initiative*	2.773	7.410	7.616	0.000	7.616	7.651	7.688	7.738	7.795	Continuing	Continuing

A. Mission Description and Budget Item Justification

The role of the Software Producibility in major Defense acquisition programs has been steadily increasing. Much of the mission functionality demanded from programs such as F/A-22, JSF, Future Combat System, and many others is embodied in large, complex software systems. Shortcomings in software development often lead to schedule slippage, cost growth, and mission compromises. These shortcomings can frequently be traced to underpowered software development technologies not up to the task of developing the scale and complexity of software needed. Despite the large role of the commercial sector in advancing software technology, there are many key aspects of complex, distributed, robust systems crucial to DoD that are not being addressed directly by commercial technology efforts, as our experience over the past decade shows.

This initiative will conduct integrated program of research from basic through dem-val that advances the state-of-the art in produceability of software for DoD systems, particularly those systems characterized by high complexity, need for robustness, information assurance, real-time performance, and physical distribution. Research and transition efforts will pursue technical goals to (1) meet and ensure mission-critical requirements; (2) control complexities; (3) enable system evolution; (4) ensure seamless interoperability; and (5) model behavior and performance.

Invest in promising software technologies involving (1) specification of complex requirements; (2) correct-by-construction software development; (3) composable and customizable frameworks; (4) high-confidence system software and middleware; (5) system architectures for network-centric environments; (6) technologies for testing, verification, and validation, and (7) modeling and metrics. Additionally, software and systems development researchers would serve as experts to advise ongoing acquisition programs.

Private sector investment has created rapid advances in technology primarily in information technology and related electronic components and devices. Obtaining an early, accurate understanding of the technological advances that are emerging from small, innovative companies has been problematic for the Department of Defense (DoD) due to these types of companies either overlooking or even avoiding federal sales opportunities. Further, once such innovative technologies become commercially available they can be rapidly obtained by insurgents for terrorist actions. DoD needs opportunities to discover emerging technologies, evaluate their potential to fit DoD needs, and where appropriate conduct critical tests of the components or software under DoD conditions. Facilitating early interactions and meaningful information exchanges between the innovative companies and DoD users will accelerate the application of emerging technical solutions to DoD needs, reduce development costs, and avoid potentially disastrous technological surprises from insurgent use of such new technology. Based on workshops and interactions

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with these companies and the DoD acquisition community in 2007 and 2008, the need emerged for funding to support rapid evaluation and test of these technologies that can't be accommodated by the normal acquisition program budget process.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Software Producibility	2.773	2.902	2.965	0.000	2.965

This initiative will conduct integrated program of research from basic through dem-val that advances the state-of-the art in produceability of software for DoD systems, particularly those systems characterized by high complexity, need for robustness, information assurance, real-time performance, and physical distribution. Research and transition efforts will pursue technical goals to (1) meet and ensure mission-critical requirements; (2) control complexities; (3) enable system evolution; (4) ensure seamless interoperability; and (5) model behavior and performance.

Invest in promising software technologies involving (1) specification of complex requirements; (2) correct-by-construction software development; (3) composable and customizable frameworks; (4) high- confidence system software and middleware; (5) system architectures for network-centric environments; (6) technologies for testing, verification, and validation, and (7) modeling and metrics. Additionally, software and systems development researchers would serve as experts to advise ongoing acquisition programs.

FY 2009 Accomplishments:
Continued execution of the Software and Systems Test Track. Completed 2007 research efforts in developing technologies for interoperable systems of systems. Matured business plan for gov/ industry co- investment in research, selected an implementation approach, and initiated the necessary agreements. Matured the SIS Producibility Technology Roadmap, achieved community consensus on priorities and measures. Promoted and monitored usage of the Systems and Software Test Track to provide a place (possibly virtual and not a single physical location) for experimental verification of Software-Intensive Systems Producibility technologies due to their novelty and the potential complexity of the underlying theories. The experimental platforms incorporated software technology

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
to instrument, monitor and test large- scale applications. The experimental platform research included subtasks to conduct large-scale coordination experiments, and developed methods and tools for evaluating aggregate performance of applications. This environment provided a full range of collaborative technology challenges, run-time platforms and applications, experiments, evaluations, and demonstrations. A Common infrastructure enabled control and data flow between both kinds of application components for a distributed environment. The open experimentation environment provided the fundamental reference architecture and underpinnings helping researchers to develop and test their designs as well as facilitates transition of promising technologies into production use. Initiated a research topic in interoperability to address software techniques to improve system of system interoperability. Reviewed previously awarded contracts to develop and transition new methodologies, tools, technologies and techniques that improve DoDs ability to acquire software for large, net-centric warfighting systems of systems. Released a Broad Area Announcement (BAA) with subsequent award for community based technology efforts, such as reusable SW library or populating existing toolsets with domain-specific knowledge for application to a DoD-specific need, such as military avionics, communications, or platform control. *FY 2010 Plans:* Initiate 2-3 new efforts based on mature technology roadmap. Sustain experimentation on the Software and Systems Test Track. Continue DoD-specific community based technology effort awarded in 2008. *FY 2011 Base Plans:* Continue to execute the 2-3 new efforts started in 2010. Sustain experimentation on the Software and Systems Test Track. Initiate a new DoD-specific community based technology effort based on the technology roadmap and results from the 2008-10 efforts.					
Technology from Non-Traditional Sources Transferred from P781 in FY2010 and beyond.	0.000	4.508	4.651	0.000	4.651

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2010 Plans: * Continue and further refine use of experimentation funds to promote technology transfers into the DoD. * Hold a minimum of four workshops. * Perform a survey to identify all successful technology transfers. * Assist in the transfer of five technologies into the DoD. *FY 2011 Base Plans:* Continue workshops and technology assessment.					
Accomplishments/Planned Programs Subtotals	2.773	7.410	7.616	0.000	7.616

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Strategic Goals Supported: Improve ability to acquire systems; Value to taxpayer; Value to taxpayer.
Existing Baseline: Value to Customer; Contract Billings; Performance and Cost review.
Planned Performance Improvement / Requirement Goal: Average rating of 4 or higher; All costs are allowable and allocable; Less than 5% of programs unsatisfied.
Actual Performance Improvement: 4.33
Actual Performance Metric / Methods of Measurement: 1-5

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COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	93.802	73.583	78.244	0.000	78.244	86.662	102.104	94.681	170.325	Continuing	Continuing
P826: *Quick Reaction Fund*	27.496	20.250	28.822	0.000	28.822	32.333	38.204	35.382	109.341	Continuing	Continuing
P828: *Rapid Reaction Fund*	41.748	34.125	49.422	0.000	49.422	54.329	63.900	59.299	60.984	Continuing	Continuing
P829: *Technology Transition Initiative (TTI)*	24.558	19.208	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

Quick Reaction Special Projects (QRSP) Program supports three separate projects that provide rapid funding to expedite new development and transition of new technologies to the warfighter. The projects that are part of the QRSP are the Quick Reaction Fund (QRF), Technology Transition Initiative (TTI), and the Rapid Reaction Fund (RRF). QRSP provides the flexibility to respond to emergent DoD issues and address technology surprises and needs within the years of execution outside the two-year budget cycle.

The Technology Transition Initiative (TTI), authorized by Title 10 and Section 215 of the FY2003 Defense Authorization Act, facilitates the rapid transition of new technologies from the DoD science and technology (S&T) base into DoD acquisition programs. The program addresses the funding gaps that exist between the time a mature technology is demonstrated and the time it can be funded and procured for use in an intended weapons system or operational capability for the warfighter. The TTI program is mandated by Congress and receives high congressional interest. Since the program inception in FY 2003, 71 projects have been initiated and 32 are complete. Of the 32 completed projects, 24 (75%) have successfully transitioned to DoD Acquisition Programs of Record or procurement contracts for operational use and subsequent fielding; exceeding the objective of 30% for demonstration programs (Strategic Objective 4-3, Office of the Under Secretary of Defense, Acquisition, Technology & Logistics (OUSD (AT&L).

The Quick Reaction Fund (QRF) program is focused on responding to emergent needs during the execution years that take advantage of technology breakthroughs in rapidly evolving technologies. Examples of the types of projects that are envisioned include: accelerating promising research that will enable transformation; or will fill critical gaps in DoD acquisition programs and will last no longer than 12 months; or maturation of technologies critically needed by combatant commanders for operations. Typically these projects are on the technology maturity scale where an idea or technology opportunity is proven and demonstrated.

The Rapid Reactions Fund (RRF) objectives are to leverage the DoD science and technology base and those of the other Federal Departments; stimulate interagency coordination and cooperation; accelerate the fielding of capabilities and concepts to counter emerging threats; and provide feedback to the S&T community to

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guide long term developmental strategies. The task force works to anticipate adversaries' exploitation of technology, including available and advanced capabilities. Additionally, the task force works to exploit technology developed outside of DoD in the commercial sector, in academia and international arenas as well as anticipate adversary's application of available and advanced technology. The average length of a RRTO program falls within an 8-12 month range in order to more effectively aid the warfighter. RRF consistently exceeds the transition objective of 30% for demonstration programs (DoD Strategic Objective 4-3). For example, in FY 2009 RRF transitioned 94% of its completed projects to operational use.

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	113.924	107.984	0.000	0.000	0.000
Current President's Budget	93.802	73.583	78.244	0.000	78.244
Total Adjustments	-20.122	-34.401	78.244	0.000	78.244
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	-7.053	0.000			
• SBIR/STTR Transfer	-2.840	0.000			
• Other Adjustments	-3.690	-0.601	78.244	0.000	78.244
• Congressional Distributed Actions	-6.539	-33.800	0.000	0.000	0.000

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2009	FY 2010
Project: P826: *Quick Reaction Fund*		
Congressional Add: *2009QRF0018_Research and Development of Arctic Unmanned System*	1.200	0.000
Congressional Add Subtotals for Project: P826	1.200	0.000
Project: P828: *Rapid Reaction Fund*		
Congressional Add: *Augmented Reality to enhance Special Warfare Domain - "Special Warfare Domain Awareness Technologies (SW-DAT)"*	1.600	0.000
Congressional Add Subtotals for Project: P828	1.600	0.000

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Congressional Add Details ($ in Millions, and Includes General Reductions)	**FY 2009**	**FY 2010**
Congressional Add Totals for all Projects	2.800	0.000

Change Summary Explanation

Note: In FY 2011, Technology Transition Initiative (TTI), resources will be transferred from Quick Reaction Special Projects to PE 0603942D8Z (Technology Transfer and Transition) as part of an effort to more effectively align interwoven program efforts that will benefit management communications, budget justification, fiscal tracking and improve overall program resource management of Technology Transfer and Transition efforts.

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COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P826: *Quick Reaction Fund*	27.496	20.250	28.822	0.000	28.822	32.333	38.204	35.382	109.341	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Quick Reaction Special Projects (QRSP) Program supports three separate projects that provide rapid funding to expedite new development and transition of new technologies to the warfighter. The projects that are part of the QRSP are the Quick Reaction Fund (QRF), Technology Transition Initiative (TTI), and the Rapid Reaction Fund (RRF). QRSP provides the flexibility to respond to emergent DoD issues and address technology surprises and needs within the years of execution outside the two-year budget cycle.

The Quick Reaction Fund (QRF) program is focused on responding to emergent needs during the execution years that take advantage of technology breakthroughs in rapidly evolving technologies. Examples of the types of projects that are envisioned include: accelerating promising research that will enable transformation; will fill critical gaps in DoD acquisition programs and will last no longer than 12 months; or maturation of technologies critically needed by combatant commanders for operations. Typically these projects are on the technology maturity scale where an idea or technology opportunity is proven and demonstrated.

On July 10, 2009, the QRF released the FY 2010 Quick Reaction Fund Call For Proposals Memorandum. As noted in the memorandum, the QRF Program provides Components, Combatant Commanders and Force Providers an opportunity to capitalize on emergent technology and to rapidly field-test promising new technology prototypes that can immediately have an impact on military operations. It should be noted that QRF initiatives are limited to those that will deliver a military prototype application within 6 - 12 months of being funded. Projects funded thus far are generally in the dollar range from several hundred-thousand to several million dollars. The QRF program is focused on selecting proposals that have the potential to address disruptive, catastrophic and irregular technologies. More specifically, initiatives that address the following Interest Areas are of particular interest:

- Base Protection
- Bandwidth and Spectrum Enhancement
- Large Data Decision Aids
- Persistent Intelligence, Surveillance, and Reconnaissance (ISR) — must produce field ready demo within one year
- Potential “Red Team” Activity

It should be noted once again that QRF funded projects are typically considered short term efforts, 12 months or less, and are selected to address emergent needs and fill technology gaps. As such, there are no plans to fund the specific projects listed below in the out years. However, FY 2010 and FY 2011 QRF plans include continuing to indentify and fund new projects that are best equipped to respond to critical operational needs and new technology opportunities.

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
2009QRF0001_Mini-Scan Mirror (MSM) - Ultra-Reliable Infrared Countermeasures Beam Director	1.750	0.000	0.000	0.000	0.000

Prior to the initiation of this project, the Office of the Secretary of Defense-Acquisition Technology and Logistics Aircraft Survivability Joint Analysis Team (JAT) found that there were no Infrared Countermeasures (IRCM) beam directors that were suitable (small, light and reliable) for use with small helicopters. Multiple attempts by several vendors to produce a smaller version of conventional beam directors had demonstrated marginal results.

This effort leveraged the smaller and more reliable micro-magnetically actuated Mini-Scan Mirror (MSM) technology developed for another application by the Army and Navy under Small Business Innovative Research (SBIR) in an effort to develop a "game changer" for IRCM applications.

FY 2009 Accomplishments:

1. Delivered three Mini-Scan Mirrow (MSM) prototypes integrated with fiber coupled and direct coupled versions of the Air Force ATADS IRCM laser.
2. Performed laboratory demonstration of the MSM prototypes which included demonstrating the following:
   a. Minimum detectable spectral irradiance of the MSM Pointer-Tracker Fine Track Sensor (FTS) as a function of the Angle-of-Arrival (AOA)
   b. Far field laser intensity across the 2 pi steradians coverage of the MSM Pointer Tracker
   c. MSM Pointer-Tracker scan and slew-and-settle times when given a pointing vector by the Common Missile Warning System (CMWS)
3. Provided report of results from Highly Accelerated Life Testing (HALT), which included the comments on the claim that MSM can achieve 10,000 hours Mean Time Between Failure (MTBF) in field use.
4. Built and tested the hardware and interface specifications for the MSM.
5. Obtained an independent assessment of the TRL level at the completion of the effort.

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
2009QRF0002_Sensor Fusion Improvement Initiative (SFII) Phase 3	0.675	0.000	0.000	0.000	0.000
The purpose of this project is to evaluate the suitability and performance benefits of introducing Naval Cooperative Engagement Capability (CEC) track quality data and fused sensor environment into the NORAD/NORTHCOM (N/NC) sensor grid. CEC is a proven mechanism for integrating diverse sensors into a common, high fidelity, tracking and engagement system capable of supporting an optimized integrated air picture. Because of its inherent, multi-sensor architecture, and the available base of military sensors already configured for CEC use, it offers an attractive means of enhancing and extending the N/NC sensor grid to include multiple, wide-area feeds, including maritime approach data from naval surface and air units operating ashore or at sea in the tidewater Virginia area supporting the National Capital Region (NCR) Integrated Air Defense System (IADS) mission. The primary goal of this effort was to demonstrate and evaluate options (both RF and Land Line) for the introduction of CEC information into N/NC and theater sensor grids and to assess the degree of benefit provided as determined by operations teams within the Combative Command. *FY 2009 Accomplishments:* • Developed and demonstrated in a live environment CEC-N/NC integration prototype (both hardware and software components). • Developed hardware and software specifications and requirements needed for transition to USAF Air Combat Command (ACC) for BC3 program and US Army PEO Missiles and Space for the Joint Land Attack Cruise Missile Defense Elevated Netted Sensor (JLENS) program. • Provided Monthly Progress Reports/Congressional Report/Quad Chart/Program Briefing/After Action Summary/Obligation and expenditure documents. • Developed CONOPS/TTP's for CEC integration into N/NC sensor grid architecture. • Developed an operational "surge" capability to increase surveillance for the NCR IADS mission.					
2009QRF0003_Dogstar (Command Control and Protection of Communications Systems C2CS Protect)	2.400	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Prior to the initiation of this project, the JTF/CoCOM lacked real time situational awareness of critical Cyber resources and means to insure essential C2 functions were available to support C2 of operations. This project used sensors, data fusion tools, and additional security networks as a means to address this issue. *FY 2009 Accomplishments:* Installed advanced network sensors and data correlation tools with respect to Cyber resources; reported lessons learned and measures of effectiveness, which demonstrated a reduction in response time and an improved situational awareness posture; and provided status reports and quad charts.					
2009QRF0004_Rover Compatible SmartCapture Video for Close Air Support Provided a compact, high-quality digital video/voice/data capture and encoder device (called MilSmartCapture), which is Rover compatible, for Close Air Support. This effort permitted rapid dissemination of sensor video to commanders and warfighters for battlefield decision-making. Developed and delivered 20 military grade devices. *FY 2009 Accomplishments:* Delivered military grade 20 MilSmartCapture devices; delivered Quad Charts and status reports.	0.197	0.000	0.000	0.000	0.000
2009QRF0005_Vigilant Sentinel Prior to the initiation of this project, no missile warning system existed that could detect the launch of a shoulder launched missile with high probability of detection and low false alarm rate at an affordable cost. This project completed the development of COTS VIS/NIR electro-optical based system operating in real-time on a Field Programmable Gate Array Processor to detect the launch of a shoulder-launched, Man Portable Air Defense System (MANPADS) with high probability of detection and low false alarm rate.	0.950	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: Fabrication, integration, and testing of a Vigilant Sentinel missile warning system along with the supporting documentation. The end result is that the Vigilant Sentinel Missile Warning System uses Visible/NIR sensors, field programmable array processors and innovative algorithms to provide a complete missile defense at affordable costs when combined with a low cost countermeasure.					
2009QRF0006_Standoff Terahertz Human Threat Identification (Phase II)	2.300	0.000	0.000	0.000	0.000
The goal of this effort was to develop an advanced sensor using terahertz (THz) radiation that can detect trace residues of explosives embedded on the hair, skin, and clothing of humans at standoff distances. The objectives of the 3-year Lincoln effort included the following: 1. Measure and characterize trace explosive residues in the hair, skin and clothing of bomb handlers. 2. Assess the feasibility of THz radiation for sensing trace explosives on humans. 3. Build a prototype THz sensor with 20 m standoff range, and with sensitivity sufficient to detect trace explosives embedded in the hair, skin and clothing of humans. 4. Assist the transfer of technology developed under this effort to industry for productizing the instrument for field use. *FY 2009 Accomplishments:* Accomplishments included: I. Phenomenology - Reported the following: a. Reported on explosive residue amounts, their persistence and temporal evolution in hair of bomb-handlers. b. Reported on HE signature analysis on hair and clothing samples from theatre. II. THz Ladar Test Bed - demonstrated the following: a. High power, broadband THz source: 0.5 mW,¬ 0 – 2 THz,					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
b. Low-noise, room-temperature THz receiver: NEP = 40 fW/Hz1/2, 0 – 2 THz c. THz upconversion spectrometer: 0 – 2 THz d. Standoff trace detection system capable of detecting 8 ☐g/cm2 of explosive residue at 5 m					
2009QRF0007_Angle of Attack Transmitter (AOAT) Probe Torque Tester The objective of this project was to fabricate and demonstrate the utility of a prototype, on-aircraft tester for the angle-of-attack (AOA) probe for the F/A-18 E/F. Prior to the start of this project, AOA probes were functionally checked by hand during aircraft preflight checks. This method provides inconsistent results leading to mission aborts. The ability to detect a failure prior to launch will reduce mission abort rate and help reduce the hazard probability associated with a stuck or binding AOA probe. *FY 2009 Accomplishments:* The following deliverables were provided: 1. Four prototype AOA probe torque tester devices. 2. Test plan and report documenting the results of lab and field testing results. 3. A drawing package suitable for use in manufacturing further torque testers. 4. Calibration procedures. 5. User Manual. 6. Status Reports. 7. Quad Chart s 8. Program Briefings. 9. After Action Summary.	0.162	0.000	0.000	0.000	0.000
2009QRF0008_Mobile Active Targeting Resource for Integrated eXperiments (MATRIX) field demonstration vs. Unmanned Aerial Vehicles (UAVs) The objective for this program was beam control, fire control, and targeting development and enhancements for Airborne Tatical Laser (ATL). Secondary goals included the research and development of a mobile testbed (in a ground or aircraft or future aircraft pod-mounted configuration)	0.750	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
for the operational assessment of active and passive trackers, sensors and system components in the development of tracking, discrimination, targeting and progapation of laser beams and of sensor fusion algorithms and concepts. *FY 2009 Accomplishments:* 1. Development of beam control/fire control for tactical high energy lasers (HELs) 2. Developed testbed (ground and airborne) for assessment of sensing schemes. 3. Evaluation of tracking, discrimination and targeting algorithms for tactical HELs, surveillance and situational awareness missions. 4. Test reports, Quad Charts, Status Reports were delivered.					
2009QRF0009_Micro Air Vehicle (MAV) for Enhanced Support of Cave Detection, Attack Planning, Battle Damage Assessment, and Mission Planning This effort included the integration of COTS components with minimal hardware and interface development resulting in a Small Unmanned Aircraft System (SUAS) for use by ground-based troops to provide enhanced capabilities for detection, characterization, and attack planning with respect to enemy cave targets. *FY 2009 Accomplishments:* Provided an operational demonstration and delivery of a working prototype that included using on-board imaging (video, and still EO & IR) and positional (GPS, IMUs) sensors that were downlinked to the MAV's Ground Control Station (GCS). Additionally, deliverables such as Status Reports and Quad Charts were provided.	1.909	0.000	0.000	0.000	0.000
2009QRF0011_Fuel-Cell-Based Squad Battery Charger The DoD and virtually all branches of the US military will benefit from the portable logistical battery charger and APU based on fuel cells operating on hydrocarbon fuels. High-performance portable	2.020	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
power has been identified as critical in all areas of the military and has the potential to significantly improve portable device performance in terms of weight, cost, run duration and operational capabilities. The electronic requirements for soldier power and battlefield equipment are increasing rapidly, and in many cases, battery technologies are unable to effectively meet demands for extended mission duration and other requirements. The solid oxide fuel cell (SOFC) power systems can provide lightweight, clean, quiet and efficient power for a range of critical portable military missions and devices. This program targeted operation with prepackaged kerosene fuel with exceptionally high energy density and will serve as the basis for future upgrades to run JP8 directly (with future materials improvements). These new power sources will allow the DoD to ship and store fewer batteries and reduce the cost of fuel per watt-hour of energy delivered to the battlefield. Specific advantages include: • Lighter mission weight. For a 3-day, 125 W average power mission, the fuel cell battery charger system, along with rechargeable batteries, is expected to be up to 60% lighter. This represents a 31 kg (68 lb) savings for this mission. For missions where the fuel cell powers equipment directly, the weight savings could be 80% or more. • Lower cost. Equipping six soldiers for a 3-day, 20 W average per soldier mission requires nearly $6,000 in batteries. 72 hours of fuel for the fuel cell costs under $10. Over the expected 2,000 hour lifetime of the charger, the expected savings in primary batteries could exceed $160,000 per unit. *FY 2009 Accomplishments:* Developed and delivered two Fuel Cell Power Systems. Delivered Status Reports and Quad Charts.					
2009QRF0012_Industrial Implementation of Environmentally Friendly Nanometal Electroplating Process for Cadmium and Chromium Replacement using Low Cost Pulse Current Power Supplies	0.500	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Nanostructured Co-based and Zn-based alloys are emerging as viable alternatives to hazardous Chromium and Cadmium plating processes, respectively. While the fundamental process operating windows, related material properties and demonstration/validation testing for the nanostructured coatings are being addressed in various development projects (SERDP and ESTCP projects), a key consideration that is not being addressed in these projects that will help ensure the widespread adoption and implementation of the technology in the DoD and general industry is access to high power output, low-cost pulse plating power supplies. The main objective of the proposed effort is to develop 100kW and 200kW power supplies capable of producing direct current and low frequency pulse and pulse reverse current and to demonstrate that the nanostructured cobalt and Zn-based plating processes are not affected by the new design of these power supplies. The successful completion of the proposed effort is expected to result in alternative technologies for cadmium and hard chrome coatings that provide enhanced material performance and eliminate the need for the toxic and hazardous Cd and Cr6+ electroplating baths. The nanocrystalline coatings would allow for the retention of numerous benefits associated with Cd and Cr coating technologies (i.e., non-line-ofsight application, excellent adhesion, dimensional consistency and superior surface finish) and allow for the use of existing DoD plating infrastructure. This will significantly reduce the time and cost to practical					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
implementation. Implementation of these coating on aircraft and defense related components should lead to improved performance and lower life-cycle costs thereby improving the overall effectiveness of the war-fighter. *FY 2009 Accomplishments:* In addition to demonstrating that the nanostructured coatings can provide adequate performance and producibility the following was also provided: 1. Monthly Financial Reports. 2. Quarterly Progress Reports providing summaries of technical progress on the project for the preceding quarter which also noted any milestones completed and if there are any technical issues affecting the project. 3. Interim Progress Reports. Two Interim Progress Reports were submitted to the ESTCP Weapons Systems and Platforms Program Manager, one at the end of Phase I and one at the end of Phase II of the project. The first report will described the work done on the project from inception to the completion of Phase I and the second will describe work done on the project from the completion of Phase I to the completion of Phase II. 4. Final Report. A final report was submitted to the ESTCP Weapons Systems and Platforms Program Manager at the completion of the project and described in detail all work done in the project from inception to completion.					
2009QRF0013_Computational Research and Engineering Acquisition Tools and Environments (CREATE) Meshing and Geometry Module Development a. The objective of the CREATE program was to develop and deploy new physics-based computationally based engineering (CBE) software tool sets for DOD acquisition programs to use to design, test, and evaluate aircraft, ships and antennas. These software tools will run on current high	0.850	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
performance computers (super-computers) and ultimately on next-generation (N/G) super-computers. Successful completion of this multi-year project will enable the acquisition engineering community to (1) identify design defects and correct them early in the design process before major schedule and budget commitments are made, (2) use live tests to validate a mature design rather than identify the problems in an immature design, and (3) replace experimental prototypes with computational prototypes that can be constructed much more quickly and cheaply. b. The objective of the meshing and geometry project (MG) is to satisfy the need for geometric and meshing models that can be used with multiple software programs and that have a high degree of accuracy. Currently, methods for rapidly generating the required accurate geometries and numerical grids and meshes generally do not exist. The multi-year MG project will produce a comprehensive and integrated set of geometry, meshing and associative attribution software capabilities needed to support computationally-based software tool applications for antennas, ships, and aircraft. These improved techniques for rapid, accurate and scalable generation of analyzable representations for use by CBE tools will provide useful and timely information for making acquisition decisions and developing designs. Phase one of the project will develop a detailed software development plan, a core-architecture design, and identify the attributes for the geometry and meshing software modules needed to support the higher fidelity analysis tools for CREATE and DOD avionics, ships, and antenna acquisition engineers and software developers. *FY 2009 Accomplishments:* a. Provided a documented detailed software development plan. b. Provided a meshing and geometry core-architecture design document. c. Provided Application Program Interfaces (APIs), documentation and skeleton implementation plans for the geometry, mesh and attribution modules of the core Meshing-Geometry infrastructure to CREATE projects.					
	0.400	0.000	0.000	0.000	0.000

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2009QRF0014_Computational Research and Engineering Acquisition Tools and Environments – Aircraft (CREATE-AV) Kestrel Project					
a. The objective of the CREATE-AV project is to develop and deploy new physics-based computationally based engineering (CBE) software tool sets for DOD acquisition programs to use to design, test, and evaluate aircraft weapon systems and modifications. These software tools will run on current high performance computers (super-computers) and ultimately on next-generation (N/G) super-computers. Successful completion of this multi-year project will enable the acquisition engineering community to (1) identify design defects and correct them early in the design process before major schedule and budget commitments are made, (2) use live tests to validate a mature design rather than identify the problems in an immature design, and (3) replace experimental prototypes with computational prototypes that can be constructed much more quickly and cheaply.					
b. Kestrel is the sub-project of CREATE-AV that will address the objective of simulating full fixed wing aircraft carrying stores at realistic flight conditions in the subsonic, transonic, and supersonic flight regimes. The objectives of the first phase of the project were: 1. Identify which functions of existing legacy systems provide prototypes for future software modules. 2. Initiate development of the software architecture to link usable legacy models and features together. 3. Develop new software modules for the aircraft trim and engine thrust models.					
FY 2009 Accomplishments: Accomplishements included: a. Submitted report that provides top-level architecture structure to integrate usable legacy code and computer models. b. Provided codes and supporting software module documentation for an aircraft trim computer model. c. Provided codes and supporting software module documentation for an engine thrust computer model. d. Provided report of results of analysis of usable legacy codes that can be incorporated into the next generation code development.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
e. Submitted report that provides results of initial efforts to link software modules and recommendations for future linkage efforts.					
2009QRF0015_SHADOW-Ops Project SO2009-1 - Small Tactical Unmanned Aerial System (STUAS) – Aerodynamic Development for Performance and Flying Qualities Analysis	0.050	0.000	0.000	0.000	0.000
a. The objective of the Computational Research and Engineering Acquisition Tools and Environments – Aircraft (CREATE-AV) project was to develop and deploy new physics-based computationally based engineering (CBE) software tool sets for DOD acquisition programs to use to design, test, and evaluate aircraft weapon systems and modifications. These software tools will run on current high performance computers (super-computers) and ultimately on next-generation (N/G) super-computers. Successful completion of this multi-year project will enable the acquisition engineering community to (1) identify design defects and correct them early in the design process before major schedule and budget commitments are made, (2) use live tests to validate a mature design rather than identify the problems in an immature design, and (3) replace experimental prototypes with computational prototypes that can be constructed much more quickly and cheaply. b. One sub-project within CREATE-AV is Shadow-Operations (Shadow-Ops). The FY09 Shadow Ops objectives are to work with the acquisition engineers in selected DOD program offices to address current problems using existing computational engineering tools and to identify and understand acquisition programs requirements for NG software tool development. The Shadow-Ops teams provide computational tools to solve acquisition engineering problems and provide the acquisition engineers with hands on involvement in how to use these tools. This approach has twin benefits in that it (1) provides CREATE with needed information as to which legacy functions are valuable and (2) provides the acquisition engineering community immediate support and experience to enable better and faster responses. c. Naval small Unmanned Aerial Vehicles (UAVs) have limited data from Computational Fluid Dynamics (CFD) analysis, wind tunnel testing and/or flight testing. The CREATE-AV SHADOW Ops Small Tactical Unmanned Aerial System (STUAS) – Aerodynamic Development for Performance and Flying Qualities Analysis effort will complete generation of an aerodynamic database to be used in					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
simulation tools for engineering analysis and evaluation of flight worthiness and finalize/document a standard process for future CFD aerodynamic database generation to be used in flight dynamics and performance engineering evaluations during early phases of the DoD acquisition process. This will reduce risk in flight dynamics and performance assessments for flight worthiness certifications during initial flight test programs and provide enhanced aerodynamic data to be used in flight clearance assessments and modification assessments for small UAVs. *FY 2009 Accomplishments:* The following accomplishments/deliverables were realized: a. Performed CFD analysis of the process development configurations. b. Provided the aerodynamic model/database of the small UAV and incorporated it into a NAVAIR simulation environment (CASTLE) in the Function Table Lookup format. c. Submited a report of the results of the CFD analysis of STUAS/Tier II (to include lessons learned and elements that can be incorporated into the next generation software.					
2009QRF0016_CREATE AV SHADOW Ops Project SO2009-2: Advanced Performance Analysis of Unmanned Combat Aerial Systems (UCAS) and Unconventional Configurations a. The objective of the Computational Research and Engineering Acquisition Tools and Environments – Aircraft (CREATE-AV) project was to develop and deploy new physics-based computationally based engineering (CBE) software tool sets for DOD acquisition programs to use to design, test, and evaluate aircraft weapon systems and modifications. These software tools will run on current high performance computers (super-computers) and ultimately on next-generation (N/G) super-computers. Successful completion of this multi-year project will enable the acquisition engineering community to (1) identify design defects and correct them early in the design process before major schedule and budget commitments are made, (2) use live tests to validate a mature design rather than identify the problems in an immature design, and (3) replace experimental prototypes with computational prototypes that can be constructed much more quickly and cheaply.	0.050	0.000	0.000	0.000	0.000

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b. One sub-project within CREATE-AV is Shadow-Operations (Shadow-Ops). The FY09 Shadow Ops objectives are to work with the acquisition engineers in selected DOD program offices to address current problems using existing computational engineering tools and to identify and understand acquisition programs requirements for NG software tool development. The Shadow-Ops teams provide computational tools to solve acquisition engineering problems and provide the acquisition engineers with hands on involvement in how to use these tools. This approach has twin benefits in that it (1) provides CREATE with needed information as to which legacy functions are valuable and (2) provides the acquisition engineering community immediate support and experience to enable better and faster responses. c. The CREATE-AV SHADOW Ops Advanced Performance Analysis of UCAS and Unconventional Configurations effort will provide the CREATE-AV conceptual design (CD) project information regarding the interaction between higher fidelity computational fluid dynamics (CFD) analysis and lower fidelity CD. It will also continue analysis of N-UCAS models to increase the fidelity of the maximum lift conditions and pitch control for the carrier landing analysis and identify requirements for smooth (CFD) analysis to support CD in a timely manner. *FY 2009 Accomplishments:* a. Reported on analysis of Next Gen Tactical Fighter alternatives. b. Provided optimization and final aero analysis and optimized grid documentation and computations. c. Status reports and quad charts.					
2009QRF0017_CREATE-AV SHADOW Ops Project SO2009-3 - Joint Heavy Lift (JHL) Concept Refinement a. The objective of the Computational Research and Engineering Acquisition Tools and Environments – Aircraft (CREATE-AV) project was to develop and deploy new physics-based computationally based engineering (CBE) software tool sets for DOD acquisition programs to use to design, test, and evaluate aircraft weapon systems and modifications. These software tools will run on current high performance computers (super-computers) and ultimately on next-generation (N/G) super-computers.	0.050	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Successful completion of this multi-year project will enable the acquisition engineering community to (1) identify design defects and correct them early in the design process before major schedule and budget commitments are made, (2) use live tests to validate a mature design rather than identify the problems in an immature design, and (3) replace experimental prototypes with computational prototypes that can be constructed much more quickly and cheaply. b. One sub-project within CREATE-AV is Shadow-Operations (Shadow-Ops). The FY09 Shadow Ops objectives were to work with the acquisition engineers in selected DOD program offices to address current problems using existing computational engineering tools and to identify and understand acquisition programs requirements for NG software tool development. The Shadow-Ops teams provide computational tools to solve acquisition engineering problems and provide the acquisition engineers with hands on involvement in how to use these tools. This approach has twin benefits in that it (1) provides CREATE with needed information as to which legacy functions are valuable and (2) provides the acquisition engineering community immediate support and experience to enable better and faster responses. c. The CREATE-AV SHADOW Ops Joint Heavy Lift (JHL) Concept Refinement effort completed a conceptual design process for rotary wing configurations. This will provide increased capability to acquisition engineers working with heavy lift aircraft to analyze modification and new design options more quickly. Specifically, the effort will improve aerodynamic description of government design with high-fidelity CFD correlation and provide an enhanced toolset to leverage high-fidelity aerodynamic analysis in preliminary design. *FY 2009 Accomplishments:* a. Provided a report on lessons learned on using the JHL database for valuation of candidate configurations. b. Provided a report on HETR geometry sensitivity analysis results. c. Developed and documented a conceptual design process for rotary wing configurations.					
2009QRF0019_Agile Logistics for Robotics	4.000	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Robotics capabilities are becoming increasingly important in supporting operations associated with asymmetric conflicts. The use of robotics technologies can save lives, reduce costs, and equip forces with new paradigm shifting capabilities. This effort built on previous research and development work needed to advance robotics material handling capabilities. Specifically an unmanned forklift was developed and demonstrated that can operate in semi-structured environments including tactical supply support activities and ammunition storage/holding areas. This work will assist Soldiers in receiving assets, loading and unloading of bulk sustainment commodities and movement to/from bulk storage or unit pick up areas. Robotic material handling equipment can be a force multiplier; improving throughput, customer wait times, and reducing logistics footprint. *FY 2009 Accomplishments:* The primary deliverable was a robotic a proof-of-concept demonstration of an autonomous forklift handling palletized and below pallet loads under human direction. The fundamental capability underlying the demonstration scenario was for the robotic forklift to approach and lift a human-indicated pallet, safely transport the pallet over uneven terrain to a human-specified location, place the pallet at the location, and withdraw.					
2009QRF0020_Thin Disk Ultra Short Pulsed USP) Laser Technology Demonstrator USP Lasers have been demonstrated to have unique effects against military targets of interest. Field testing using a U.S. Navy Transportable Demonstrator System provided by Applied Energetics (AE) has confirmed the effectiveness of USP lasers against specific targets of interest. This effort will produce a demonstration laser system specifically designed to further explore these effects, determine requirements for deployment on U.S. Navy and U.S. Marine Corps aircraft, and be of an architecture that is traceable to producing a “pod mounted” system for installation on a test aircraft. *FY 2009 Accomplishments:* Designed, built, and delivered a multi-mJ USP laser seed source and regenerative amplifier at the base wavelength of 1 micron in an enclosure suitable for use in testing at a customer test facility.	1.300	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
The hardware delivered did not include launching optics for the customer testing. Integration with Government provided launching optics and field test support occurred under a subsequent contract.					
2009QRF0022_Vehicle Power and Energy Coating Technology Demonstration – Phase II	1.000	0.000	0.000	0.000	0.000
The DoD is seeking unique power and energy technologies that can increase fuel efficiencies of their vehicles. It is well known that reducing friction in vehicle systems provide an increase in system efficiency. In addition, if a technology can provide additional wear resistance over the baseline systems, life cycle costs can be reduced. A wear resistant, lubricious surface treatment on engine and powertrain components is expected to enable a gain in fuel efficiency of 5% or more. The Army Research Lab Materials Directorate (ARL), UCT Defense (UCTD), and Crane Cams partnered in Phase I to apply and test Nickel Boron-coated ring and pinion gears on an instrumented commercial SUV. Through dynamometer and road tests, the project demonstrated that the coated gears provided a significant performance benefit when compared to baseline gears. The results included a fuel efficiency gain, a 19HP power gain, and a peak torque increase of 21 ft-lbs. The Contractor will apply and test Nickel Boron coatings to High Mobility Multi Wheel Vehicle (HMMWV) and other light duty fleet vehicle ring and pinion components to further demonstrate improvements to fuel efficiency, durability for severe and tactical driving conditions (damage and wear tolerance), improvements to torque delivery (pulling power), and improvements to horsepower delivery (top speed). This will demonstrate the wide applicability and impact this coating can have for the DoD's vehicle fleet. This is a continuation of Phase I efforts focused on fuel efficiency gains realized from Nickel Boron coated ring and pinion components. *FY 2009 Accomplishments:* The following accomplishments were realized:					

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	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Task 1: The Contractor determined the optimum and proper lubrication for Nickel Boron coated ring and pinion gears that result in the lowest parasitic power loss due to friction, viscosity, and heat build-up without compromising the proper function of the lubricant. Analysis and measurement of critical lubricant qualities will be performed.					
Task 2: The Contractor performed dynamometer testing of coated gears to measure horsepower, torque, coast horsepower, and lubricant temperature profiles.					
Task 3: The Contractor teamed with an outside test center to perform durability and accelerated life tests using HMMWVs with on optimally coated ring and pinion gears. This full scale testing determined the wear resistance and fuel economy improvements achieved by using the Nickel Boron coating in standard driving conditions. The Contractor also performed baseline tests with standard uncoated ring and pinions on all tests for comparison and quantification of changes realized by coating these components with Nickel Boron.					
Task 4: The Contractor determined the maximum survivability of coated ring and pinion gears when lubrication is lost, simulating the emergency use of a damaged differential (loss of lubricant) under tactical driving conditions.					
Task 5: The Contractor defined the optimal coating process through use of Failure Mode Effects Analysis (FMEA), Root Cause Analysis (RCA), and Process Flow determination to begin transitioning the application from development to pre-production readiness.					
Task 6: The Contractor developed a production readiness package to define the equipment and processes required to transition this application to production with high technical readiness and manufacturing readiness levels (TRL, MRL).					
The contractor provided the following deliverables:					

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B. Accomplishments/Planned Program ($ in Millions)

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• Monthly progress reports. • Test Plan for Army approval • Test results from all trials. • A production readiness package that enables transition from development to production. • A final report. • All coated components and a description of the coating parameters used to coat the components.					
2009QRF0023_Minimally Manned Force Protection (M2FP)	0.975	0.000	0.000	0.000	0.000

This effort provided enhanced force protection for small teams and expeditionary units working in contested areas and reduced the number of personnel required for monitoring surrounding area allowing them to focus on mission responsibilities.

USSOCOM has the requirement to protect minimally manned base camps during contingency operations in remote contested areas. This system has the ability to network, integrate and manage various sensor systems including the SPIDER EO/IR camera detection system, the DRS Squire Radar, and several unattended ground sensors. This is accomplished through a universal translator, allowing a single operator to manage all the different sensors and alert devices. The system can be locally or remotely monitored, and has the potential to trigger text messages when required.

FY 2009 Accomplishments:

This effort combined technical integration (machine-to-machine translation software and interfaces) and operational integration (development of graphical user interface, a common operating environment, and tactics, techniques and procedures (TTP) for employment and use of the system). This system supports force protection in a minimally (U.S. Forces) manned operating base. This result of this effort resulted in a reduction of the number of video displays and controls, as well as the number of personnel needed to monitor and operate the system, while allowing the personnel to effectively monitor a large training facility in a potentially contested environment.

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Deliverables included: • Provided an integrated system using a common language to feed into a universal translator routed through servers to the main Common Operating Picture (COP) or wirelessly to any capable wireless device. • 2 Servers with ancillary cables and switches. • 2 Server racks with Air conditioning packages • 2 Large screen monitors • 1 SPIDER (EO/IR camera/detection system) with ancillary cables and switches • 1 DRS Squire Battlefield radar with ancillary cables and switches • 40 Unattended ground sensors (UGS)					
2009QRF0024_High Temperature Incendiary Fireball For Facility and HDBT Detect Military forces continue to have limited options when dealing with nuclear, chemical and biological weapons of mass destruction stored in hard and deeply buried targets (HDBT's). This project leverages a technology developed for HDBT air dropped munitions by The defense Threat Reduction Agency (DTRA) and apply them to man portable devices that can be employed by military forces in the field. *FY 2009 Accomplishments:* Will completed a feasibility assessment, design, and technical approach for man-portable high temperature incendiary defeat technology. The final product delivered will be one or more HTIF designs capable of destroying facilities and CW, BW, and NW agents and stores in HDBTs.	0.500	0.000	0.000	0.000	0.000
2009QRF0025_AN/TPS Radar Weather Processing Capability (TWPC) The project objective is to meet a USAF Central Command (USAFCENT) warfighter operational need for a common networked weather radar sight picture across USCENTCOM Area of Operations (AOR) to enhance safety of flight using the AN/TPS-75 (TPS-75) radars currently in theater. The intent of this effort is to mitigate unnecessary risks associated with mission-impacting weather and to provide more time for decision-makers to take required actions (e.g., adjust combat operations or safeguard combat	0.525	0.000	0.000	0.000	0.000

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	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
resources). USAFCENT/A3W estimates 1-2 sorties per year are involved in some level of aircraft mishap which could be avoided with better weather surveillance. Use of existing deployed TPS-75 defense radars will eliminate the need to purchase and deploy additional radars to provide the same data. *FY 2009 Accomplishments:* At completion of this project the following accomplishments will have been realized: Feasibility Study, System analysis and design, Test plan and procedures, Test report that contains verification methods and results of system testing, WEC prototype system, Follow-on contract plan, costs, and timelines to modify up to eight currently deployed TPS-75 radars in the AOR.					
2009QRF0026_Hostile Fire Identification (HFI) using the AAR-57, Common Missile Warning System (CMWS) The proposed action will provide a Hostile Fire (HF) detection capability through the Gen 3 Electronic Control Unit (ECU) scheduled for fielding on the existing Common Missile Warning Systems (CMWS) already installed on the USSOCOM MH-47G and MH-60M rotary wing aircraft. Small arms fire is the most prolific threat to Special Operations rotary-wing aviation and no current capability exists to alert the aircrew to the presence of hostile fire directed at the aircraft. Currently available data suggests when a crew is alerted to the presence of hostile fire survivability increases significantly. The proposed HFI capability will enable the aircrew to employ Tactics, Techniques, and Procedures (TTP) to evade or conduct counter-fire operations and will significantly improve aircrew and aircraft survivability and mission success. Due to the timing of the award, funding will be split between FY09 and FY10 in order to cover the cost of the effort. *FY 2009 Accomplishments:* BAE Systems will provide and sustain two fully operational Gen3 ECUs with User Data Modules (UDMs) and reprogramming accessories for the duration of the Period of Performance (PoP), which will be delivered to the Government at the end of the effort. BAE Systems will provide CMWS	1.850	0.750	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Operational Flight Program (OFP) including HFI software algorithms, Performance Specification, Software Version Description/Version Description Document (SVD/VDD), SIL, and SIT test plans and reports, and live fire test reports. *FY 2010 Plans:* This project, which received an initial increment of funds in FY09, will receivce the remainng funds that were agreed upon in FY10.					
FY 2009, FY 2010, and FY 2011 Funding Some FY 2009 funds remain uncommitted to allow coverage of new starts throughout the fiscal year. Funding decisions are made throughout the execution years in response to emergent COCOM and service requirements, new threats, and new opportunities. QRF projects are typically limited to 12 months or less, but start at different points within a fiscal year. As such, outyear projects are unknown until shortly before the start of a new fiscal year. With this in mind, FY 2010 and FY 2011 projects are not listed; as they have not been identified as of the time of this update. *FY 2009 Accomplishments:* Some FY 2009 funds remain uncommitted to allow coverage of new starts throughout the fiscal year. Funding decisions are made throughout the execution years in response to emergent COCOM and service requirements, new threats, and new opportunities. *FY 2010 Plans:* At the time of this update, only a small portion of 2010 funds were actually available and are in the form of CRA funds. Additionally, FY 2010 Projects have not been identified at the time of this update. As noted above, Funding decisions are made throughout the execution years in response to emergent COCOM and service requirements, new threats, and new opportunities. QRF projects are limited to	1.133	19.500	28.822	0.000	28.822

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
12 months or less and are typically unknown until after the start of a fiscal year. With this in mind, FY 2010 and FY 2011 projects are not listed; as they had not been identified at the time of this update. *FY 2011 Base Plans:* At the time of this update, only a small portion of 2010 funds were actually available and are in the form of CRA funds. Additionally, FY 2010 Projects have not been identified at the time of this update. As noted above, Funding decisions are made throughout the execution years in response to emergent COCOM and service requirements, new threats, and new opportunities. QRF projects are limited to 12 months or less and are typically unknown until after the start of a fiscal year. With this in mind, FY 2010 and FY 2011 projects are not listed; as they had not been identified at the time of this update.					
Accomplishments/Planned Programs Subtotals	26.296	20.250	28.822	0.000	28.822

	FY 2009	FY 2010
Congressional Add: 2009QRF0018_Research and Development of Arctic Unmanned System *FY 2009 Accomplishments:* This project was established in order to conduct research and development on technologies suitable for application aboard small unmanned aircraft. Work included working with the appropriate Government Agencies to address issues (such as, Detect, Sense, and Avoid capability) which preclude unmanned aircraft from flying in the National Air Space (NAS). Specific areas of focus included: 1. Developing comprehensive standard operational procedures (SOP) for remote and/or arctic small Unmanned Aerial Systems (UAS) deployments and operations. 2. Integrating new payloads onto the UAS airframe and conduct flight test evaluations at the high latitude facilities established in the tasks above.	1.200	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
3. Developed new methods to manipulate the imagery from these new payloads as well as to improve the manipulation of data from existing Electric Optic (EO)/IR payloads. 4. Established arctic flight test areas suitable for experimental testing or evaluation of payload sensors, sense and detect concepts, and operator training. 5. Developed a working understanding of the unique interfaces to integrate payloads into the selected small UAS design architecture through experimentation. 6. Tailored and validated generic risk models (Federal Aviation Administration (FAA) and National Aeronautics and Space Administration (NASA) provided) for UAS flights in civil airspace models for specific high latitude operations. 7. Supported and documented field experiments designed to evaluate the new payloads in real-world high latitude scenarios.		
Congressional Adds Subtotals	1.200	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Including the Congressional Add Project listed above, QRF provided funding to 24 unique projects in FY09. Although each project is unique, all QRF projects were monitored for schedule deviation and transition outcome, as well as for meeting reporting requirements such as periodic status reports, quad charts, financial reporting, and briefing materials. Additionally, some projects were monitored for the delivery of additional deliverables such as test reports, studies, components, and equipment as well.

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COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
P828: *Rapid Reaction Fund*	41.748	34.125	49.422	0.000	49.422	54.329	63.900	59.299	60.984	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Quick Reaction Special Projects Program (QRSP) (Program Element 0603826D8Z) supports three separate projects that provide rapid funding to expedite the development and transition of new technologies to the warfighter: The projects that are part of the QRSP are the Quick Reaction Fund (QRF), Technology Transition Initiative (TTI), and Rapid Reaction Fund (RRF).

RRF is fully executed through the Combating Terrorism Technology Task Force (CTTTF), which was re-designated as the Rapid Reaction Technology Office (RRTO). The CTTTF was stood up to provide rapid response to operations in Iraq, Afghanistan and other theaters in support of the Global War on Terrorism (GWOT) and to accelerate the transition of high-potential science and technology projects into operationally useful products in the execution years. A key focus is to "anticipate" what future Irregular Warfare needs might arise. The dynamics and nature of current conflicts require a venue to prototype new capabilities in anticipation of their potential future need. In FY 2005/2006, CTTTF/RRTO leveraged the DoD science and technology base and those of the other Federal Departments; stimulated interagency coordination and cooperation; accelerated fielding of capabilities and concepts to counter emerging threats; and provided feedback to the S&T community to guide long term developmental strategies. The task force anticipated adversaries' exploitation of technology, including available and advanced capabilities. Additionally, the task force exploited technology developed outside of DoD in the commercial sector, in academia and internationally; as well as anticipated adversary's application of available and advanced technology. In FY2007 RRTO built upon previous experience and pursued projects in: counter cover, concealment and deception in a counter insurgency environment; explored methods and approaches of persistent surveillance stimulation for counterinsurgency; developed alternate power sources for sensors and systems; and expanded human, social and cultural knowledge. In 2008 RRTO focused its projects in the areas of small unit situation awareness, program synchronization, non-kinetic operations, strategic communications, biometrics and forensic applications, persistent surveillance infrastructure, maritime surveillance, small unit dispersed capabilities within specific geographic areas, cross organization / agency sharing , network war concept development and strategic multi-layer assessments. In 2009 RRTO focused its projects in the areas of surveillance system testing, the interface of law enforcement and military operations, strategic communication and influence operations, biometrics and forensics capabilities development, capabilities to support denied area operations, small dispersed unit operations, autonomous system operations, strategic multi-layer assessment and the establishment of an Open Business Cell to facilitate better interactions with small innovative companies that do not normally do business with the DoD. In FY 2011 RRTO will continue to explore new and emerging capabilities to support Irregular Warfare operations. Potential areas for FY 2011 RRTO projects include: FOB protection, persistent surveillance, maritime domain awareness, interface of Law Enforcement and military ops, biometrics and forensics, autonomous operations, operations in cold environments, capabilities to exploit denied areas, strategic communications and multi-layer assessments and nontraditional approaches to leverage innovative businesses. The average length of a Rapid Reaction Technology Office project falls within an 6-12 month range in order to more effectively aid the Warfighter.

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Naval Postgraduate School (NPS) IO Threat - Information Operations (IO) to Defeat Coalition Enemies in OEF This project provides expertise and resources to develop IO plans and educate forward deployed staffs. *FY 2009 Accomplishments:* This project provides direct support to Special Operations units deployed in OEF. A faculty led student seminar has been in continuous and direct contact with the deployed SOF headquarters to develop IO plans to support the campaign against coalition enemies. Specific aspects of this program are classified.	0.400	0.000	0.000	0.000	0.000
Asymmetrical Lasercomm for Unmanned Vehicles The goal of this project was to develop and demonstrate small gimbaled modulating retroreflector (MRR) terminals for high bandwidth free space optical (FSO) communications between a base station and an unmanned vehicle with limited payload capacity. *FY 2009 Accomplishments:* Produced and demonstrated an optical communications system that links an unmanned aerial system (UAS) with a ship or shore platform ground station for downloading covert, free streaming video or stored data.	1.405	0.000	0.000	0.000	0.000
Counter-Motivation Block 1 (CMB1) CMB1 will help create a suppression sphere around areas of ideologically-based extremism and terrorism. The intent is to produce targeted products for young and at-risk audiences in the Muslim world and through those products introduce ideas, content, and communication mechanisms that will reduce radicalization.	0.690	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: This program deployed several independent programs into conflict regions using the latest advances in social media and networking technology. Specific activities are coordinated with USD (Policy Global Engagement Office) and SOCOM's Interagency Task Force.					
Griffin Autonomous Unmanned Surface Vehicle (USV) Project This effort will provide a mission level autonomy system for use with multiple unmanned surface vessels. Algorithms developed in support of this project will enable unmanned systems to execute assigned missions with minimal human intervention. *FY 2009 Accomplishments:* This project developed and installed autonomous command and control systems and integrated associated sensors on two USVs. The unmanned systems cooperatively executed a maritime domain awareness task during the Navy's Trident Warrior excercise.	1.600	0.000	0.000	0.000	0.000
U.S. Naval Academy Tracking Transnational Illicit Networks Using New Methods of Analysis & Communication This project was a collaborative research effort involving midshipmen at the United States Naval Academy who identified and analyzed linkages among transnational criminal networks smuggling drugs and other contraband from Latin America or Africa to jihadist terrorists within Europe or the United States. *FY 2009 Accomplishments:* This project provided junior naval officers, with exposure to new analytic tools, skills and knowledge about real and potential links among criminal and jihadist networks. Information from this program is supporting formal open source intelligence on terrorist and criminal activity.	0.200	0.000	0.000	0.000	0.000
	0.600	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Foliage Penetration Reconnaissance, Surveillance, Tracking and Engagement Radar (FORESTER) Enterprise-Based Exploitation (FEBE) The objective of the FEBE effort was to rapidly develop and demonstrate an automated exploitation tool that processes detections from the FORESTER radar and automatically detects activity, suppresses persistent false alarms and discriminates between people and wildlife. *FY 2009 Accomplishments:* This effort developed algorithms and software that performs automatic processing of FORESTER data to allow non-expert users to rapidly and reliably detect areas of significant activity, while rejecting false alarms and non-threat activity. The project also allows FORESTER operators to discern friendly forces. FORESTER, a DARPA project, will transition to SOCOM.					
Afghan Counter Insurgency (COIN) Web Portal – Program for Culture & Conflict Studies: A Web Gazetteer for the 21st Century This project allowed the expansion and development of materials to include more detailed tribal maps, provincial and district summaries, political and tribal leadership profiles, and security analysis reports. This development work provided relevant research in support of current COIN and reconstruction programs in Afghanistan. *FY 2009 Accomplishments:* This project expanded and developed ongoing research and dissemination of socio-cultural / human terrain information on Afghanistan via an open-source web portal. It provided comprehensive assessments of tribal and clan networks in coordination with ongoing COIN operations and needs. It is used by U.S., NATO ISAF and non-governmental organizations in Afghanistan.	0.200	0.000	0.000	0.000	0.000
Project Anubis	1.300	0.000	0.000	0.000	0.000

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	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
The objective of this project was to develop, prototype, and test Non Line of Sight munitions with man-in-the-loop target ID with very low collateral damage as a proof of concept effort. The ANUBIS capability will give the tactical user an offensive capability against immediate threats. *FY 2009 Accomplishments:* The effort achieved longer range and time of flight as well as more precise lethality against different target sets than currently fielded squad level capabilities. ANUBIS systems are deployed to Afghanistan awaiting an operational demonstration.					
Multiple Heterogeneous Cooperative UAVs Technologies Developing a cooperative multiple UAV system that provides warfighters with capabilities to continuously collect intelligence, conduct surveillance, and perform reconnaissance for mission planning and execution, friendly force protection, and exploitation of enemy weaknesses. *FY 2009 Accomplishments:* The project has performed the necessary tests and refinement of multiple UAVs technologies for operational deployment. In addition, the project has designed and developed a standard multiple UAVs control, sensor fusion, and integrating software system in a compact, deployable unit suitable for a variety of small UAVs. Algorithms developed for this project are also supporting the Griffin project.	0.450	0.000	0.000	0.000	0.000
Smart, Lightweight Infra-Red Polymer Emitters for Vehicle Mounted Identification, Friend or Foe (VMIFF) Supported further analysis of novel lightweight and low cost devices for remote identification using polymer based light emitting diodes (PLED). *FY 2009 Accomplishments:* This effort produced four ruggedized VMIFFs for use in Cobra Gold experimentation and field tested new VMIFFs for remote activation from ground laser target designators (GLTD). The project	0.250	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
demonstrated a significant improvement to be able to detect friendly vehicles at great standoff distances. Additional products are being transitioned to operational use.					
Afghan Virtual Science Library (AVSL) Pilot at Kabul University The pilot Afghanistan Virtual Science Library at Kabul University offered students, scientists and engineer's access to international scientific, engineering, and technical journals and professional resources. Based on this pilot, the U.S. Civilian Research & Development Foundation (CRDF) developed a plan to extend the capacity to other universities and to Afghan government ministries. *FY 2009 Accomplishments:* The pilot project delivered a fully deployed functional website and VSL rollout assisted by key staff members of Kabul University and a project brief to the Afghanistan Ministry of Higher Education.	0.175	0.000	0.000	0.000	0.000
Common Operation Research Environment (CORE) Program The intent of CORE is to leverage evolving analytical technologies to educate the officer corps on how to apply theoretical concepts to the problems of terrorism and irregular warfare. *FY 2009 Accomplishments:* This funding has expanded the Common Operational Research Environment (CORE) Lab's capability by incorporating additional analytical tools. CORE activities include education of students at the Naval Postgraduate School (NPS) and direct support for specific operations. The CORE Program has transitioned to the NPS curriculum. Analysis products generated by CORE students have been used by the operational special operations organizations.	0.355	0.000	0.000	0.000	0.000
Software Reprogrammable Payload (SRP) Electronic Attack (EA) Waveform Development The demo will highlight the ability to port communications and intelligence, surveillance, and reconnaissance (ISR) applications across space and terrestrial domains and deploy aboard various	0.600	0.000	0.000	0.000	0.000

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	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
hardware platforms. Enabled by Government owned intellectual properties to enable sharing of waveforms and applications. *FY 2009 Accomplishments:* Assisted with demonstration and software development to support the application architecture. The capability will give users the ability to change mission applications without having to change hardware.					
Data Aggregation, Analysis, and Visualization for Violent Non-State Actor Networks with Spatial and Temporal Attributes The Institute for the Study of Violent Groups (ISVG) at the University of New Haven will perform technical aggregation and fusion of multi-cultural and multi-lingual data sources to allow for automated discovery of hidden and unseen attributes and relationships between criminal groups, terrorist groups, and extremist organizations. *FY 2009 Accomplishments:* Provided a new data source and analytical capability through aggregation and fusion of multi-cultural and multi-lingual datasets to Special Operations Command Pacific (SOCPAC) and the Joint Interagency Task Force South (JIATF-S) for analyzing and understanding violent non-state actor networks and transnational threats in their areas of responsibility.	0.950	0.000	0.000	0.000	0.000
Defense Analysis Insurgency & Manhunting Projects This work combines the COIN model with decision making tools. Interactive modeling allows users to change parameters, and test new alternate courses of action, that in turn influence the outcome of the insurgency. It also allows the user to test the assumptions of policy decisions. *FY 2009 Accomplishments:* This project built a dynamic model of insurgency that clearly defines the variables, parameters, and relationships that shape the outcome of insurgent competitions. This Naval Postgraduate School	0.415	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
program involves students and supports specific military operations. This program is usd by the Naval Postgraduate School to support US Forces Afghanistan with requests and requirements.					
Intelligence Surveillance & Reconnaissance – Situational Awareness Tool (ISR-SAT) ISR-SAT combines a proven, fully developed and National Geospatial-Intelligence Agency (NGA) validated geo-location technology with an existing integrated situational awareness platform using National Technical Means (NTM) data and mapping. *FY 2009 Accomplishments:* This combined effort provided an improved time critical exploitation and targeting decision process, resulting in actionable intelligence against High Value Targets (HVT). This is operational in NGA.	0.422	0.000	0.000	0.000	0.000
Transitioning From Counterinsurgency to Lesser Forms of Engagement This effort provided recommendations on the procedures and capabilities required to successfully transition from counterinsurgency (COIN) operations to some lower level of conflict, to include police-led operations, peacekeeping and/or the training and equipping of local forces. The objective is to identify specific science and technology areas that could potentially support and enhance the transition from counterinsurgency operations to a lower level of conflict. *FY 2009 Accomplishments:* This research has identified procedures and specific capabilities required by the Department of Defense (DoD) and other U.S. government agencies in order to transition successfully from COIN to sustained stability operations.	0.550	0.000	0.000	0.000	0.000
Mobile Modular Command and Control (M2C2) M2C2 provides on-the-move, over-the-horizon (OTH) communications and digital command and control (C2) capability. The M2C2 systems include an integrated suite of tactical radios, broadband satellite	1.100	0.000	0.000	0.000	0.000

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communications, and staff kits with processor/display hardware, battalion-level tactical applications, secure wireless network connectivity, and tactical intercom. *FY 2009 Accomplishments:* The M2C2 provides an immediate and transitional solution to the long-standing operational force requirement for an OTH Command and Control capability. The M2C2 capability has been installed, tested and delivered in a Cat 1 MRAP vehicle. M2C2 has deployed to Afghanistan with the Marine Corps.					
Joint Urgent Operational Need (JUON) Application for Joint Staff/OSD This project provided continued improvements for the Joint Chiefs of Staff Knowledge Management Decision Support (KM/DS) JUON application, and supported work flow management and improved information sharing within the Rapid Acquisition Community of Interest (COI). As a module of KM/DS, the JUON Application implements workflow management, and a structured feedback process. *FY 2009 Accomplishments:* This initiative has provided greater visibility and control of the JUON process, and has expedited communications and workflow throughout the Rapid Acquisition COI. The end result provides for better JUON and Immediate Warfighter Need (IWN) accountability and more rapid resolution of urgent Warfighter needs. This tool has enabled life saving capabilities to get to the Warfighter faster.	0.400	0.000	0.000	0.000	0.000
Children's Arabic Media for Prevention of Radicalization This project focused on understanding and finding resources for prevention of radicalization among Arab children. The researchers, specialists in children's education and fluent in Arabic, identified the key criteria appropriate for children in the prevention of radicalization, found Arabic media for children which met these criteria, and provided copies of the media to the DoD funded counter-radicalization media repository at the University of Maryland (UMD).	0.350	0.000	0.000	0.000	0.000

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FY 2009 Accomplishments: Identifying such creative works, and understanding which ones to select and why, provides a concrete reach-back resource for those developing Arabic school curricula (e.g. in Iraq) and building counter-radicalization programs. Also, this contributes to a publicly accessible repository, thereby overcoming the current stove-piping of counter-radicalization research efforts.					
Support Combatant Command (COCOM) Planning Using Causal Frameworks This project has improved the COCOM ability to develop and assess Theater Campaign Plans and facilitate coordination of planning and assessment among COCOMs and interagency partners. It provides near term insight and support to a specific COCOM and considers how framework development and customization can effectively support broader COCOM planning, compliance with planning and assessment requirements of Guidance for Employment of the Force (GEF) and the Joint Strategic Capabilities Plan (JSCP). *FY 2009 Accomplishments:* This effort has provided a systems framework that could accelerate the understanding of complex threats and facilitate discussions into complex regional/global operating environments. The product is being reviewed by a COCOM. This has been completed and transferred to the Joint Staff.	0.403	0.000	0.000	0.000	0.000
Mission Fabric This project has built a meshed digital network that is a new situational awareness architecture enabling collaboration and decision making in a distributed environment. The Mission Fabric is the engine for executing Flexible Distributed Control. Flexible Distributed Control is a disruptive process weaving the virtues of social networking innovations into a distributed group-action Mission Fabric.	0.875	0.000	0.000	0.000	0.000

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FY 2009 Accomplishments: This effort allows self-organizing, dispersed groups to immediately synchronize their efforts for temporal opportunities to support the commander's intent. This effort supports enhanced interagency coordination. It will be evaluated during an Interagency exercise in FY 2010.					
Stand-off Optical Detection of Trace Explosives This effort is designing a man portable, stand-off Remote Explosives Detector (RED). The system employs eye safe IR lasers to detect sub-milligram traces of explosives at 10+ meter standoff distances. This system is being designed and produced in several phases. *FY 2009 Accomplishments:* Field tests of this capability produced very promising results. The current phase of the project has designed a compact ruggedized, stand-off Remote Explosives Detector (RED) that will be evaluated in FY10.	1.600	0.000	0.000	0.000	0.000
Multi-Sensor Trip Wire System This project employs power lines as a bistatic radar to provide affordable persistent surveillance for facility, perimeter and border security with proven communications capability to transmit intrusion detection alerts to security authorities. *FY 2009 Accomplishments:* The initial assessment showed the capability to detect various targets along a linear power line. The system is able to provide ground and air surveillance capable of discriminating targets of interest including people, vehicles and low flying aircraft.	0.711	0.000	0.000	0.000	0.000
Strategies for Winning Net Wars	0.205	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
The objectives of this work are to provide the military, government agencies, and law enforcement with knowledge and tools to deter, undermine, and defeat criminal, state and non-state supported actions—enacted wholly or in part through the internet and cyber space—that threaten the US, its interests and allies. *FY 2009 Accomplishments:* The outcomes of this effort identify important factors underlying the organization and operation of criminal and terrorist groups as networks in physical and cyber space, and develop knowledge, organization, and response options to deter, undermine, and defeat these networks. This work is completed and is employed as instructional material at the Naval Postgraduate School.					
Netwars on the US Borders This effort represents a proof of concept investigation of networked forms of organization among criminal and terrorist networks operating across US borders that take advantage of areas outside of effective US government control. *FY 2009 Accomplishments:* This understanding of the structure and functioning of criminal networks operating across US borders is helping the USG organize and operate more effectively to defeat these types of networks outside the US. The knowledge gained in this effort is informing the development of a pilot program for initial application at US borders and subsequent application outside the US. It is being developed in coordination with U.S. Northern Command Joint Task Force North.	0.235	0.000	0.000	0.000	0.000
Cat Eyes This project has developed a rugged dual use, commercial off the shelf, autonomous (ground and aircraft capable) low light surveillance camera system with automated target recognition software and embedded geo referencing and target mensuration.	0.900	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: The system has incorporated a cooled Electron Multiplying Charge Coupled Device (EMCCD) technology for improved sensitivity over previous low light camera systems. The system will be turned over to SOCOM units and counter narco-terrorism units operating in Afghanistan for operational evaluation.					
Persistent Sensor Integration Demonstration (PSID) Riverine This project will demonstrate the deployment and operation of a river-based fiber optic backbone system to support persistent sensor connectivity in a triple canopy environment where RF communications are limited/impossible. *FY 2009 Accomplishments:* The ultimate goal of the current effort is to conduct a System Technical Demonstration in a Riverine-like environment with Warfighter participation. The capability will provide better situational awareness to tactical operators. The initial demonstration is scheduled for 1st quarter FY 2010.	0.850	0.000	0.000	0.000	0.000
Submerged Launch System for a Fuel Cell Powered Long Endurance Expendable Unmanned Aerial System (UAS) for ISR The Naval Research Laboratory has developed a Fuel Cell Powered Long Endurance UAS for ISR. The project will develop a submerged launch capability for the UAS. *FY 2009 Accomplishments:* This project has integrated a novel UAV aboard a standard submarine launch canister to provide the Navy an extended reach ISR asset equipped with a high quality real-time video.	0.600	0.000	0.000	0.000	0.000
Trade Space Support to UAV	0.300	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
The Applied Research Laboratory/Penn State University (ARL/PSU) has developed trade space exploration and decision support tools to support UAV operations for the Navy's Trident Reach deployment, which will be operating MQ-9 Reapers with multiple sensors in an Overseas Contingency Operations (OCO) mission. *FY 2009 Accomplishments:* The trade space tools were tailored to two related domains (1) Decision support for employing the UAV sensor suites and (2) Trade space exploration in support of network analysis.					
Accelerating Integrated Patient Care Solutions In support of DoD objectives for joint patient movement, this project will accelerate (1) the development and fielding of important software / data system feature enhancements for the DARPA/Army MedEx 1000 "suitcase ICU", (2) development and fielding of improved power system capabilities for the MedEx 1000; and (3) development of a method to secure the MedEx 1000 to a NATO litter other than using the Special Medical Emergency Evacuation Device (SMEED) patient shelf which limits patients access. *FY 2009 Accomplishments:* This effort supports the Department's Wounded Warrior Program and will enhance patient survivability. Once validated, the capabilities will transition to ARMY, SOCOM, and NAVY.	1.140	0.000	0.000	0.000	0.000
Civil Counterinsurgency (COIN) Under Fire The premise of this study is that new integrated civil-military concepts of operation (ICONOPS) for counterinsurgency, tailored for the local context and threat environment, will enable counterinsurgents to better integrate and balance civil and military efforts. These integrated operational concepts should provide a basis for practical steps that will help counterinsurgency planners and operators solve the central problem: how to implement civil measures effectively and manage risk in contested and violent areas to help establish the legitimacy, effectiveness and reach of the host government.	0.050	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: The approach developed in this project will improve the overall COIN effort, with the goal of helping to shift the burden for civil COIN away from US military forces by providing integrated approaches that permit the civilian side to take on a larger share of the burden in violent areas. Project has proposed new counterinsurgency integrated concepts of operations and required technical capabilities that should affect joint and service doctrine and Tactics, Techniques and Procedures (TTPs), as well as those of interagency partners.					
DURAD Beckham This effort developed a lower cost miniaturized version of an earlier classified RRTO project. This capability assists the Warfighter in detecting areas of interest from a standoff distance. *FY 2009 Accomplishments:* This project enables Central Command (CENTCOM), Special Operations Command (SOCOM), Southern Command (SOUTHCOM), and other military users to discover and geolocate the position of certain systems which have been known to be associated with terrorists. This effort is executed by DIA.	0.600	0.000	0.000	0.000	0.000
National Tactical Means (NTM) Phase II This project will implement the use of NTM as part of the Thunderstorm sensor and data network to enhance tactical user support. Further details are classified. *FY 2009 Accomplishments:* This project demonstrated the utility of NTM under direct control of the Warfighter. It developed the tactics, techniques and procedures to be used in the future. Further details are classified. The services will be involved in the demonstration and Concepts of Operations (CONOPs) development to maximize transition success.	1.600	0.000	0.000	0.000	0.000

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	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Wide-Area Infrared System for Persistent-Surveillance (WISP) The effort has enabled night capable persistent surveillance over large areas. This capability maps to both forensic analysis and tactical downlink. *FY 2009 Accomplishments:* The Air Force Big Safari wide area persistent surveillance program has a requirement for wide area day/night performance. The Air Force has expressed interest in WISP to provide day/night wide area capability if the prototype system is demonstrated. *FY 2010 Plans:* Development of a hemispherical field of view Long Wave Infrared (LWIR) sensor system with 100 µradian pixel angular resolution and 1.5 second field of regard update rate. The system will enable mover detection over the hemispherical field of regard out to ranges greater than 5km.	1.300	1.500	0.000	0.000	0.000
SeaStalker This effort incorporated a suite of Intelligence, Surveillance and Reconnaissance (ISR) sensors into a modified 38-inch diameter Seahorse Unmanned Undersea Vehicle (UUV). The vehicle is capable of navigating submerged to the target where it will surface to collect data. The data is transmitted via satellite to the control platform and operational users. *FY 2009 Accomplishments:* This project provides a persistent ISR platform with broadband over the horizon connectivity that can serve as a remote station allowing the host platform to remain out of sight and simultaneously conduct other missions. SeaStalker conducted an operational demonstration in FY09. Lessons learned are being incorporated in order to develop a more capable system. This effort has transition to the Navy.	0.626	0.000	0.000	0.000	0.000
Enhanced National Tactical Coordination	1.600	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

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This effort has provided the Tactical Exploitation System (TES) Officer-in-Charge the ability to coordinate the operations of selected National and Tactical assets. Further details are classified. *FY 2009 Accomplishments:* This effort resulted in leave behind capabilities in the TES.					
Operationalized worldwide Specific Emitter Identification (SEI) This project has moved the worldwide SEI capability from demonstration to full operations. More information is available at a higher classification level. *FY 2009 Accomplishments:* This project provides joint intelligence centers and tactical forces with identification data needed to locate and track specific targets and correlate on-board and off-board information. This effort has resulted in leave behind capabilities both in the planning and processing systems.	1.000	0.000	0.000	0.000	0.000
Aircraft-Based Electronic Warfare Demonstration This project demonstrated the utility of an Electronic Warfare (EW) suite when fitted in a Commercial-Off-The-Shelf (COTS) low life cycle cost aircraft during Thunderstorm Spiral 2. *FY 2009 Accomplishments:* The EW suite was flown in the controlled and scripted environment of Thunderstorm Spiral 2. The utility results of the EW system is available for assessment by a cross section of the Intelligence, Surveillance, and Reconnaissance (ISR) community.	0.150	0.000	0.000	0.000	0.000
Wide Area Video Exploitation Library (WaveLib)	0.969	0.000	0.000	0.000	0.000

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	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
WaveLib was developed as a modular toolkit of video processing functions designed to ingest raw imagery and metadata from wide area airborne sensors, such as Constant Hawk, and produce accurately geo-stabilized contrast-enhanced imagery, vehicle detections and tracks. *FY 2009 Accomplishments:* The modular toolkit can be easily integrated with 3rd party Wide Area Persistent Surveillance (WAPS) exploitation tools. Toolkit functions improve geo-location accuracy, probability of detection, automatic track duration, and processing speed, while reducing false detections. The library enables analysis to develop actionable intelligence with improved speed and accuracy.					
Motion Detection and Classification This effort developed software to detect activity in wide-area video of an area of interest (AOI), without relying on tracking. *FY 2009 Accomplishments:* The software enables analysts to detect and track suspect vehicles arriving at or departing from an AOI with greater accuracy. In addition, analysts are able to detect dismounts from vehicles within an AOI. The result of this effort will enable faster analysis of video data.	0.486	0.000	0.000	0.000	0.000
Large Enterprise Scale Data Extraction/Compression Software has been developed to provide accelerated extraction of imagery data from storage, adjustable streaming compression, and spatial-temporal archival compression. *FY 2009 Accomplishments:* The new capabilities are being integrated and demonstrated in an open manner to allow for rapid integration into other exploitation tools. The integrated software application will be available to the Wide Area Persistent Surveillance (WAPS) community including National Geospatial-Intelligence Agency (NGA), and the Counter-IED Operations Integration Center (COIC). It will be used in support	0.605	0.000	0.000	0.000	0.000

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of analysis of data from existing wide area surveillance electro-optical formats, including Constant Hawk.					
Supercavitation The Applied Research Laboratory of Penn State University (ARL/PSU) leveraged an existing ONR-funded supercavitating vehicle field test program to provide a low cost continuation of their exploration of supercavitation physics. *FY 2009 Accomplishments:* This effort has helped to further the understanding of the phenomenology of supercavitation propulsion of torpedoes.	0.200	0.000	0.000	0.000	0.000
Counter Swarm Tactics This effort built a computer simulation model of asymmetric naval swarm tactics, and used it to design and test counter-tactics to disrupt swarm attacks. *FY 2009 Accomplishments:* The projects demonstrated the feasibility of using a small group of Unmanned Surface Vehicles (USVs) to disrupt asymmetric swarm tactics.	0.250	0.000	0.000	0.000	0.000
Project Blind Roc A portable system designed to control certain mobile communication devices is being developed under this project. This project allowed for additional validation tests to occur using flying and seaborne communications links to more accurately represent real world applications.	0.125	0.000	0.000	0.000	0.000

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FY 2009 Accomplishments: The Blind Roc system was tested in a scenario which employs the radio frequency and kinematic characteristics of a real world application of the technology. This allows the developer to fully understand how platform range, movement, altitude and orientation impact system performance.					
Intelligent Mobile Sensor Barrier (IMSB) This project has developed an integrated, persistent, at-sea surveillance system to detect, monitor and support interdiction of self-propelled semi-submersibles (SPSS). The initial phase developed a feasibility assessment for deployment of a robust fixed and mobile acoustic sensor barrier to detect target maritime vessels. *FY 2009 Accomplishments:* IMSB will provide a significant increase in autonomous, persistent detection and time-critical alert capabilities to enable airborne or sea-based threat acquisition and interdiction by US and host-nation forces.	0.500	0.000	0.000	0.000	0.000
Inflatable Satellite Communication (SATCOM) The United States Marine Corps (USMC) required a lightweight, portable SATCOM Antenna as an alternative to the current family of deployable SATCOM antennas. This product is significantly lighter and smaller to transport, yet provides equivalent or superior performance. *FY 2009 Accomplishments:* This project decreased the total number of transit cases necessary to field Support Wide Area Network (SWAN) SATCOM Terminals and the Lightweight Multiband Satellite Terminal (LMST), saving space and weight. In addition it is now possible to include an antenna with a larger aperture on the SWAN terminals and still realize a size/weight savings. The Inflatable SATCOM capability has operationally deployed with the Marines.	0.295	0.000	0.000	0.000	0.000

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Building Effective States This pilot project delivered a proof of concept for the practical implementation of the existing Institute for State Effectiveness (ISE) framework in any USG entity, develop practical tools for developing country specific strategic plans and deliver an actionable plan to be implemented by a U.S. country team. *FY 2009 Accomplishments:* This project enhances the military understanding of and ability to support the task of building effective states. More broadly it serves to identify gaps and necessary tools to enable the broader USG to develop better approaches to enhancing security. This effort is being executed by the Army.	0.421	0.000	0.000	0.000	0.000
Strategic Multi-Layer Assessment (SMA) Effort The objective of this effort was to support and participate in an interagency experiment to demonstrate and measure the effectiveness of an analytical process within a virtual collaborative environment (VCE) to anticipate and find leading indicators of acts of terror, use of weapons of mass destruction (WMD) or other high profile acts. Each SMA focus area is in direct response to a COCOM request. *FY 2009 Accomplishments:* SMA virtually and collaboratively brought together analysts from diverse agencies with multi-disciplinary social science modeling and analysis (SSM&A) experts drawn from industry and academia to: (i) leverage the understanding social science modeling and analysis tools and experts within the SSM&A reach back cell can provide analysts for a given rare event threat scenario, (ii) share tradecraft and expertise in interpreting data, (iii) expand the knowledge base applied to the problem, and (iv) rank possible enemy courses of action from a multi-sourced set of data using various criteria and multiple priorities. *FY 2010 Plans:* SMA virtually and collaboratively will bring together analysts from diverse agencies with multi-disciplinary social science modeling and analysis (SSM&A) experts drawn from industry and academia	3.000	3.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
to: (i) leverage the understanding social science modeling and analysis tools and experts within the SSM&A reach back cell can provide analysts for a given rare event threat scenario, (ii) share tradecraft and expertise in interpreting data, (iii) expand the knowledge base applied to the problem, and (iv) rank possible enemy courses of action from a multi-sourced set of data using various criteria and multiple priorities. Specific projects are being conducted in direct support of US Forces Afghanistan.					
Idea Management System The objective of the Open Business Cell (OBS) (online at DefenseSolutions.gov) is to reach out to smaller innovative companies, including those who have no experience dealing with the Department of Defense. The program, still in a prototype phase, selected Battlefield Forensics as a topic. The OBC uses the Idea Management System (IMS) to collect, track, evaluate, and store all ideas submitted to the DefenseSolutions.gov website. This effort made improvememts to the tracking system focusing on communications and autonomous filing and organization that will send, receive, automatically sort and file pertinent correspondence. *FY 2009 Accomplishments:* This project's package of improvements alleviated the manual insertion of important messages, attachments, ideas, proposals, and initial evaluations into the IMS system. These improvements enabled more efficient assessment of proposals and selection of valid projects.	0.356	0.000	0.000	0.000	0.000
Lanthanide Oxide Nanoparticles This effort demonstrated a new method of developing latent fingerprints from documents without the need for the current "fuming techniques. This method uses lanthanide oxide nanoparticles functionalized to specifically bind fingerprint residue and provide for fluorescence detection under ultraviolet illumination. This project is being executed through the Open Business Cell (OBC).	0.400	0.000	0.000	0.000	0.000

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FY 2009 Accomplishments: Instead of taking evidence back to a lab for complete fingerprint analysis, this effort enables the Warfighter to complete the entire process in the field on both paper evidence and larger objects.					
Battlefield Multi-Test Kit This project delivers three prototype Battlefield Multi-Test Kits. Each kit contains colorimetric tests that presumptively identify the presence of explosives, gunshot residue (GSR), and drugs. This effort is being executed through the Open Business Cell (OBC). *FY 2009 Accomplishments:* The Multi-Test Kit enables the Warfighter, with minimal training, to quickly identify high risk indicators, specifically, the presence of explosives, GSR, and drugs.	0.151	0.000	0.000	0.000	0.000
Integrated Multi-Test Sensor Systems Developed an integrated multi-dimensional sensor system that provides for real-time fast forensic analysis of unknown chemical materials that may be encountered by battlefield soldiers, first responders, law enforcement officials and transportation administration agents. This effort is being executed through the Open Business Cell (OBC). *FY 2009 Accomplishments:* This effort resulted in a low-cost, lightweight and low power handheld device capable of detecting a wide range of chemicals with high reliability and sensitivity.	0.225	0.000	0.000	0.000	0.000
Digital Imaging Device This effort developed algorithms and a software prototype to support forensic investigations on digital images associated to cell phones. This effort is being executed through the Open Business Cell (OBC).	0.400	0.000	0.000	0.000	0.000

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FY 2009 Accomplishments: The project created a small, rugged prototype device that interrogates cell phones with cameras to determine if stored images were captured by the phone's integrated camera or were received into memory from some other source, such as a website, scanner etc.					
Tunnel Detection This effort provided a rapid, accurate, and decisional test area that will recommend prototype testing and research and development to meet US NORTHCOM, US CENTCOM, and US SOUTHCOM force protection program goals. The facility will host various types of tunnels ranging from small unsupported structure to larger tunnels with power and rails. This test site will enable capabilities to detect tunnels used to smuggle material across borders or prisoners escaping detainment facilities. *FY 2009 Accomplishments:* A facility was constructed that allows technology discrimination for mission applicability and economy; provide decisional test documentation and archival library for proposed technologies; enable visible documentation and performance matrix for selected technologies; and allows untainted data for investment decisions for chosen programs.	1.000	0.000	0.000	0.000	0.000
Project Thunderstorm RRTO and interagency partners developed the concept of operation in FY 2009 or an enduring ISR Test Bed, Thunderstorm, using Joint Interagency Task Force-South (JIATF-S) AOR to demonstrate in an operational environment multi-int sensor and exploitation systems integration. *FY 2009 Accomplishments:* Thunderstorm allows OSD to develop ISR CONOPS and facilitate future ISR capability development while providing JIATF-S improved intelligence.	3.608	3.000	0.000	0.000	0.000

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	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2010 Plans: Spiral 3 is tentatively planned for February 2010.					
Joint Experimental Range Complex (JERC) Support Maintain a joint force protection team and infrastructure at Yuma Proving Ground (YPG) capable of testing and reporting a wide array of new technology uses and concepts toward the protection of our forces. *FY 2010 Plans:* Rapid reaction joint services testing support will be one week every two months at YPG. These test periods are the opportunity for technologies without enough funding for testing to show their capabilities in a real world setting. RF suppression systems will have low priority. The Joint Experimental Range Complex was constructed for the purpose of supporting these tests. Improvements and construction of a second JERC site are nearing completion. Construction of a third, mountainous JERC site is underway. A team of NAVAIR and YPG personnel is provided as manpower, expertise, facilitation, direction, and reporting. Personnel from NAVEODTech, NGIC, Marines, etc, are called upon as their expertise is required.	0.000	1.500	0.000	0.000	0.000
RRF 2010 Plans RRF investment decisions are made during the execution years in response to combatant commander, service and other government organization's requirements 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 counterterrorism/ counterinsurgency capabilities.	0.000	25.125	0.000	0.000	0.000

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	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2010 Plans: FY10 plans include continuing to explore new and emerging capabilities to support Irregular Warfare operations. Potential areas for FY10 RRTO projects include: FOB protection, persistent surveillance, maritime awareness, interface of Law Enforcement and military ops, biometrics and forensics, autonomous operations, operations in cold environments, capabilities to exploit denied areas, strategic communications and multi-layer assessments and nontraditional approaches to leverage innovative businesses.					
RRF FY11 Goals RRF investment decisions are made during the execution years in response to combatant commander, service and other government organization's requirements 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 counterterrorism/ counterinsurgency capabilities. *FY 2011 Base Plans:* RRTO's FY11 goals are to continue to identify and develop near term capabilities to support irregular warfare needs. RRF investment decisions are made during the execution years in response to combatant commander, service and other government organization's requirements and as new threats emerge or new opportunities are presented. Projects from these focus areas will be selected according to these needs: Small Unit, Dispersed Operations, Denied Area Operations, Autonomous System Operations, Countering and Exploiting Commercial Technologies and Commercially Derived Science and Technology Research, Military - Law Enforcement Interfaces and Coordination, Open Source Exploitation, Strategic Communications and Feedback, Standoff Facial Recognition, GMTI/SIGINT Fusion Test Bed, Sociological Sensing, Marbles, Multi-INT Track Fusion	0.000	0.000	49.422	0.000	49.422
Accomplishments/Planned Programs Subtotals	40.148	34.125	49.422	0.000	49.422

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
Congressional Add: Augmented Reality to enhance Special Warfare Domain - "Special Warfare Domain Awareness Technologies (SW-DAT)" *FY 2009 Accomplishments:* SW-DAT provides integrated navigation (charts, sensors) and tactical (mission planning, force tracking) capability for operators of small high speed craft using unique Augmented Reality (AR) functionality. This effort has resulted in a modular bolt-on capability suitable for installation in a wide range of craft including the Special Operations Craft – Riverine (SOC-R) and the emerging Combat Craft Medium (CCM).	1.600	0.000
Congressional Adds Subtotals	1.600	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Project performance metrics are specific to each effort and include measures identified in the specific project plans. 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, fielding dates, and demonstration goals and dates. Generic performance metrics applicable to the Rapid Reaction Fund (RRF) includes attainment of DoD Strategic Objective 4-3. The title of this objective is "Speed technology transition focused on warfighting needs" and the metrics for this objective is to transition 30% of completing demonstrations program per year. During FY 2009 the RRF achieved a transition rate of greater than 90% exceeding the objective of 30%.

In FY 2011, RRF investment decisions will be made during the execution year, to rapidly respond to combatant commander requirement and new threats/new opportunities.

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RRF: In FY 2008/FY 2009/FY 2010 RRF investment decisions are made during the execution years in response to combatant commander requirements and new threats/new opportunities.

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COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P829: *Technology Transition Initiative (TTI)*	24.558	19.208	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

Note

In FY 2011, Technology Transition Initiative (TTI), resources will be transferred from Quick Reaction Special Projects to PE 0603942D8Z (Technology Transfer and Transition) as part of an effort to more effectively align interwoven program efforts that will benefit management communications, budget justification, fiscal tracking and improve overall program resource management of Technology Transfer and Transition efforts.

A. Mission Description and Budget Item Justification

The Quick Reaction Special Projects Program (Program Element 0603826D8Z) has three sub-elements: the Technology Transition Initiative (TTI), the Quick Reaction Fund (QRF) and the Rapid Reaction Fund (RRF). The fiscal controls above represent the investment of the QRSP Program funding for the TTI Program.

The Technology Transition Initiative (TTI), authorized by Title 10 and Section 215 of the FY2003 Defense Authorization Act, facilitates the rapid transition of new technologies from the DoD science and technology (S&T) base into DoD acquisition programs. The program addresses the funding gaps that exist between the time a mature technology is demonstrated and the time it can be funded and procured for use in an intended weapons system or operational capability for the warfighter. Since the program inception in FY 2003, 75 projects have been initiated and 37 are complete. Of the 37 complete projects, 27 (73%) have successfully transitioned to DoD Acquisition Programs of Record or procurement contracts for operational use and subsequent fielding; exceeding the objective of 30% for demonstration programs Strategic Objective 4-3, Office of the Under Secretary of Defense, Acquisition, Technology & Logistics (OUSD (AT&L).

TTI projects are selected by the Technology Transition Manager (DDR&E Research Directorate) in consultation with representatives of the Technology Transition Council (TTC). (The TTC is comprised of the Acquisition and S&T executives from each Service and Defense Agency and representatives from the JROC.) The call for TTI proposals is distributed to the DoD Services and Agencies through the Technology Transition Working Group (TTWG) members, designated by the TTC. The TTWG members receive proposals from their Service/Defense Agency S&T base, conduct a prioritization based on Joint, Service or Agency capabilities needed and submit them to the OSD TTI Program Manager. The Technology Manager's senior staff consolidates the proposal submissions, evaluates the Service/ Agency recommendations, reviews new start selection options based on available resources, and prepares a recommended new start selection list to the Technology Transition Manager for funding. The Technology Transition Manager selects the highest priority proposals for funding.

The OSD FY 2010 proposal call memo was signed out by the Technology Transition Manager on February 25, 2009, requesting the Services, Agencies and CoComs provide their prioritized inputs by April 30. OSD is looking for candidate proposals that demonstrate a strong commitment from the operational and acquisition

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communities to transition improved capabilities to operational use or an acquisition program of record. Six Core Mission Areas to define military activities required to achieve strategic objectives were established. They are: Homeland Defense and Civil Support (HD/CS), Major Combat Operations (MCOs), Military Support to Stabilization Security, Transition, and Reconstruction Operations, Deterrence Operations, Irregular Warfare, and Military Contribution to Cooperative Security. A total of 43 proposals were formally submitted to OSD, addressing these mission areas. These proposals were evaluated against the following evaluation criteria: TTI funding must accelerate product transition, the technology must be from the DoD S&T base, Component cost sharing to leverage funding, project duration less than four years, established exit criteria, potential for joint use, value to the warfighter, sufficient technology maturity, and commitment to transition/acquisition.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Implementation of Extremely Insensitive Detonating Substance (EIDS) and Insensitive Munitions Solution in 155 mm Artillery Ammunition (Army)	1.950	0.000	0.000	0.000	0.000
This effort accelerates the transition to production of technologies that eliminate or minimize accidental hazards for munitions. Insensitive Munitions (IM) minimize damage or loss of life and property due to reduction in sensitivity of the munition to external stimulus. Compliance is required by public law and mandated by DoD regulation. In addition to meeting IM requirements, the technologies will satisfy Extremely Insensitive Detonating Substances (EIDS) classification requirements for the 155mm high explosive loaded artillery projectiles being procured by the Army and United States Marine Corps (USMC). EIDS munitions dramatically enhance the warfighters' survivability by reducing the reaction to unplanned stimuli, e.g., fire, mass detonation, etc., and increase safe storage capacity of ammunitions by lowering the storage quantity / safe distance in accordance with the relaxed requirements that go with EIDS designation. Program Outputs and Efficiencies: EIDS classification will change the current Hazard Class from 1.1 (greatest hazard) to 1.2.3. The 1.2.3 hazard classification level allows more compact storage and shipping than otherwise, with consequent reduction of logistics costs for this widely procured Army and USMC projectile. This project will accelerate the fielding of new IM technologies from forecasted FY 2012 to FY 2009.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: Using the FY 2008 Energetic Material Qualification Board (EMQB) test matrix, all the long-term tests were scheduled for completion to qualify the new insensitive explosive formulation. The gun qualification tests were concluded. Lethality assessment was carried out by a full-scale arena test. Formal IM tests were scheduled to be performed to demonstrate compliance with current Department of Defense (DoD) IM requirements and determine the final EIDS classification. This project resulted in a Technology Readiness Level 9 (TRL 9) maturity which will be implemented by the Project Manager Combat Ammunition Systems for their applicable programs. Formal IM tests were performed to demonstrate compliance with current Department of Defense (DoD) IM requirements and determine the final EIDS classification. Energetic Material Qualification Board (EMQB) testing was completed, except for sympathetic detonation (SD). Loading parameters have been defined for transition to production. More than 37,000 pounds of IMX-101 (the explosive component of the munition) were manufactured and an additional 95,000 pounds ordered. Gun qualification tests were conducted. Lethality assessment was carried out by a full-scale arena test.					
Combined Arms Planning and Execution-monitoring System Integration into Force XXI Battle Command Brigade and Below (FBCB2) (Army) This program addresses an emerging requirement for a planning capability to reside within Force XXI Battle Command Brigade and Below (FBCB2). In Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF), FBCB2 has emerged as a critical Command and Control (C2) system in both traditional and asymmetrical warfare environments. However, FBCB2 does not currently contain planning software. Both the current FBCB2 Operational Requirements Document and the draft Capabilities Development Document for the Joint Battle Command Platform (JBCP) cite requirements for decision support aids, mission planning/rehearsal, mission execution and the ability to interface with onboard/system-specific Command Control and Communication (C3) tools.	0.975	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Outputs and efficiencies include: The output of this program is to provide an automated planning and execution tracking capability within FBCB2. The planning capability will be derived from Combined Arms Planning and Execution-monitoring System (CAPES) and the emphasis is placed at the tactical level, allowing lower echelon commanders to provide task status reporting vertically through the Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) architecture. The planning and execution tracking will provide a total situational awareness through the sharing of subordinate unit and sister unit plans. Goals/Metrics: (1) Percentage reduction in the time to develop combat plans (goal is 35 percent reduction); (2) Percentage increase in the ability to monitor execution, assess effects, and adapt (goal is 25 percent); (3) Percentage increase to track execution at allowing lower echelon commanders to provide task status, reporting vertically through the C4ISR architecture (goal is 90 percent). (4) Percentage increase in the ability to support Military Operations in Urban Terrain (MOUT) through movement planning tools that consider man-made obstacles, infrastructure and total situational awareness through the sharing of subordinate unit and sister unit plans (goal is 20 percent). This is a two year effort with the completed package delivery within FBCB2/Joint Battle Command Platform (JBCP) software baseline and installed on all platforms for SoftWare Blocking (SWB) 4 (expected to be 44,000 platforms). TTI accelerates the transition of this capability by two years. *FY 2009 Accomplishments:* Completed integration of high priority items, and selected lower priority items. Developed a new geospatial map interface to support drag and drop plan authoring and third party integration. Performed integration testing, and delivered software into the FBCB2/JBCP software baseline. Delivered the following; source code for all completed capabilities, test plan documentation, user documentation, test results and release notes, and final integrated product.					
Electronic Image Intensifier for Pilotage (Army)	2.750	2.512	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
This project will integrate Electronic Image Intensifier (EI2) technology into a lightweight sensor for the Apache Modernized-Pilot's Night Vision System (M-PNVS). Two form-fit, function and flight ready EI2 prototypes will be developed, built, and delivered to PM Apache for aircraft qualification and users evaluation flights. The EI2 camera will provide performance that is equal to or greater than the current aviator's night vision goggles and at the same time allow for image fusion with the second generation Forward Looking Infrared (FLIR) on the Apache helicopter. Program Outputs and Efficiencies: meet pilotage requirements for dynamic motion, resolution, and contrast through improved readout electronics and high definition format (1920 x 1080); exit criteria to be met include Aviator's Night Vision Imaging System (ANVIS) performance and $35 thousand per camera; two pre-production prototype cameras delivered for operational flight testing in FY 2010. TTI funding accelerates the transition of this capability by two to three years. *FY 2009 Accomplishments:* This project completed design, fabrication, and test of 1920 x 1080 Read-Out Integrated Circuit (ROIC) and camera electronics. *FY 2010 Plans:* This project will fabricate two prototypes; conduct reliability and environmental testing; initiate component qualification testing,					
Fuel Cell Powered Long Endurance Expendable Unmanned Aircraft System (Navy) The Navy and Special Forces have counterterrorism technology requirements that include an over the horizon (OTH) intelligence, surveillance and reconnaissance (ISR) capability using small unmanned aerial systems (UAS)s. Battery powered UASs, although inherently stealthy and safer to operate in most environments, lack the necessary endurance required for SOF/ISR operations and because of power and weight issues, have low grade electro-optical (EO) cameras. Currently, there is no existing UAS that can meet the needs and requirements. This technology gap prevents current SOF war	0.000	2.531	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
plans from being executed. This project will mitigate the problem by completing the development and demonstration of a small, expendable, long endurance, fuel cell powered UAS (the XFC) with a real time high resolution electro-optical/infrared (EO/IR) payload. *FY 2010 Plans:* Efforts will result in the delivery of two-four XFC UAS with a ground station and an end to end test of autonomous flight with linkages to a surfaced submarine or a land vehicle to demonstrate industry readiness by third quarter of FY 2010. Planned transition to Navy production is scheduled to start in FY 2011.					
Improved Heating Technology for the Unitized Group Ration - Express (Army)	0.676	0.000	0.000	0.000	0.000
The Improved Heating Technology (IHT) project addresses a critical need for non-hydrogen producing chemical heating technology for the Unitized Group Ration Express (UGR-E) Military group self heating meal application that does not produce hydrogen as a by-product of the heating process. The primary goal of the IHT TTI project is to accelerate transition of new heater technology into an on-going UGR-E procurement that eliminates operational, transport, and storage restrictions attributed to the hydrogen by-product of the current heater and thereby fosters potential commercial applications and expanded industrial base. Additional benefits that may be realized through the IHT initiative include additional sources of supply beyond the current sole source, and improved performance, quality, and cost. Alternative ration heating technologies to be considered include an exothermic air-activated aluminum/ zinc/nickel heater, a blended phosphorous pentoxide (P205) and calcium oxide (CaO) anhydrous heater, and an enhanced Magnesium-Iron (Mg-Fe) heater that couples manganese dioxide in the heater matrix. Program Outputs and Efficiencies: 1) Raise the temperature of the shelf stable polymeric food trays from 40 to 140 degrees Fahrenheit in less than 45 minutes; 2) Weigh less than 500 grams per heater with a unit cost less than 3 dollars and pose no operational, storage, transport, or disposal restrictions;					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
3) Provide a drop-in product replacement for existing UGR-E heater product and enable an immediate transition of non-hydrogen heater technology for full rate production by Defense Supply Center Philadelphia (DSCP) in FY 2010, a three year acceleration over previous program schedules. *FY 2009 Accomplishments:* This project integrated heaters within the UGR-E assembly and tested them in an operational environment to assess reliability, durability, and user acceptance. It completed performance specifications and is scheduled to transition to DSCP for direct, rapid implementation to the target UGR-E and commercial applications.					
Joint Service General Purpose Mask Filter End-of-Service-Life Indicator (Army) An end-of-service-life indicator (ESLI) has been developed for chemical, biological radiological, nuclear (CBRN) protective mask filters that will alert the user to exchange the filter following exposure to acid-gas chemical warfare agents (CWAs). The technology to be transitioned consists of thin colorimetric indicator films coated with pondus hydrogenii (pH)sensitive dyes and reagents that target common functional groups and chemical properties of the major classes of blood agents and select Toxic Industrial Chemicals (TICs). The approach is to place the ESLI along the inside wall of the filter in contact with the carbon bed so it can react with the passing agent wave front to produce a color change, thereby alerting the user to replace the filter well before its gas-life capacity is depleted. Program Outputs and Efficiencies: The Joint Service General Purpose Mask (JSGPM) CBRN filter housing will be equipped with a transparent plastic window to view the indicator response. The ESLI will be designed to provide a visual signal when approximately 20 to 60 percent of the filter's service life capacity is expired, depending on the target agent. The ESLI technology will be transitioned to the M50 JSGPM acquisition program as a spiral upgrade (product improvement) to the current primary CBRN filter. TTI funding accelerates this transition by one year.	0.750	0.465	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: This project was scheduled to hold a Critical Design Review. Fabrication of ESLI filter prototypes was completed. Prototype test and evaluation was initiated. *FY 2010 Plans:* This project will complete test and evaluation, hold Transition Readiness Evaluation review, complete Engineering Change Proposal, and submit for joint service approval.					
Medium Caliber Cartridge Improvements using Micro Electro-Mechanical Systems and Direct Write Explosive Ink	1.200	3.865	0.000	0.000	0.000
40mm M433 and M430 cartridges have been in service since the 1950's and 1970's respectively, and are used with the M203 and MK-19 by all services. Both cartridges use point detonating fuzes with mechanical safe and arm devices which do not reliably detonate on soft impact targets or high graze angles. The objective of this effort is to incorporate a Micro Electro-Mechanical Systems (MEMS)-based Safe and Arm (S&A) device with automated explosive loading technology into current 40mm combat cartridges. Outputs and efficiencies: incorporate impact sensors that will sense initial impact and electronically send a signal to initiate the explosive train for improved lethality and improved reliability on soft targets (from 50 percent to 90 percent), and also significantly reduce the number of duds on the battlefield and training ranges. The MEMS S&A will also require less volume which will allow room for improvements in lethality or other future alternate applications. This Technology Transition Initiative accelerates transition of this technology by approximately three years. *FY 2009 Accomplishments:* This project built inert demonstration units verifying MEMS survivability of MK19 cycling/firing and conducted a laboratory safety evaluation on micro-scale firetrain.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2010 Plans: This project will initiate verification hardware build and conduct test and evaluation on prototype high explosive cartridges.					
Tactically Integrated Sensor (TIS) (Navy) The Tactically Integrated Sensor project provides the ability to protect the last miles of the Sea Lanes of Communication. The specific objectives of the project are to support US Forces in an area of heightened vulnerability from surface, air and subsurface attack; protect merchant shipping and maritime infrastructure; and quickly assess the extent of the threat for the Naval Coastal Warfare (NCW) Commander. Output of the project will provide an integrated family of surface, air and subsurface sensors for persistent intelligence, surveillance and reconnaissance which is fundamental to the NCW mission *FY 2009 Accomplishments:* This project built two software spirals to process, correlate and de-conflict multiple and dissimilar sensor type data, and present data as a consolidated combat system picture. It integrated small high speed surface vessel detection and tracking into the combat system. It also integrated additional capabilities to detect and track swimmer/diver delivery vehicles, and provided capability to the combat system to detect and track aircraft.	2.400	0.000	0.000	0.000	0.000
Solid State Laser Ignition (Army) The Solid State Laser Ignition System replaces the primer feed mechanism (PFM) and primers used in the 155 mm M777 family of towed howitzers. The current PFM ignition system is complex and high maintenance with known operational issues due to mechanical jamming of the PFM and premature firing due to primer sensitivity. This solid state laser ignition system increases system safety by eliminating the manufacture, storage, resupply and demilitarization of explosive primers and reduces	1.200	0.515	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
system costs associated with the logistics and maintenance required with primers and primer feed mechanisms. Outputs and efficiencies: (1) an integrated design for M777 application where major risk areas have been mitigated or managed; (2) hardware availability to verify the design in system tests; and (3) a comprehensive assessment of the technology to support a production decision and an operational evaluation of its readiness for field insertion. This solid state laser ignition effort will yield a system prototype and will accelerate the availability of this technology for fielding by four years. *FY 2009 Accomplishments:* The system requirements review (SRR) was conducted, the preliminary design was completed and the preliminary design review (PDR) was conducted. Detail design was performed, and an integration concept was developed from system trades which focused on minimizing the operational impact of converting from a primer based to a solid state laser ignition system on the current M777 family of towed howitzers. Test articles were fabricated and qualified by subsystem tests. Hazard analyses and safety assessments were performed in preparation of system test and live fire evaluation. *FY 2010 Plans:* Risk mitigation activities will be completed and a post PDR assessment (PPA) will be conducted. Prototype hardware will be fabricated, the advanced system demonstrator (ASD) test readiness review (TRR) will be conducted and ASD testing and evaluation will be completed in accordance with the diode pumped laser ignition system (DPLIS) Program test schedule. Improvements to the prototype hardware design will be incorporated and captured in the solid state laser ignition Technical Data Package (TDP). Hardware will be procured and fabricated for conducting development testing (DT) and early user assessment (EUA) by the program office in accordance with the DPLIS Program test schedule. Manufacturing and technology readiness assessments will be performed.					
Tactical Idle Reduction Equipment for Heavy Tactical Vehicles (Army)	1.950	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
This project develops and equips a suitable auxiliary power unit (APU) and auxiliary environmental control unit onto the next-generation M915 and family of next-generation long haul Heavy Tactical Vehicles (HTV's). Excessive fuel consumption for this fleet of vehicles has been attributed to significant idling, during which the vehicle is parked but the main engine is left running to meet power and energy demands. The idle reduction equipment developed under this effort would enable M915 operators to disable the main engine while maintaining power and environmental control capabilities, thereby conserving 66 percent of the fuel currently being consumed by the fleet during parked operations. Outputs and efficiencies: 1) Fabrication of an APU and integration onto the M915 platform; 2) Demonstration of power quality utility class 2C conformance per Department of Defense Military-Standard-1332B, protective device functionality verification, and validated environmental control per American Society of Heating Refrigerating and Air-Conditioning Standard 37. Additionally, operational testing of integrated idle reduction equipment will be performed to demonstrate that it can be integrated with the M915 to fit its maintenance and operational schedule without any adverse effects. These tests include demonstration of maintenance ratio less than 0.015, demonstrated reliability comparable to the M915 (mean time between hardware mission failure of 8,600 miles), and conformance to survivability metrics for shock, vibration, sand, water-immersion, hot/cold environmental, altitude testing. TTI funding accelerates the transition of this capability three years. *FY 2009 Accomplishments:* Accomplished test and evaluation on stand-alone auxiliary power unit (APU) and auxiliary environmental control unit prototypes. Integrated prototypes onto M915 platform and performed advanced technology demonstration and maintenance demonstration of fully-integrated platform for Program Manager (PM) HTV.					
Weapons Decision Support System (Navy)	0.690	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Weapons Decision Support System (WDSS) provides intelligent agent decision support to provide the Build Breakout Re-stow Management Tool (BBRMT) Ready Service Weapons (RSW) breakout and build planning, Magazine Arrangement Planning Aid - Internet (MAPA-I) planning, and ADMACS integration onboard carriers. WDSS system manages weapons current stowage location, weapons peculiar attributes, breakout and build support requirements, and alternate weapons availability. WDSS employs expert systems and intelligent agents to collect, interpret, and process the information into a knowledge base which can be used to support and automate the decision making processes associated with weapons planning. WDSS will function as a component of Aviation Weapons Information Management System (AWIMS) that will interface with or receive data from other systems such as Load Plan Generator, Ordnance Information System (OIS), MAPA-I, and other related systems to provide weapon system attributes during planning of the aircraft load plan. Outputs and efficiencies: WDSS shortens the time to plan initial ship load-outs and fulfill replenishment requisitions by 50 percent and improves availability of weapons asset availability information following replenishment by 30 percent. WDSS increases survivability; less bombs are required to be staged on flight deck (stage only two events in advance vice three-five events in advance). Higher mission-capable sortie rate, additional 18-25 sorties from faster planning, mission flexibility and tracking under WDSS. TTI funding accelerates the transition of this capability by two years. *FY 2009 Accomplishments:* Accomplished System and Software requirements identification. Initiated steps to incorporate WDSS into ADMACS Block 2 for shipboard testing and fleet delivery.					
Battlespace Terrain and Reasoning Awareness Battle Command (BTRA-BC) (Army)	1.200	0.000	0.000	0.000	0.000
BTRA-BC transitions terrain, atmospheric and weather analytic Tactical Decision Aids (TDAs) in support of Command, Control, Communication, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR). TDA software for transition operates at two levels: 1) TDAs that operate over					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
large data sets to create actionable information of the effects of the terrain, atmosphere and weather on units, tactics, ground and air platforms, systems and sensors and the soldier and 2) TDAs that perform mission and task level analysis in support of the Military Decision Making Process (MDMP), planning, Course of Action Analysis (COA), asset management and execution monitoring. Specific TDAs developing actionable information address topics of: 1) Observation and Fields of Fire, Cover and electro-optical concealment, Obstacles, Key Terrain and Avenues of Approach, 2) platform mobility and unit maneuver incorporating weather effects, 3) interactive graphs representing maneuver potential and battlefield geometry, 4) Tactical Spatial Objects for varying military tasks, 5) Infra-red, Acoustic and Seismic sensor performance, 6) atmospheric and weather effects on UAV mobility and performance. TDAs addressing MDMP activities support: 1) Interactive, MapQuest-like mission constrained ground and air platform routing, 2) ISR asset management, 3) ground and air asset synchronization and 4) battlefield effects. All products are designed for visualization and input to other automated Battlefield Operating Systems (BOSs). BTRA-BC transitions an Engineered Doctrinal Knowledge (EK) language supporting semantic and syntactic interoperability between Army and Joint systems via the Joint Consultation, Command and Control Information Exchange Data Model (JC3IEDM) required by Army and USMC systems. Each year, BTRA-BC will transition various data analysis and decision support tools to: 1) National Geospatial-Intelligence Agency's (NGA) Commercial Joint Mapping Toolkit (CJMTK), supporting 207 approved Joint Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) programs, 2) the Digital Topographic Support System (DTSS) supporting the Current force of the Army at Division and Brigade Combat Teams via CJMTK, 3) Distributed Common Ground System Army via CJMTK and 4) the Army's Future Combat System via CJMTK. Efficiencies: 1) Software reuse: Transition via NGA's Commercial Joint Mapping Toolkit (CJMTK) and make the software tools available to over 207 approved Joint C4ISR programs and operational					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
on military systems using either Windows, Solaris (Unix) or Linux operating systems. 2) Common integration and use of tools and products. CJMTK will provide, for the first time, reference implementation guidance regarding software, services and resulting product interaction using the JC3IEDM. 3) Single approach to interoperability across Joint and Coalition Systems for geospatial Battle Command Information. 4) Early risk mitigation. Accelerated transition allows the Army's Future Combat System and Distributed Common Ground System-Army (DCGS-A) and Digital Topographic Support System (DTSS) to evaluate and adopt design methods, procedures and processes in early spirals of development. TTI accelerates the delivery of these tools by one year. *FY 2009 Accomplishments:* Transitioned six (6) decision support tools, aggregated services and data/ information models for incorporation in the Army mandated Joint C3 Information Exchange Data Model (JC3IEDM). Outcomes: (1) Common, Joint Battle Command software tools and services ensuring consistent, actionable information from terrain and weather analysis, enabling shared awareness, empowering predictive analysis and providing a common geo-environmental basis to the Common Operating Picture (COP) or Common Relevant Operating Picture (CROP); (2) Extended capability to share actionable, C4ISR relevant, geospatial and weather information with Army and Coalition partners via the extension of the Joint C3 Information Exchange Data Model (JC3IEDM); and (3) Defense Information Service Agency (DISA) compliant analytic software services.					
Precision Fires Image Software Suite Handheld Capability (Navy)	1.300	1.420	0.000	0.000	0.000
Currently Overseas Contingency Operations (OCO) missions on the ground are planned using traditional means and require dismounted operators, (conventional and Special Operations Forces), who do not carry laptop computers. The mission set is currently supported by paper (maps, printouts of images, etc.). The objective of this project is to integrate Battlespace Awareness (Mission Planning, Force Protection, Direct Action, etc.) capability on a Windows CE/mobile handheld computer by building					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
upon already proven and deployed technology. The availability of these software tools on a handheld computer will immediately advance warfighter capabilities by enhancing situational awareness, precision targeting, and rapid employment at the tactical level. Program Outputs and Efficiencies: This program will generate and transition a Government-Off-The-Shelf (GOTS) software suite that provides image, video, and geographical capabilities on the Army's Pocket Sized Forward Entry Devices (PFED) and compatible Special Operations Forces Windows mobile handheld computers. These forward operating Battlespace Awareness applications will be built around the previously transitioned and deployed Precision Fires Image (PFI), which is a National Geospatial-Intelligence Agency (NGA) validated, CENTCOM approved, image-based targeting tool for coordinate-seeking weapons. Integration to the handheld computer will be advantageous in achieving advanced mission capability with less weight, space, and provide shorter operational readiness delays. The TTI funding will accelerate the acquisition and integration of this handheld software capability by two to three years. *FY 2009 Accomplishments:* The first year focused on: 1) Gridded Reference Graphics (GRG's), Collateral Damage Estimation (CDE); 2) Importing route capability; and 3) Inclusion of the Combatant Commander's No Strike List. This provided: 1) The capability to use Windows XP/Vista computers to generate PFI's from any image (i.e. commercial satellite, Global Hawk, national systems) that has the meta-data required to support coordinates so that missions can be run using a variety of images; 2) basic graphics and drawing capability to any 3rd party application by generation of a generic shared object module on the CE/ Mobile devices; and 3) the ability to work directly with dismounted users (Special Operations and Conventional Forces) during a series of events and before deployment to inject advanced capability and Tactics Techniques and Procedures (TTP's) designed to save lives and successfully prosecute Overseas Contingency Operations (OCO) missions. Technology was transitioned on a six-month cycle with enhancements integrated into the PFED baseline based on blocking cycles and integrate with an initial Program of Instruction (POI) at each Service's schoolhouse.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2010 Plans: The second year will focus on Battlespace Awareness directed at specific mission sets, which include Direct Action (DA), Leadership Interdiction Operations (LIO), Mobility and Force Protection (FP). Integration with other imagery types will be accomplished as well as integration with the Rapid Delivery of Online Geospatial Intelligence (GEOINT) (RDOG) program to provide current imagery directly to the warfighter. A "low visibility" or "Red night mode" as required by the operators will be produced. Product upgrades will deployed on six month transition upgrade cycles, testing capability with scheduled exercises, and working with the instructors and schoolhouses.					
Magneto-Rheological (MR) Fluid Suspension System for Stryker (Army) The objective of the project is the direct replacement of the Stryker Family of Vehicles (FOV) passive suspension system with the Magneto-Rheological (MR) Fluid Semiactive Suspension System during the Stryker Modernization Program (S-MOD). The MR Suspension System significantly reduces shock and vibration levels, improves vehicle mobility and handling, and improves chassis stability, thereby improving crew responsiveness during target acquisition and engagement as well as improving firing accuracy for the Mobile Gun System (MGS). The TTI effort will accelerate the integration activity to the Stryker fleet by 8-12 months. Program Outputs and Efficiencies: The MR Suspension technology is low risk and will provide outstanding vehicle performance, including cross-country speed improvements up to 72 percent, vehicle hull shock and vibration reductions up to 60 percent, a 30 percent improvement in vehicle handling stability, and greater than 50 percent improvement in firing accuracy. The MR suspension improvement in ride performance will also reduce operator fatigue, thereby increasing crew sustainment and operational effectiveness.	2.900	1.335	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: Completed Tank-Automotive and Armaments Command (TACOM) Life Cycle Management Command (LCMC) assessments, test plans, and reports, procured contracts, solicited cost estimates and test plans from government testing facilities and generated reports of each of the following testing phases. 1) Design Iteration and analysis: augmented the Wheeled Vehicle Power and Mobility Advanced Technology Objective - Development (ATO-D) for system/subsystem design iterations and analysis. 2) Subcomponent Endurance Testing: performed design iterations of the current damper hardware and developed subcomponents of the newly iterated design using the predetermined Stryker Mission Profile provided by the Program Management Office for the Stryker Brigade Combat Team (PMO SBCT). 3) Component Endurance and Environmental Testing: performed endurance testing of the newly iterated MR damper design using the predetermined Stryker Mission Profile provided by PMO SBCT at both ambient temperature and also in a cold chamber to determine the durability of the system. 4) Full Vehicle Endurance Simulation Testing: developed and installed a full vehicle set of MR dampers for a Stryker vehicle, which were provided by PMO SBCT, for the purpose of endurance testing the vehicle *FY 2010 Plans:* Vehicle Baseline Characterization at Yuma Proving Grounds (YPG): generate data for the purpose of replicating and comparing to the MR Suspension Endurance Test on the 8-post shaker at the Tank Automotive Research, Development and Engineering Center (TARDEC).					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Full Vehicle Endurance Simulation Testing at TARDEC: simulate 3000 miles of the most strenuous courses from the program manager approved Mobile Gun System (GGS) Reliability Availability and Maintainability (RAM) Mission Profile Test. Full Vehicle Endurance Testing at YPG: 3000 miles of the most strenuous courses from the PM SBCT approved MGS RAM Mission Profile Test S-MOD Vehicle Demonstration: S-MOD vehicle demonstration will take place at Aberdeen Proving Grounds. The Suspension Trade Study decision is based on the performance of the system during this vehicle demonstration.					
Polymer Light Emitting Diode (PLED) Identification of Friend or Foe (IFF) (USSOCOM) United States Special Operations Command users currently lack adequate, mutually recognizable, and intuitive IFF systems that are accepted and interpreted across the command. An improved IFF system is required to mitigate potential friendly fire incidents within Special Operations Forces (SOF). The objective of this project is implementation of a next generation IFF system incorporating PLED technology for laser interrogated response visible only to Generation III Night Vision Goggles (NVGs). This Technology Transition Initiative (TTI) will accelerate the program by 12-18 months. In addition to programmatic acceleration, TTI funding will enable acceleration in manufacturing and production of PLED emitters. Program Outputs and Efficiencies: The program will deliver significantly enhanced IFF capability providing an IFF emitter visible to GEN III NVGs operating in the near-infrared (IR) spectrum and initiated only by modulated military laser interrogators (AN/PEQ-5). The effort will focus on developing brighter PLED material with extended emission range, improving efficiency of the system through integration of flat-cell batteries, and development of a streamlined, flexible form-factor that meets user requirements.	0.900	0.375	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: The project: 1) delivered Spiral 1 PLED IFF Tag prototypes (100 units); 2) completed Limited User Assessment of the Spiral 1 prototypes; and 3) drafted an IFF Annex to the Special Operations Personal Equipment Advanced Requirements (SPEAR) Operational Requirement Document (ORD). *FY 2010 Plans:* This project will develop and produce 200 Spiral 2 Prototype IFF PLED Tags based on user defined modifications generated during the FY 2009 user evaluation and requirements development process and conduct an Operational Test to support a procurement decision and potential initial operating capability (IOC) in 2010.					
155mm M1122 (formerly M107E1) IM Training Projectile (Army) The objective of this program is to provide artillerymen with a safer, combat-representative, less expensive, 155mm training round that would be Insensitive Munitions (IM) compliant. This new training round will be used in lieu of the 155mm M107 high explosive (HE) wartime projectile and provides the look, feel and flight characteristics of the wartime M795 HE projectile. The plan includes reutilization of M483 shell bodies (from the M483 demilitarized (DEMIL) effort driven by End-of-Life and Cluster Munition Elimination policy issues) and utilizes the IMX-101 Extremely Insensitive Detonating Substance (EIDS) explosive formulation (a non-TNT formulation leveraged under an ongoing FY2008 TTI project) to produce the M1122 projectile. TTI funding accelerates the transition of this capability by one year. Program Outputs and Efficiencies: 1) Enhances IM performance; 2) Reduces training costs; 3) Improves logistics safety; 4) Enhances training by more closely replicating the operational capability; and 5) Improves soldier safety during training.	2.065	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: In FY09 this project baselined the final design and performed qualification testing to support a Milestone C Type Classification and loaded and tested the projectiles according to Hazard Classification testing requirements given in TB700-2 (the IM requirements in MIL STD 2105C).					
Improved Tactical Air Launched Decoy – Jamming (ITALD-J) Project (Navy) This project will transition a compact payload for a new variant of ITALD using component designs developed under ONR Future Naval Capabilities program funding. Additional information is For Official Use Only (FOUO). Program Outputs and Efficiencies: This project will integrate and transition a new payload into the currently fielded ITALD. Four form-fit systems and firmware will be delivered. *FY 2009 Accomplishments:* Vehicle and avionics modifications were completed and repackaged together. *FY 2010 Plans:* Complete environmental and flight testing and deliver the prototypes to the program of record.	0.802	0.990	0.000	0.000	0.000
Hellfire Height of Burst (HOB) Sensor (Army) The Hellfire Height of Burst Sensor is a miniaturized radio frequency (RF) or laser based target detection device that will be integrated into the new Electronic Safe and Arm Device (ESAD) being incorporated into the next generation Hellfire missile (Hellfire R). The HOB sensor provides for improved lethality against targets in the open by detonating the warhead at a height above ground optimized for these targets. This TTI project funds the final design and engineering of the HOB sensor optimized for Hellfire, provides component and system level environmental and hardware-in-the-loop	0.500	2.665	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
testing, and allows two flight tests of HOB sensor equipped missiles. TTI funding accelerates the delivery of this capability by two years. Program Outputs and Efficiencies: HOB sensor for the Hellfire AGM-114R missile. The HOB sensor will be integrated into the Hellfire missile and undergo hardware-in-the-loop, environmental, and flight testing as part of the TTI effort. The final outcome will be two missile flights incorporating the HOB sensor. The first flight will replace the warhead with a telemetry package to record the missile flight data as well as the point at which the HOB sensor triggers the warhead. The second flight will incorporate both the HOB sensor and the Hellfire warhead. Lethality data will be collected to validate the modeled performance against targets in the open. Simulation has shown that the HOB sensor will significantly increase the lethality when fired from platforms that allow a steep angle of impact. TTI accelerates the transition of this capability by two years. *FY 2009 Accomplishments:* The requirements for the HOB sensor were finalized. Modifications to the Hellfire arming device were initiated. *FY 2010 Plans:* Performance testing of the HOB sensors as well as hardware-in-the-loop and environmental testing and two flight tests are scheduled for FY 2010.					
Hellfire II Next Generation Captive Carry Health Monitor (NG-CCHM) (Army) The Hellfire II NG-CCHM is a missile health monitoring device that measures and records operational and environmental stresses tailored to the most recent Hellfire II missile design, the AGM-114R model. The NG-CCHM is conceiHOB ved as a self-powered, low-cost autonomous system capable of measuring and recording key health status parameters. It will be an electronic data acquisition device embedded into each missile and will be optimized for long life to automatically record Captive Carry hours, temperature exposure,	0.350	2.535	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
and possibly humidity exposure and drop shock events. The NG-CCHM will enable the warfighter to ascertain if a missile has been subjected to excessive use or exceeded environmental design parameters that may prevent the missile from performing according to specifications. Program Outputs and Efficiencies: System requirements trade study, preliminary design review, critical design review, design verification and analysis activities. This effort will leverage past and ongoing Army Aviation and Missile Research Development and Engineering Center (AMRDEC) Science & Technology (S&T) efforts, specifically the Remote Readiness Asset Prognostics and Diagnostics System (RRAPDS). Initiated as a Science and Technology Objective (STO) in FY00-02 timeframe, RRAPDS is a missile health monitoring system that senses and measures the environments to which a missile has been exposed inside its storage container. Key technologies of this system are integrated into Patriot, Precision Attack Missile, and Ground Multiple Launch Rocket System. An applied research effort titled "Missile Sustainment Technology" that began in FY07 will be leveraged. The primary efficiencies expected from the NG-CCHM effort are reduced Operations and Maintenance (O&M) costs and maintenance burden to the warfighter, increased reliability and availability, and enhanced system safety; the residual from these efficiencies is increased readiness. TTI funding accelerates the delivery of this capability by two years. *FY 2009 Accomplishments:* The system requirements trade study was completed. *FY 2010 Plans:* Based on the trade study completed in FY 2009, the selection of sensors to be used in the monitoring device is underway. Preliminary design review, critical design review, and design verification and analysis activities are scheduled for FY 2010. The effort will provide form-factored prototypes to support completion of design verification testing. The formal qualification efforts associated with the AGM-114R health monitoring unit will begin in FY 2011.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Accomplishments/Planned Programs Subtotals	24.558	19.208	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Project performance metrics are specific to each effort and include measures identified in the project plans identified above as well . In addition, program completion and success will be monitored against program schedule and deliverable stated in the proposals. The metrics include items such as target dates from project work break down schedules, production measures, production goals, production numbers and demonstration goals and dates. Generic performance metrics applicable to the Technology Transition Initiative (TTI) program includes attainment of Strategic Objective 4-3, Office of the Under Secretary of Defense, Acquisition, Technology & Logistics (OUSD (AT&L)). The title of this objective is "Speed technology transition focused on warfighting needs" and the metrics for this objective and the objective of TTI is to transition 30% of completing demonstrations program per year.

FY 2009 Performance: The Technology Transition Initiative demonstrated a transition rate of 66% and exceeded the 30% goal identified in Strategic Objective 4-3.

In FY 2009, initiated the new start of 5 projects and concluded the activities on continuing projects with the result of 6 technologies transitioning to the warfighter.

FY 2010 Goal: Initiate the new start of 5 projects and conclude the activities on continuing projects with the result of at least 16 technologies transitioning to the warfighter.

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COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	100.253	106.800	111.946	0.000	111.946	113.999	115.297	117.153	119.245	Continuing	Continuing
P808: *Joint Experimentation*	100.253	106.800	111.946	0.000	111.946	113.999	115.297	117.153	119.245	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Joint Experimentation (JE) Program Element is the lynchpin resource underwriting a diverse portfolio of experiments and concept development activities addressing the needs of the joint warfighter. Projects typically confirm critical joint mission capability gaps; identify potential remedies; explore a range of Doctrine, Organizational, Training, Materiel, Leadership, Personnel, Facilities, and Policy (DOTMLPF-P) solutions; and establish the best path to solving security challenges. Experiments span a spectrum from early efforts to develop new joint operational concepts, to refinement of joint doctrine, to scenario-based examination of potential technology-based solutions. By defining emergent shortfalls and exploring force enhancement options, JE is essentially an early risk mitigation tool preceding implementation of doctrine changes, advanced prototype demonstrations and acquisition decision investments. Joint Combatant Commanders (COCOMs) and Services are the primary customers of projects funded by the JE Program, but these projects provide collateral benefits to a wider Defense Experimentation Enterprise including Agencies and the Office of the Secretary of Defense (OSD) as well as intra-government, international and Non-Government Organization (NGO) partners. The experiments funded by this program establish the path to resolve current joint warfighting deficiencies and lay the foundation for effective future joint forces. Director, Defense Research & Engineering (DDR&E) within the Office of the Secretary of Defense (OSD) provides oversight to ensure alignment with strategic guidance and emphasizes disciplined design and cost control of individual projects with meaningful results that can be assessed with metrics based on incremental force improvements. Flexibility is maintained in the JE Program to address emergent requirements identified by Combatant Commanders and Services, and necessary to resolve operational capability gaps that require time sensitive solutions for operational forces. Commander, U.S. Joint Forces Command and Director, Defense Research & Engineering work in concert to provide responsive support to customers and partners.

The JE Program Element provides funding for the Department's Joint Experimentation (JE) effort led by US Joint Forces Command (USJFCOM). The JE Enterprise includes the COCOMs, the military services, the National Guard, the Joint Staff, the Office of the Secretary of Defense (OSD), and several Defense Agencies. Intra-government agencies and coalition partners often participate in JCDE processes and projects. JE primarily serves the COCOMs and Services, but important collateral benefits accrue to other members and partners in the extended experimentation community. For example, much of the joint content in military "Title 10" wargames can be traced to coordination within the JE Enterprise. JE experiments originate from an annual call for nominations, as well as an assessment of COCOM identified critical warfighting capability gaps articulated in the Integrated Priority Lists submitted to the Chairman of the Joint Chiefs of Staff (CJCS). JE nominations undergo preliminary analysis by USJFCOM to confirm topic suitability for experimentation and, where feasible, to associate closely related subjects for economy of effort. The resultant list is termed Warfighter Challenges (WFC) and constitutes the list of experimentation efforts eligible for design and execution. The JE enterprise ranks WFCs before

preliminary experimentation plans are developed. In consultation with JE partners, USJFCOM formulates an annual program of experimentation intended to support the widest customer base, while addressing the highest priorities and yielding meaningful outcomes.

JE experiments and activities examine potential solutions for COCOM operational needs through targeted DOTMLPF-P improvements. JE tackles joint capability issues demanding sophisticated analysis, innovative design and complex execution. JE addresses topics that would prove difficult for individual COCOMs and Services to capture in the context of their immediate operational and force generation responsibilities. Experiments and efforts produce a range of outcomes inclusive of fundamental joint doctrine, inputs to major policy documents such as Guidance for Development of the Force (GDF) and Guidance for Employment of the Force (GEF). In partnership with the COCOMs and military services, JE mitigates operational risk by establishing procedural models to conduct emergent concepts like Irregular Warfare that are not yet instantiated in conventional force generation.

JE examines joint concepts and develops exploratory concepts in an effort to describe how the Joint Force Commander will operate to meet current and future security challenges, and examines the joint capabilities required to execute the concepts. To support the continued transformation of the joint force even while it is engaged in operations around the world, joint concept development applies historical precedents, lessons learned from current operations, and studies the projected joint operational environment to advance the conceptual foundation for the future force. A relatively stabile investment projection for the JE Program drives aggressive efforts to derive greater return on investment for the DoD in the face of increasing demand for projects from COCOMs and joint experimentation partners.

Joint and Service experimentation are complementary efforts. Joint experimentation focuses on the needs of the Joint Force Commander, while Service experimentation enables the components the Joint Force Commander will employ. Complementing the experimentation efforts undertaken by USJFCOM (JCDE directorate), other COCOMs may conduct Limited Objective Experiments (LOEs) to address operational capability gaps and support identification of potential solutions for theater specific and functional joint warfighter needs, as part of the overall JCDE campaign. Within the process, the JCDE enterprise leverages Service wargame/experimentation to address joint challenges. All experimentation activities undertaken are coordinated within the JCDE enterprise to cover gaps and avoid unnecessary duplication, and the results are reported to the enterprise. The collaborative planning effort of the JCDE enterprise is intended to ensure joint context, concepts, and anticipated capabilities are effectively integrated into service experimentation as appropriate.

A biennial report captures activities across the Defense Experimentation domain to inform Congress of program execution and project accomplishments.

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
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B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	114.947	124.480	0.000	0.000	0.000
Current President's Budget	100.253	106.800	111.946	0.000	111.946
Total Adjustments	-14.694	-17.680	111.946	0.000	111.946
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		-20.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		2.320			
• Congressional Directed Transfers		0.000			
• Reprogrammings	-5.436	0.000			
• SBIR/STTR Transfer	-2.620	0.000			
• Other Program Adjustments	-6.638	0.000	111.946	0.000	111.946

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

	FY 2009	FY 2010
Project: P808: *Joint Experimentation*		
Congressional Add: *Collaboration Gateway*	1.200	0.000
Congressional Add: *Tidewater Full Scale Exercise*	0.000	2.320
Congressional Add Subtotals for Project: P808	1.200	2.320
Congressional Add Totals for all Projects	1.200	2.320

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense											DATE: February 2010
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COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P808: *Joint Experimentation*	100.253	106.800	111.946	0.000	111.946	113.999	115.297	117.153	119.245	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Joint Experimentation (JE) Program Element is the lynchpin resource underwriting a diverse portfolio of experiments and concept development activities addressing the needs of the joint warfighter. Projects typically confirm critical joint mission capability gaps; identify potential remedies; explore a range of Doctrine, Organizational, Training, Materiel, Leadership, Personnel, Facilities, and Policy (DOTMLPF-P) solutions; and establish the best path to solving security challenges. Experiments span a spectrum from early efforts to develop new joint operational concepts, to refinement of joint doctrine, to scenario-based examination of potential technology-based solutions. By defining emergent shortfalls and exploring force enhancement options, JE is essentially an early risk mitigation tool preceding implementation of doctrine changes, advanced prototype demonstrations and acquisition decision investments. Joint Combatant Commanders (COCOMs) and Services are the primary customers of projects funded by the JE Program, but these projects provide collateral benefits to a wider Defense Experimentation Enterprise including Agencies and the Office of the Secretary of Defense (OSD) as well as intra-government, international and Non-Government Organization (NGO) partners. The experiments funded by this program establish the path to resolve current joint warfighting deficiencies and lay the foundation for effective future joint forces. Director, Defense Research & Engineering (DDR&E) within the Office of the Secretary of Defense (OSD) provides oversight to ensure alignment with strategic guidance and emphasizes disciplined design and cost control of individual projects with meaningful results that can be assessed with metrics based on incremental force improvements. Flexibility is maintained in the JE Program to address emergent requirements identified by Combatant Commanders and necessary to resolve operational capability gaps that require time sensitive solutions for operational forces. Commander, U.S. Joint Forces Command and Director, Defense Research & Engineering work in concert to provide responsive support to experimentation customers and partners.

The JE Program Element provides funding for the Department's Joint Experimentation (JE) effort led by US Joint Forces Command (USJFCOM). The JE Enterprise includes the COCOMs, the military services, the National Guard, the Joint Staff, the Office of the Secretary of Defense (OSD), and several Defense Agencies. Intra-government agencies and coalition partners often participate in JCDE processes and projects. JE primarily serves the COCOMs and services, but important collateral benefits accrue to other members and partners in the extended experimentation community. For example, much of the joint content in military "Title 10" wargames can be traced to coordination within the JE Enterprise. JE experiments originate from an annual call for nominations, as well as an assessment of COCOM identified critical warfighting capability gaps articulated in the Integrated Priority Lists submitted to the Chairman of the Joint Chiefs of Staff (CJCS). JE nominations undergo preliminary analysis by USJFCOM to confirm topic suitability for experimentation and, where feasible, to associate closely related subjects for economy of effort. The resultant list is termed Warfighter Challenges (WFC) and constitutes the list of experimentation efforts eligible for design and execution. The JE enterprise ranks WFCs before preliminary experimentation plans are developed. In consultation with JE partners, USJFCOM formulates an annual program of experimentation intended to support the widest customer base, while addressing the highest priorities and yielding meaningful outcomes.

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JE experiments and activities examine potential solutions for COCOM operational needs through targeted DOTMLPF-P improvements. JE tackles joint capability issues demanding sophisticated analysis, innovative design and complex execution. JE addresses topics that would prove difficult for individual COCOMs and services to capture in the context of their immediate operational and force generation responsibilities. Experiments and efforts produce a range of outcomes inclusive of fundamental joint doctrine, inputs to major policy documents such as Guidance for Development of the Force (GDF) and Guidance for Employment of the Force (GEF). In partnership with the COCOMs and military services, JE mitigates operational risk by establishing procedural models to conduct emergent concepts like Irregular Warfare that are not yet instantiated in conventional force generation.

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Joint and Service experimentation are complementary efforts. Joint experimentation focuses on the needs of the Joint Force Commander, while Service experimentation enables the components the Joint Force Commander will employ. Complementing the experimentation efforts undertaken by USJFCOM (JCDE directorate), other COCOMs may conduct Limited Objective Experiments (LOEs) to address operational capability gaps and support identification of potential solutions for theater specific and functional joint warfighter needs, as part of the overall JCDE campaign. Within the process, the JCDE enterprise leverages Service wargame/experimentation to address joint challenges. All experimentation activities undertaken are coordinated within the JCDE enterprise to cover gaps and avoid unnecessary duplication, and the results are reported to the enterprise. The collaborative planning effort of the JCDE enterprise is intended to ensure joint context, concepts, and anticipated capabilities are effectively integrated into service experimentation as appropriate.

A biennial report captures activities across the Defense Experimentation domain to inform Congress of program execution and project accomplishments.

Description (JE Program): The JE Program delivers relevant, sufficient, and necessary DOTMLPF-P comprehensive solutions responding to specific needs of Joint Force Commander articulated Warfighter Challenges. Warfighter Challenges focus on solving DoD's most important security challenges now and for the future: inform and are informed by strategic guidance; and address issues from the tactical to strategic levels of war. From the perspective of OSD engagement and oversight, emphasis will be focused on the following refinements to influence the JE business model.

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Refinements to the JE business model. Aiming to constantly improve return on investment, USJFCOM and OSD partners engage partners throughout the Department of Defense to join the experimentation process and to incorporate results in policy, doctrine, tactics, materiel, training and operational procedures. In pragmatic terms, this effort to distill ever greater benefit includes:
- Tracing JE efforts to discriminate changes to joint capabilities.
- Tying JE closer to Department operational analysis & Defense Planning Scenarios.
- Periodically and deliberately rebalancing near-term critical capability adjustments and long-term capability conceptualization.
- Positioning joint experimentation in a larger scheme of overarching capability development that begins with lessons learned and critical analysis, enjoins experimentation, and progresses through demonstration, acquisition, and training.
- Designing experiments for more responsive deliverables through quicker starts, event-driven "go/no go" reviews, and incremental designs permitting faster "do-learn-decide" cycles for continued investment.

Analytical Rigor.
Increased emphasis has been placed on adherence to standards of analytical rigor in design, conduct, and exploitation of experiments. A significant part of this rigor is aligning the JE to warfare areas common to wider areas of Defense analyses. FY 10 and FY 11 experimentation efforts are organized into Lines of Joint Experimentation (LOJX), grouping prioritized war fighter challenges into areas of related or complementary work. This organizational construct facilitates DoD-wide understanding and tracking of planned joint experimentation activities and resulting products and outcomes by matching the Tier 1 Joint Capability Areas. JE work follows seven LOJXs, including: Battlespace Awareness (BA), Building Partnerships (BP), Command & Control (C2), Force Application (FA), Logistics (LOG), Net – Centric (NC) and Protection (P). In addition, in FY 08, USJFCOM employed Community Management and Support to establish the DoD-wide JE Enterprise. The Enterprise will continue to contribute to overall DoD JE results.

Initiatives.
- Contract Vehicle Initiative. USJFCOM completed an ambitious multi-year effort to redesign their contracted support vehicle for JE. Departing from the model of a single large contractor, USJFCOM's awarding of a new contract structure including three prime vendors enables the command to compete bids for individual experiment support. Early results from FY09 indicate noteworthy decline in per event experimentation costs, increasing the enterprises ability to address backlogged requests (warfighter challenges) from enterprise customers.
- Networked Coordination. Introduction of a Virtual Operations Center (VOC) to allow Enterprise-wide transparency and holds the potential for decreasing travel associated with customer service and enterprise-wide coordination. Increasing use of distributed experimentation design will allow geographically separated groups to join experiment projects from their home bases, again saving travel funds and increasing potential partner base.
- Transition of the JCDE enterprise from an independent computer network to the USJFCOM computer network, and a consolidation of Information Technology support have potential to further decrease indirect cost within the enterprise.

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FY10-11 experimentation efforts seek to provide innovative joint solutions and joint interoperability standards to address capability shortfalls identified by Warfighter Challenges organized within the DoD Joint Capability Areas (JCA). This organizational construct facilitates DoD-wide understanding and tracking of planned joint experimentation activities and resulting products and outcomes by matching the Tier 1 Joint Capability Areas. The FY10, Warfighter Challenges mapped to seven JCAs: Battlespace Awareness, Building Partnerships, Command and Control, Force Application, Logistics, Net-Centric, and Protection. Force Support and Corporate Management and Support JCAs did not have FY10 Warfighter Challenges that could be mapped to the JCAs. The JE enterprise is capable and prepared to accept Warfighter Challenges from all nine JCA's.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Building Partnerships (BP)	22.764	15.401	23.998	0.000	23.998

The evolving nature of joint operations creates a corresponding need to integrate operations with international, governmental and non-governmental partners to address a wide variety of security challenges using a comprehensive approach.

FY 2009 Accomplishments:

- Provided the defense portion of an integrated interagency security sector assessment to support COCOM/Joint Task Force (JTF) peacetime engagement planning; validated in Albania and provided basis for assessment for JTF 435 in Afghanistan.
- Developed seven pre-doctrinal publications to improve coalition force ability to counter irregular adversaries; benefitting 18 international partners and NATO.
- Developed and applied a series of Joint Commander Handbooks to guide planning and coordination with USG agencies; incorporated into Joint doctrine; supported ISAF campaign assessment and JTF 435 rule of law planning.
- Developed Armed Private Security Contractor Guide to enable the Joint Force Commander in establishing operational and functional relationships with armed private security contractors to achieve theater mission objectives.

FY 2010 Plans:

- Develop and validate a planning framework and procedures to support Inter-Agency (IA) steady-state campaign planning.

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
• Develop, validate and integrate methods and tools to synchronize coalitions operations, assess campaign progress, conduct strategic communications and provide enabling awareness and logistics for coalition operations to counter irregular adversaries. • Develop an Integrated Financial Operations operating concepts to describe effective application of fiscal resources & capabilities required to separate the population from insurgents and destroy/disrupt enemy financial networks. *FY 2011 Base Plans:* • Enable the planning and execution of whole-of-government campaign by developing enhanced processes, tools, training, and policy recommendations to plan and execute synchronized whole-of-government deterrence campaigns. • Develop Counter Adversary Information Ops methodology to reduce effectiveness of adversary information operations. • Enable the joint force to gain and maintain access in the global commons by further developing operating concept, joint doctrine and Tactics, Techniques, and Procedures (TTP). • Create a model/architecture that enhances synchronization of SFA activities to enhance national capability to manage support to GCCs and US Embassy Country Teams. • FY 11 projects will be further developed based on Enterprise Warfighter Challenges with continued support to perennial and new Joint Service Experimentation efforts.					
Battlespace Awareness (BA) The evolving nature of joint operations creates a corresponding need to understand complex and dynamic environments through collection, synchronization and visualization of information across all domains, and sharing with interagency and multinational partners.	11.338	11.926	11.778	0.000	11.778

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: • Developed and validated an information-sharing environment using existing data systems and standards; procedures published in an Information-Sharing Guide, distributed within DoD and IA and implemented. • Developed Cross Domain Collaborative Information Environment application and defined processes to conduct real-time collaboration with coalition, interagency, and multinational partners across security and classification domains in order to improve synchronization of joint force operations. *FY 2010 Plans:* • Deliver operating concepts/TTPs to retool persistent surveillance process in support of joint operations. • Transition a series of TTPs and DoD architecture framework (DoDAF) compliant architectures to improve integration and interoperability of Counter Intelligence/Human Intelligence. *FY 2011 Base Plans:* • Enhance integration of multi-source intelligence through improved TTP and technological solutions. • Identify technological solutions and revise Concept of Operations (CONOP) and TTPs for active interrogation and passive Weapons of Mass Destruction (WMD) detectors. • Develop more comprehensive CONOPs, TTPs and supporting tools to employ enhanced capability to counter adversaries in a threat environment. • Improve maritime security operating concept for information sharing among military, IA, international, and commercial partner.s • Revise and refine persistent ISR organizational interfaces and architecture to make better use of technology for multiple geographic areas of operation. • FY 11 projects will be further developed based on Enterprise Warfighter Challenges with continued support to perennial and new Joint Service Experimentation efforts.					
Command and Control (C2)	11.864	12.533	12.378	0.000	12.378

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Joint force commander requires secure, robust and reliable networks to provide responsive command and control in complex, chaotic and degraded information environments to integrate and share information with a full range of partners. *FY 2009 Accomplishments:* • Provided training and education, targeting support and automation initiatives to meet targeting needs of combatant commanders; initiatives were institutionalized by the Joint Staff at the direction of the Joint Chief's of Staff Vice Chairman. *FY 2010 Plans:* • Develop the following products to address shortfalls in DOD's ability to conduct cyberspace operations(CYBEROPS): - Offensive cyber manning model. - Cyberspace operations crisis action planning template. - Computer network attack measures of performance and measures of effectiveness guide. - Joint force commanders' planning guide for cyberspace operations. *FY 2011 Base Plans:* • Conduct prototyping of cyber operations to improve integration and synchronization of cyberspace operations across DOD and IA organizations. • Enable Ballistic Missile Defense C2 across COCOM seams and boundaries by improving planning and collaboration between component commanders and COCOMs. • Develop capabilities, processes and procedures across all levels of warfare for the continuation of operations in a degraded communications environment, including cyber attack. • FY 11 projects will be further developed based on Enterprise Warfighter Challenges with continued support to perennial and new Joint Service Experimentation efforts.					
Force Application (FA)	14.606	15.618	15.426	0.000	15.426

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Joint Force Commander requires improved kinetic or non-kinetic capabilities to maneuver and engage adversaries from political, strategic, operational, and tactical perspectives. *FY 2009 Accomplishments:* • Developed capstone concept for joint operations to provide force development and policy recommendations that informed QDR development and identified significant joint force development implications. • Co-authored with USSOCOM, Irregular Warfare: Countering Irregular Threats JOC to shape future force and capability development. *FY 2010 Plans:* • Develop military activity concepts outlining future capabilities required to address Combat, Security, Engagement and Relief and Reconstruction activities as they relate to the future joint operating environment. • Develop operating concept, CONOPs and TTPs to codify procedures and joint enabling capabilities for distributing joint forces. *FY 2011 Base Plans:* • Enhance organizational interfaces and processes to improve integration, synchronization and execution of offensive global cyber operations. • Increase capability to rapidly determine the source of, and appropriate response to, a major cyber intrusion/attack. • Identify joint force operating capabilities required to recognize, defend and counter cyber attacks. • FY 11 projects will be further developed based on Enterprise Warfighter Challenges with continued support to perennial and new Joint Service Experimentation efforts.					
Logistics (Log)	17.985	19.593	19.351	0.000	19.351

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Joint Force Commander requires responsive, agile logistics support to project force, sustain operations and ensure freedom of action wherever the force engages and in whatever form the engagement takes. *FY 2009 Accomplishments:* • Identified joint seabasing capabilities required for overcoming or mitigating identified gaps. • Developed coalition deployment planner CONOPs and TTPs for logistics planning in multinational coalition force across national boundaries including identification of coalition force deployment and transportation scheduling requirements. *FY 2010 Plans:* • Develop standardized multinational logistics procedures and information exchange requirements to synchronize logistics operations with initial focus on AFRICOM AOR. • Develop and deliver documentation of logistics support requirements for Joint Distributed Operations that enabled the JFC to project and sustain joint forces in support of joint distributed operations. *FY 2011 Base Plans:* • Apply logistics integration, synchronization and efficiency of theater deployment and resupply to the point of execution. • Increase effectiveness of processes and procedures that allow synchronization of logistics support • Increase ability to execute strategic deployment and distribution to the point of effect where an organization is employed or a commodity is consumed • Expand ability to implement a scalable, responsive, and effective intra-theater distribution system to support combat, security, engagement, and relief and reconstruction activities • Enhance capability to establish joint logistics control mechanisms to deliver, position, and sustain the force • Provide scalable, responsive and flexible joint enablers to support and sustain globally distributed SOF.					

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B. Accomplishments/Planned Program ($ in Millions)

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• FY 11 projects will be further developed based on Enterprise Warfighter Challenges with continued support to perennial and new Joint Service Experimentation efforts.					
Protection (P)	14.946	16.088	15.890	0.000	15.890
Joint Force Commander lacks sufficient ability to detect, prevent and mitigate adverse effects of attacks on personnel (combatant/non-combatant) and physical assets of the United States, allies and friends. *FY 2009 Accomplishments:* • Defined current authorities, responsibilities, capabilities and identified gaps and seams throughout DOD and USG agencies to resolve critical challenges in combating WMD operations. *FY 2010 Plans:* • Identify organizational and operational construct to detect, interdict and seize, destroy or defeat nuclear yield devices to fill identified capability gaps in WMD mission areas. • Identify organizational structures, architectures, processes, capabilities, and supporting authorities enabling development of an operating concept that defined DOD's role in Non-Domestic Consequence Management (NDCM). • Develop a concept and commander's handbook, and identify promising mid-term capabilities for countering irregular threats to air operations. • Identify requirements and develop CONOPs and TTPs to counter irregular adversary ability to deploy and employ Precision Guided Munitions. *FY 2011 Base Plans:* • Expand the joint force capability to detect, track and engage the full range of missile threats against the homeland. • Increase effectiveness of the CBRNE response sourcing and sustainment by improving an operating concept and organizational construct.					

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B. Accomplishments/Planned Program ($ in Millions)

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• Identify technology, processes and procedures leading to an improved ability to detect, characterize, and establish attribution for biological agents employed as WMD; develop an operating concept incorporating all factors to employ a systems approach to countering biological agents through holistic systems approach and non-sensor capability. • FY 11 projects will be further developed based on Enterprise Warfighter Challenges with continued support to perennial and new Joint Service Experimentation efforts.					
Joint Urban Operation (JUO) / Joint Irregular Warfare Center (JIWC)	5.038	5.189	5.100	0.000	5.100
Joint Urban Operations / Joint Irregular Warfare Center: JUO LOJX projects will provide the Joint Force Commander with the ability to lead, coordinate, and integrate the urban operations doctrine, organization, training, and equipment activities of the DOD Components and improve and transform the capabilities of joint forces in conducting urban operations over the full range of urban contingencies. The Joint Irregular Warfare Center (JIWC) leads and directs the integrated USJFCOM approach with DoD, Multinational and Interagency partners for Joint Force Irregular Warfare (IW) concept development, training, integration, doctrine development, and experimentation to ensure Joint Forces IW capabilities meet Combatant Commander campaign and complex contingency requirements. Director, JIWC executes JUO responsibilities for Commander, USJFCOM. *FY 2009 Accomplishments:* • Supported technical development efforts to enhance and accelerate fielding capabilities critical to success in current and future complex, urban, and irregular operations including, Dismounted Urban Tactical Communications study, Unmanned Aerial Systems (UAS) electronic attack payload s, UAS Cargo capability development in support of USFOR-A, joint mission planning toolset (USFOR-A), enhanced crowd modeling capability and conducted analysis of stand-off non-lethal building clearing capabilities. • In conjunction with Army Test and Evaluation Command and OSD Test Resource Management Center (TRMC) completed initial analysis of urban testing capabilities as part of the Urban Environment Test Capabilities (UETC) study.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
• Identified the Joint Urban Operations (JUO) unique capability gaps within the JUO Joint Integrating Concept (JIC) 12 required capabilities, and production of sufficient data to achieve transition. • Developed the JUO Master Plan as the overarching strategy to provide direction to DOTMLPF-P initiatives and supporting Joint Capability Integration & Development System (JCIDS) documentation. • Executed discovery seminar wargames with multi-national, interagency, and academic partners to develop understanding of how to positively influence relevant populations and foster multi-national support during conflict "shaping" in complex operational environments and when required defeat adversaries embedded within urban areas while protecting the population and society. (Joint Urban Warrior 09 and US-Israel Hybrid Threat Seminar) • Conducted the Small Unit Decision Making Limited Objective Experiment (LOE) which identified how war fighters make decisions under stress (sensory overload). The results informed Service training programs of record to develop realistic combat training environments for live, virtual and constructive (LVC) training/ decision making (tactical, moral, legal and ethical).					
FY 2010 Plans: • Continue development, articulation and refinement of DOD Joint Urban Operations Master Plan, as a comprehensive document describing DoD's approach to lead, coordinate, and integrate urban operations doctrine, organization, training, and equipment that transform the capability to conduct urban operations. • Partner with the Joint Unmanned Aerial System Center of Excellence (JUAS COE) to assess current and planned efforts to employ unmanned aircraft systems (UAS) for Foreign Internal Defense and Influence Operations and in support of current operations. • Develop the DoD Test and Evaluation Strategic Plan to improve the replication of the Urban Environment for T&E, that results in better understanding and risk assessment in the system development process. • Lead the enterprise partnership improving M&S capabilities related to the small unit training simulations and urban environment to optimize service programs and improve population models that support training, analysis and experimentation.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
• Lead and coordinate efforts to identify gaps/shortfalls, assess potential solutions, and make prioritized recommendations to ensure integration of IW and JUO capability development activities across the Joint Capability Integration Development System, Defense Acquisition System, the Planning, Programming, and Budget Execution and other DOTMLPF-P process. • Continue established discovery seminar wargames to build on work optimizing joint and coalition force activities in complex environments. Extend network of multi-national, interagency, and academic partners to advance understanding of how to positively influence relevant populations and when required defeat adversaries embedded and diffused within urban areas. (Joint Irregular Warfare 10 and US-Israel Hybrid Threat Seminar). *FY 2011 Base Plans:* • As part of the program plan, continue to access, at a systems level, capabilities envisioned for deployment against urban target sets. • Lead, coordinate and integrate efforts to identify gaps/shortfalls, assess potential solutions, and make prioritized recommendations to ensure integration of IW and JUO capability development activities across the Joint Capability Integration Development System, Defense Acquisition System, and the Planning, Programming, and Budget Execution, and other DOTMLPF-P processes. • Continue Urban Modeling and Simulation efforts in FY11 to facilitate delivery of culturally-specific crowd/population models to support development of advanced operational capabilities. • Continue refinement of capabilities and technologies to enable small unit training to include human behavior modeling, visualization, and instrumentation to support optimization of service programs. • Continue Joint Irregular Warrior and US-Israeli Hybrid Threat Experimentation seminar wargame series to build on successes in answering multi-national, interagency and defense department challenges in confronting state and non-state threats in various operating environments. • Support JE and other appropriate efforts based on annual Warfighter Challenges by providing joint urban and irregular warfare context and expertise and continue support to emerging requirements from the department and operational theaters as directed.					
Joint Futures Group	0.512	1.133	1.112	0.000	1.112

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603828D8Z: *Joint Experimentation*	**PROJECT** P808: *Joint Experimentation*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
The Joint Futures Group (JFG) is the Command's team to identify the next big challenges or opportunities for the joint force that are not being addressed elsewhere in DOD. It is a unique entity within Joint Forces Command that utilizing analytic and research processes integrates future thinking and extrapolates likely future operational environments within which to generate innovative ideas about challenges and military implications for the Department of Defense. The JFG integrates the results of its "futures" research into down stream processes for concept development, experimentation scenarios, capabilities definition, doctrine, and training. The objective of the JFG is to provide a vision of the future and support identification and articulation of joint force implications, through collection, analysis, synthesis, dissemination of the world's strategic and international relations futures. The current means of articulation is the Joint Operating Environment (JOE) report. Further, the JOE provides the foundational problem statement for the CJCS's Capstone Concept for Joint Operations (CCJO), and is intended to inform the development of Joint Operating Concepts and Joint Integrating Concepts, as well as to provide a framework to experiment with those concepts through its vision of the future. Support to the analytical agenda consists of improving and refining the Defense Planning Scenarios (DPS) and ensuring that the DPSs reflect a balanced and plausible set of irregular and hybrid warfare challenges. *FY 2009 Accomplishments:* • Supported the Chairman's CCJO, completed 2008 JOE and 2009 JOE White Paper Update. Produced research papers with emphasis on the future trends, conditions, challenges, and opportunities faced by future joint warfighting. • At the request of the COCOMs, services, and multinational governments provided "future briefs" to combatant commanders, DOD officials, multinational partners, war colleges, concept developers, Services, and senior contractors. • Supported OSD by developing and refining classified DPS and QDR documents.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603828D8Z: *Joint Experimentation*	**PROJECT** P808: *Joint Experimentation*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
• Allied Command Transformation (ACT) Support: provided U.S.-perspective futures support to NATO's ACT Multiple Futures Project (MFP) and supported the development of NATO future-related analysis, research, and strategic reports. • Delivered: - ACT Futures Study, assessed the top 50 NATO capabilities in a Bi-Strategic Command (ACT/ACO) effort to determine what NATO nations (including United States) need to change to meet the future security environment). - Developed worst case future scenarios and vignettes in support of the CCJO experiment. - Planned, Coordinated and executed a bi-lateral war game focused on the Major Urban Environment of 2025 with the Bundeswehr Transformation Center • Published White Papers: "Future Hybrid Threats", "Battle of Narratives", and "Bazaars of Violence". *FY 2010 Plans:* • Support the Chairman's CCJO review and experimentation program through rewrite and publishing of the 2008 JOE based on that review and experimentation. The 2010 JOE version that will look out to 2035. In support of this effort, produce research papers with emphasis on the future trends, conditions, challenges, and opportunities to be faced by future joint warfighters. • Provide detailed input to support the development of products, papers and classified studies that support the DOD Analytical Agenda. Support will include review and input of OSD DPS scenarios and participation in the DPS process; provide input to the Comprehensive Joint Assessment and other policy and strategy "future focused" documents. • Research, analyze, synthesize and promote a vision of the future that includes critical analysis of battlefield innovation of disruptive technologies through partnership with CIA and DIA. • Specific and measurable outcomes include: - A clear statement of the future challenges and implications for the joint force that allows concepts to be developed to prepare for these challenges. - A set of alternative futures scenarios to guide focused scenario development for joint exercises and experiments.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603828D8Z: *Joint Experimentation*	**PROJECT** P808: *Joint Experimentation*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: • Conduct research and support continued refinement of articulation of the Joint Operating Environment (White Paper for 2011). The JOE is a continuously evolving document, that based on dynamic global change provides clarity on potential alternative futures and the challenges, which are used to identify future implications to the Joint Force could face. • Synthesize and promote a vision of the future that includes critical analysis of future perspectives, battlefield innovation, disruptive technologies, and operational lessons learned. • Support development of solutions to mitigate/overcome future challenges and identification of means to exploit future opportunities. • Inform and develop future scenarios to influence joint wargames and experiments • Support review and input of OSD DPS and participation in the DPS process; provide input to the Comprehensive Joint Assessment and other policy and strategy “future focused” documents. • Specific and measurable outcomes include: - A joint futures narrative that integrates plausible alternative futures, develops military implications of those futures, and guides future operational concepts and requirements. - Inform DoD Joint Experimentation and the Department’s analytic agenda with next big challenges facing the joint force.					
External Experimentation Support (EES) External Experimentation Support enables the COCOMs and Services to conduct experimentation within the joint context in order to build enterprise capacity and to integrate solutions across DOD. This leads to collaborative development, participation and support that inform the warfighter challenges and joint concepts. It provides joint context to Service experimentation through collaborative design, analysis, planning and execution.	0.000	6.999	6.913	0.000	6.913

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603828D8Z: *Joint Experimentation*	**PROJECT** P808: *Joint Experimentation*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: Note: External Experimentation Services have been historically a part of the core JE program and are specifically identified in the exhibit beginning in FY 2010. COCOM Experimentation • Supported USNORTHCOM with joint analysis and consequence management subject matter expertise for two limited objective experiments to revise, inform, and publish the Homeland Defense and Civil Support Joint Operating Concept version 3.0. The subjects of the two limited objective experiments were Scoping Homeland Defense, and Private Sector Contributions and Partnership with DOD. Joint Service Experimentation • Army – Unified Quest 09: Supported the Army's Training and Doctrine Command with joint analysis and joint logistics subject matter expertise for five major experimentation efforts within the Unified Quest 09 campaign of learning. The five experimentation events included: the Commanders' Appreciation and Campaign Design Conference, the Space and Cyber Operations Limited Objective Experiment, the Generating Force Conference, the Staff Exercise, and the Army Future Game. • Army – Earth, Wind, and Fire 09: Supported the Army's Training and Doctrine Command with joint analysis to inform the Joint Air Ground Integration Cell to provide solutions to airspace de-confliction and integration. JFCOM J9 also provided resources to implement a network architecture to link the Army's Battle Lab Simulation Collaboration Environment (BLCSE) and the Air Force's Distributed Mission Operations Network (DMON) for the purpose of executing recurring annual joint experiments such as Earth, Wind, and Fire. • Navy – Global 09: Supported the Navy War College with joint analysis for the purpose of informing a Joint Maritime Fires warfighting challenge.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
• Air Force – Unified Engagement 09: With support to the Air Force in FY09 for the execution Unified Engagement 10 in FY10, provided joint analysis and planning resources to provide solutions to a potential 15 FY10 warfighter challenges and three Chief of Staff, Air Force objectives. • Marines – Expeditionary Warrior 09: Supported the Marine Corps Warfighting Laboratory with joint analysis and subject matter expertise to inform the Counter – Insurgency Joint Integrating Concept, and Seabasing capabilities. *FY 2010 Plans:* COCOM Experimentation • Support to USNORTHCOM with joint analysis and consequence management subject matter expertise for two limited objective experiments to revise the Homeland Defense and Civil Support Joint Operating Concept version 4.0. • Support USSTRATCOM with facilities and network architecture to execute Nimble Titan 10 that will explore coalition mission defense policy, challenges, and solutions. • Provide experiment design/control and joint analysis support to USEUCOM/USAFRICOM/ USTRANSCOM in execution of Theater Lift/Point of Need Delivery (POND). Project will determine near, mid, and long term solution to deliver within 3-5 days a ready-to-employ, task organized element up to brigade-sized or equivalent, to or from a point-of-need, independent of receptive infrastructure. Joint Service Experimentation • Army – Unified Quest 10: Support the Army's Training and Doctrine Command with joint analysis for major irregular warfare experimentation efforts within the Unified Quest 10 campaign of learning.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
• Army – Earth, Wind, and Fire 10: Support the Army's Training and Doctrine Command with joint analysis to inform the Joint Air Ground Integration Cell to provide solutions to airspace de-confliction and integration. • Air Force – Unified Engagement 10: Provide joint analysis and planning resources to provide solutions to warfighter challenges and Chief of Staff, Air Force objectives. • Marines – Expeditionary Warrior 10: Support the Marine Corps Warfighting Laboratory with joint analysis and subject matter expertise to inform the Seabasing concept. *FY 2011 Base Plans:* • FY 11 projects will be further developed based on Enterprise Warfighter Challenges with continued support to perennial and new Joint Service Experimentation efforts.					
Accomplishments/Planned Programs Subtotals	99.053	104.480	111.946	0.000	111.946

	FY 2009	FY 2010
Congressional Add: Collaboration Gateway *FY 2009 Accomplishments:* • Completed development of Collaboration Gateway 2.0 • Completed IV&V testing of CG 2.0 • Completed Operational Use Assessments in CWID09, Trident Warrior 09, Empire Challenge 09 • Completed fielding of CDCIE Chat 1.2 to USCENTCOM (Bagram AFB) • Completed integration of CG 2.0 with DataSyncGuard 3.0, Radiant Mercury 5.0, and ISSE Guard 4.0	1.200	0.000
Congressional Add: Tidewater Full Scale Exercise	0.000	2.320

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
FY 2010 Plans: Funds executed by Virginia Modeling and Simulation Center to implement a multi-agency, statewide emergency modeling and simulation exercise to enhance responses to security threats to the Commonwealth of Virginia. The full scale exercise will involve a coordinated effort between federal, state, and local officials.		
Congressional Adds Subtotals	1.200	2.320

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance of Joint Experimentation efforts is measured by successful development of:
(1) objective validation of enhanced capabilities enabling the joint force commander to perform joint missions.
(2) delivery of relevant, intellectually rigorous joint concepts to enhance or change Joint Doctrine.
(3) confirmed transition of capability/products from experimentation to force implementation through the DOTMLPF-P Change Recommendations (DCR) process.
(4) identification of innovative integrated solutions and joint interoperability standards for Service and Agency capability developers to pursue.
(5) resolution of specific joint concept and capability shortfalls delineated through the JCD&E experimentation campaign plan development process.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603832D8Z: *DoD Modeling and Simulation Management Office*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	30.302	34.226	38.140	0.000	38.140	38.517	38.960	39.592	40.301	Continuing	Continuing
P476: *DoD Modeling and Simulation Management Office*	30.302	34.226	38.140	0.000	38.140	38.517	38.960	39.592	40.301	Continuing	Continuing

A. Mission Description and Budget Item Justification

Modeling and Simulation (M&S) is a key enabler of the Department of Defense (DoD) activities in communities such as acquisition, analysis, experimentation, planning, test & evaluation, and training. The strategic objective of the DoD Modeling and Simulation Management Office is to execute enterprise management of a robust, defense-wide M&S capability. The goal is to enhance the return on DoD's M&S investment through funding and coordinating high-priority activities that: (1) encourage collaboration among M&S stakeholders throughout the DoD; (2) promote outreach and better understanding of defense systems, missions, and operations; (3) support efficiency, reduce duplication, and enhance reuse through improved characterization of M&S programs and resources; and (4) leverage the investment in this National Critical Technology within the DoD, with other governmental agencies, industry, and academia. Under the authority of DoD Directive 5134.1, Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)) provides the oversight for this Modeling and Simulation Management Office Program Element with advice and assistance from a flag-officer level M&S Steering Committee. The Program Element is executed by the Modeling and Simulation Coordination Office (M&S CO) in accordance with DoD Directive 5000.59, Management of Modeling and Simulation, 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.

Comment: Performance in this program is monitored in the following ways:
1. Number of instances where M&S standards have been adopted.
2. Number of M&S standards registered with the Defense Standardization Program.
3. Number of M&S capabilities identified in Community M&S business plans and in the Corporate and Crosscutting Business Plan.
4. Number of new M&S gaps addressed in Community M&S business plans and in the Corporate and Crosscutting Business Plan.
5. Number of policy decisions obtaining M&S Steering Committee concurrence, which result in action with the Communities and Services.
6. Number of M&S resources (tools, data, and services) made visible for reuse.
7. Number of curricula available for educating the M&S workforce.
8. Number of collaborative events held with other DoD Departments and Agencies and with coalition partners.

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
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B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	38.147	38.505	0.000	0.000	0.000
Current President's Budget	30.302	34.226	38.140	0.000	38.140
Total Adjustments	-7.845	-4.279	38.140	0.000	38.140
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	-1.454	0.000			
• SBIR/STTR Transfer	-0.781	0.000			
• Other Program Adustments	-5.610	-4.279	38.140	0.000	38.140

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense											DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				**R-1 ITEM NOMENCLATURE** PE 0603832D8Z: *DoD Modeling and Simulation Management Office*				**PROJECT** P476: *DoD Modeling and Simulation Management Office*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P476: *DoD Modeling and Simulation Management Office*	30.302	34.226	38.140	0.000	38.140	38.517	38.960	39.592	40.301	Continuing	Continuing

A. Mission Description and Budget Item Justification

Modeling and Simulation (M&S) is a key enabler of the Department of Defense (DoD) activities in communities such as acquisition, analysis, experimentation, planning, test & evaluation, and training. The strategic objective of the DoD Modeling and Simulation Management Office is to execute enterprise management of a robust, defense-wide M&S capability. The goal is to enhance the return on DoD's M&S investment through funding and coordinating high-priority activities that: (1) encourage collaboration among M&S stakeholders throughout the DoD; (2) promote outreach and better understanding of defense systems, missions, and operations; (3) support efficiency, reduce duplication, and enhance reuse through improved characterization of M&S programs and resources; and (4) leverage the investment in this National Critical Technology within the DoD, with other governmental agencies, industry, and academia. Under the authority of DoD Directive 5134.1, Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)) provides the oversight for this Modeling and Simulation Management Office Program Element with advice and assistance from a flag-officer level M&S Steering Committee. The Program Element is executed by the Modeling and Simulation Coordination Office (M&S CO) in accordance with DoD Directive 5000.59, Management of Modeling and Simulation, 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.

MSCO is responsible for facilitating and coordinating:
(1) Execution of DoD's Strategic vision for DoD Modeling and Simulation activities.
(2) Oversight and strategic governance of DoD's M&S capabilities and resources.
(3) Development and implementation of policies, plans, procedures, and DoD issuances to manage M&S, to include the M&S Corporate and Crosscutting Business Plan and the community business plans.
(4) Best practices for M&S acquisition, development, management, and use by DoD Components and communities.
(5) Development of M&S technologies to meet identified capability gaps.

MSCO also serves as DoD's:
(1) Lead standardization activity (LSA) for managing modeling and simulation standards and methodologies.
(2) Focal point for coordinating DoD M&S outreach activities and interactions with non-DoD M&S agencies including NATO and Partnership for Peace (PfP) nations, The Technical Cooperation Program (TTCP), and other international Allies.

MSCO objectives for community best business practices include:

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Commonality: making visible and accessible common and crosscutting M&S tools, data, and services.
Reuse: fostering visibility, accessibility, and usability of such components.
Interoperability: creating and maintaining standards that enhance interoperability among the real operations environment, the simulated operations environment, and the range operations environment.
Efficiencies: coordinating enterprise-wide M&S activities for cost efficiency in satisfying departmental strategic requirements including, but not limited to, standards for the use of M&S; DoD M&S Coordination Agents; a DoD M&S Information Analysis Center; and M&S professional development.
Effectiveness: enabling enhanced effectiveness and use of M&S through rapid sharing of readily understandable verification, validation, and accreditation information.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
DoD Modeling and Simulation Management Office	30.302	34.226	38.140	0.000	38.140

FY 2009 Accomplishments:
DoD M&S management implemented the "Strategic Vision for DoD Modeling and Simulation" and its emerging focus areas of standards, interoperability, and visibility. The goal was and is to achieve a set of standards for the development, integration, and conduct of DoD M&S activities; improved interoperability driving the Department towards best business practices across the spectrum of DoD activities; and increased capability to discover and reuse modeling and simulation (tools, data, and services) across the Department. Specific FY 2009 high-level tasks selected included the coordination, development and dissemination of tools for the Department's chief priority--irregular warfare; managing the DoD #1 M&S priority--standards including active participation in the Simulation Interoperability Standards Organization (SISO); developing distributed simulation architectures; evolving towards a net-centric architecture; implementing new Verification, Validation and Accreditation (VV&A) technologies and processes; served as the Lead Standardization Activity (LSA) for managing M&S standards and methodologies; and focal point for coordinating DoD M&S outreach activities with other Federal agencies to include DHS, DoE and industry to include the National Training and Simulation Association (NTSA) and the National Defense Industrial Association (NDIA); and interactions with non-DoD M&S agencies including the North Atlantic Treaty Organization (NATO) and Partnership for Peace (PfP) nations, The Technical Cooperation Program (TTCP), and other international Allies. These tasks still under development will produce and apply enterprise-

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
wide best business practices which encourage commonality, interoperability, reuse, and cost savings across the Services, Combatant Commands, and OSD-level activities. These efforts are essential to informing choices for Joint solutions and providing for improved enterprise efficiency, effectiveness, and return on investment (ROI) for M&S. *FY 2010 Plans:* DoD M&S management is implementing the "Strategic Vision for DoD Modeling and Simulation" and its focus areas of standards, interoperability, and visibility. The goals are to achieve a set of standards for the development, integration, and conduct of DoD M&S activities; improve interoperability driving the Department towards best business practices across the spectrum of DoD activities; and increase capability to discover and reuse modeling and simulation (tools, data, and services) across the Department. Selected high-level tasks for FY 2010 include the continued coordination, development and dissemination of tools for the Department's chief priority – irregular warfare; managing the DoD #1 M&S priority – standards; developing distributed simulation architectures; evolving towards a net-centric architecture; implementing new Verification, Validation and Accreditation (VV&A) technologies and processes; continuing as lead standardization activity (LSA) for managing M&S standards and methodologies; and serving as focal point for coordinating DoD M&S outreach activities and collaboration with non-DoD M&S agencies including NATO and Partnership for Peace (PfP) nations, The Technical Cooperation Program (TTCP), and other international Allies. These tasks will develop, produce, and apply enterprise-wide planning and best business practices which will encourage commonality, interoperability, reuse, and cost savings across Services, Combatant Commands, and OSD-level activities. These efforts are essential to informing choices for Joint solutions and providing for improved enterprise efficiency, effectiveness, and return on investment (ROI) for M&S. *FY 2011 Base Plans:* DoD M&S management will continue implementing the "Strategic Vision for DoD Modeling and Simulation" and its focus areas of standards, interoperability, and visibility. Validated objectives for FY 2011 program element (PE) funding include enhancing M&S support to the warfighter; improving					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
M&S used for analyzing irregular warfare; increasing the credibility, transparency, and visibility of M&S applications and M&S technology; sustaining and transitioning the projects and results of previous fiscal years' High Level Tasks; ensuring that the Verification, Validation and Accreditation (VV&A) process and guidance is provided for specific applications and uses; and producing a new DoD M&S Management instruction. Specific high-level tasks planned for FY 2011 include enhancing analytical capabilities and continuing coordinating the development and dissemination of M&S tools for irregular warfare; continuing managing M&S standards; developing a VV&A roadmap; sustaining M&S education; continuing as lead standardization activity (LSA) for managing M&S standards and methodologies; and serving as focal point for coordinating DoD M&S outreach activities and collaboration with non-DoD M&S agencies including NATO and Partnership for Peace (PfP) nations, The Technical Cooperation Program (TTCP), and other Allies. These planned tasks will continue developing, producing, and applying enterprise-wide planning and best business practices to encourage commonality, interoperability, reuse, and cost savings across the Services, Combatant Commands, and OSD-level activities. These efforts are essential to informing choices for Joint solutions and providing for improved enterprise efficiency, effectiveness, and return on investment (ROI) for M&S.					
Accomplishments/Planned Programs Subtotals	30.302	34.226	38.140	0.000	38.140

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Comment: Performance in this program is monitored in the following ways:

1. Number of instances where M&S standards have been adopted.
2. Number of M&S standards registered with the Defense Standardization Program.

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3. Number of M&S capabilities identified in Community M&S business plans and in the Corporate and Crosscutting Business Plan.
4. Number of new M&S gaps addressed in Community M&S business plans and in the Corporate and Crosscutting Business Plan.
5. Number of policy decisions obtaining M&S Steering Committee concurrence, which result in action with the Communities and Services.
6. Number of M&S resources (tools, data, and services) made visible for reuse.
7. Number of curricula available for educating the M&S workforce.
8. Number of collaborative events held with other DoD Departments and Agencies and with coalition partners.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603941D8Z: *Test and Evaluation/Science and Technology*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	90.467	94.960	97.642	0.000	97.642	99.729	102.392	103.912	105.560	Continuing	Continuing
1: *Advanced Propulsion Test Technology*	17.598	18.519	18.907	0.000	18.907	18.846	19.116	19.400	19.707	Continuing	Continuing
2: *Spectrum Efficient Technology*	4.847	6.210	10.753	0.000	10.753	10.909	11.057	11.227	11.408	Continuing	Continuing
3: *Multi-Spectral Test*	11.421	18.780	16.294	0.000	16.294	12.794	12.836	13.029	13.237	Continuing	Continuing
4: *Advanced Instrumentation Systems Technology*	5.414	6.069	6.672	0.000	6.672	8.680	9.964	10.105	10.259	Continuing	Continuing
5: *Directed Energy Test*	16.542	20.033	21.044	0.000	21.044	19.329	19.660	19.937	20.241	Continuing	Continuing
6: *Netcentric Systems Test*	11.072	12.478	17.672	0.000	17.672	18.095	18.362	18.634	18.930	Continuing	Continuing
7: *Unmanned and Autonomous System Test*	5.073	6.371	6.300	0.000	6.300	6.475	6.489	6.582	6.684	Continuing	Continuing
8: *Common Range Integrated Instrumentation System*	18.500	6.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
9: *Multi-Level Security*	0.000	0.000	0.000	0.000	0.000	4.601	4.908	4.998	5.094	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 pace evolving weapons technology. The program is critical to ensuring that the Department of Defense (DoD) has the capability to adequately test the advanced systems that will be fielded in the future. To meet this objective, the T&E/S&T program:

- 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 commercial equipment, modeling and simulation, and networking innovations to support T&E.

Additionally, the T&E/S&T program examines emerging T&E requirements derived from joint service initiatives to identify needed technology areas and develop a long-range roadmap for technology insertion. The program leverages and employs applicable 6.2 applied researches from the highly developed technology base in the DoD

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laboratories and test centers, other government agencies, industry, and academia to accelerate the development of new test capabilities. This PE also 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 is funded within the Advanced Technology Development Budget Activity because it develops and demonstrates high payoff technologies for current and future DoD test capabilities.

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	94.153	95.734	0.000	0.000	0.000
Current President's Budget	90.467	94.960	97.642	0.000	97.642
Total Adjustments	-3.686	-0.774	97.642	0.000	97.642
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	-2.183	0.000			
• SBIR/STTR Transfer	-1.503	0.000			
• Program Adjustments	0.000	-0.774	97.642	0.000	97.642

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense											**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				**R-1 ITEM NOMENCLATURE** PE 0603941D8Z: *Test and Evaluation/Science and Technology*				**PROJECT** 1: *Advanced Propulsion Test Technology*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
1: *Advanced Propulsion Test Technology*	17.598	18.519	18.907	0.000	18.907	18.846	19.116	19.400	19.707	Continuing	Continuing

A. Mission Description and Budget Item Justification

This focus area, formerly known as High Speed/Hypersonic Test, has been renamed Advanced Propulsion Test Technology (APTT) to better reflect emerging test and evaluation (T&E) needs and focus area content. APTT develops technologies to enable robust, accurate, and timely T&E of future DoD weapon systems. Current weapon system demonstration and technology developments include high speed and hypersonic air breathing missiles, maneuvering reentry and boost/glide weapons, advanced gun-launched projectiles, and space access systems. These systems require development of high speed turbine, ramjet, scramjet, and combined cycle engines; high temperature materials; thermal protection systems; and thermal management systems. DoD acquisition regulations require weapon systems to undergo a thorough T&E process in order to provide early detection of deficiencies and ensure system suitability and survivability. However, current national T&E infrastructure and capabilities have deficiencies in data accuracy, flight condition duplication and simulation, test productivity, modeling and simulation (M&S) fidelity, and range safety. The APTT focus area is developing advanced T&E technologies in the areas of ground and flight test environments, M&S, and instrumentation to fulfill T&E requirements.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	**FY 2010**	**FY 2011 Base**	**FY 2011 OCO**	**FY 2011 Total**
Advanced Propulsion Test Technology	17.598	18.519	18.907	0.000	18.907
FY 2009 Accomplishments: Completed efforts initiated in prior fiscal years. - Arc Heater Aerothermal: developed technology to improve aerothermal test capabilities for ground test of ballistic reentry vehicles - Clean Air Heater: researched materials for an electrical resistance heating element utilizing advanced materials to provide continuous flow, clean air heat addition up to Mach 7 - In-Flight Combustion Gas Analysis: fabricated and ground-tested a non-intrusive laser spectroscopy diagnostic sensor suitable for in-flight T&E of hypersonic propulsion systems					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- High Heat Flux Sensor: developed a heat flux sensor capable of surviving hypersonic conditions, suitable for ground and flight test - High Pressure Arc Heater: developed technologies to extend the operating regime of arc heater facilities to Mach 8 to 12 to support test of reentry and boost/glide thermal protection systems - M&S for Hypersonic T&E: developed a computational fluid dynamics tool with enhanced physical models of transition, turbulence, chemistry, and heat transfer to verify ground and flight tests - Microelectromechanical System Shear Stress Sensor: developed a high temperature, microelectromechanical-based sensor that can be installed on ground or flight test articles and can withstand the hypersonic environments to directly measure shear stress - Micro Fiber Optical Sensor: developed advanced instrumentation for hypersonic flight test utilizing micro heat transfer sensors for leading edges and pressure sensors for laminar-turbulent transition detection - Test Media Effects: developed advanced diagnostic systems and enhanced computational fluid dynamics tools to include models for improved turbulence, reduced chemical kinetics, and flame holding - Variable Mach Number Nozzle: competing technology with Variable Mach Number Test Capability (see next); developed variable geometry test facility nozzles capable of varying Mach number from 5 to 8 while maintaining uniform flow conditions - Variable Mach Number Test Capability: competing technology with Variable Mach Number Nozzle (see previous); developed variable Mach 5 to 8 test technology using energy addition downstream of the plenum. Continued efforts initiated in prior fiscal years. - Hypersonic Engine-Facility Interaction: performing quantitative evaluations of test media effects and test facility types on engine performance and operability - Hypersonic Nozzle Cooling: developing technology to cool test facility nozzle boundary layer to reduce heat flux and expand nozzle Mach range and life - Hypersonic Test Fuel System: developing a modular fuel conditioning system to characterize fuel delivery and simulate endothermic fuel cooling					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Magnetohydrodynamic Augmentation Hypersonic Facility: developing technology to test future air-breathing propulsion systems using ceramic heater and non-equilibrium magnetohydrodynamic e-beam velocity augmentation to introduce increased uniform flow-field velocity in a T&E facility - Parameter Identification Maneuvers: developing advanced flight test techniques to enable more efficient and productive flight testing - Revolutionary Approach to Time Critical Long Range Strike Missile-In-a-Tunnel Test: developing technology to demonstrate and verify advanced flow diagnostics technologies and M&S codes - Regenerative Storage Heater: developing a storage heater based on advanced cored brick designs and materials to provide clean air heat addition for up to Mach 8 conditions - Short Duration Propulsion T&E: comparing the hypersonic propulsion data generated by impulse and short-duration facilities at Mach 5 to 7 and analyzing the effects of runtime and vitiation. Initiated new research efforts. - Advanced Nozzle Throat Designs: researching methods to extend facility nozzle life and Mach range through determination of advanced materials properties, improved design methods and development of advanced cooling methods - Autonomous Flight Termination and Decision System: developing an autonomous flight termination technology to enhance range safety for high speed and hypersonic systems testing - Mid-Pressure Arc Heater: developing core enabling technologies for high enthalpy, long duration arc heater test in the flight regime of maneuvering reentry, boost/glide, and space access systems Initiated a Broad Agency Announcement (BAA) in FY 2009 to select efforts for FY 2010 award					
FY 2010 Plans: Complete efforts initiated in prior fiscal years. - Hypersonic Engine-Facility Interaction - Hypersonic Nozzle Cooling - Hypersonic Test Fuel System - Parameter Identification Maneuvers - Revolutionary Approach to Time Critical Long Range Strike Missile-In-a-Tunnel					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Regenerative Storage Heater Continue efforts initiated in prior fiscal years. - Advanced Nozzle Throat Design - Autonomous Flight Termination and Decision System - Magnetohydrodynamic Augmentation Hypersonic Facility - Mid-Pressure Arc Heater - Short Duration Propulsion T&E Initiate new research efforts. - Effort(s) to develop advanced regenerative clean air heat addition and variable Mach nozzle technologies to create an integrated system demonstration for transition to a full scale T&E facility - Effort(s) to develop technology to test payload separation from boost/glide and maneuverable reentry vehicles - Effort(s) to develop non-intrusive measurement technology for gas species, thermodynamic properties, and mass flux of high pressure/temperature flows Initiate a BAA in FY 2010 to select efforts for FY 2011 award. *FY 2011 Base Plans:* Complete efforts initiated in prior fiscal years. - Autonomous Flight Termination and Decision System - Magnetohydrodynamic Augmentation Hypersonic Facility - Mid-Pressure Arc Heater - Short Duration Propulsion T&E Continue efforts initiated in prior fiscal years. - Advanced Nozzle Throat Design - Effort(s) to develop advanced regenerative clean air heat addition and variable Mach nozzle technologies to create an integrated system demonstration for transition to a full scale T&E facility - Effort(s) to develop technology to test payload separation from boost/glide and maneuverable reentry vehicles					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Effort(s) to develop non-intrusive measurement technology for gas species, thermodynamic properties, and mass flux of high pressure/temperature flows Initiate new research efforts. - Effort(s) to develop test technologies, techniques, and methodologies to determine full-scale propulsion system performance and operability from subscale tests - Effort(s) to develop technology for continuous flow, clean air heat addition up to Mach 6 to enable full-scale, combined cycle, propulsion system test - Effort(s) to develop M&S codes to accurately predict of flow fields, boundary layer transition, and heat transfer in high speed flow - Effort(s) to develop test technologies and methodologies to support long run time, clean air, true temperature testing above Mach 8 - Effort(s) to develop test technology in support of advanced rail guns - Effort(s) to develop test technology in support of supercavitating torpedoes Initiate a BAA in FY 2011 to select efforts for FY 2012 award. *FY 2011 OCO Plans:* N/A					
Accomplishments/Planned Programs Subtotals	17.598	18.519	18.907	0.000	18.907

C. Other Program Funding Summary ($ in Millions)

N/A

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: PB 2011 Office of Secretary Of Defense											DATE: February 2010
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COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
2: *Spectrum Efficient Technology*	4.847	6.210	10.753	0.000	10.753	10.909	11.057	11.227	11.408	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Spectrum Efficient Technology focus area enables test and evaluation (T&E) of technologies for more efficient use of legacy telemetry bands and expansion into non-traditional areas of the radio frequency spectrum and the optical spectrum. The Test Resource Management Center has structured SET to perform risk reduction and advanced technology development for future telemetry systems such as the Integrated Network Enhanced Telemetry (iNET) effort.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Spectrum Efficient Technology	4.847	6.210	10.753	0.000	10.753
FY 2009 Accomplishments: Completed efforts initiated in prior fiscal years. - Spectrally Efficient, High Data Rate Telemetry: developed technology to port and modify the Jet Propulsion Laboratory Advanced Orthogonal Frequency Division Multiplexing baseband processing firmware to carry out packet-based communications - Space-Time Code: developed a verified space-time code data encoding and processing technique and a prototype receiver designed to improve link reliability - Enhanced Forward Error Correction: developed coherent and non-coherent decoders and a detailed design of decoders with a performance table identifying the optimal code/decoder combinations Initiated new research efforts. - Aeronautical Network Transport Protocols: developing aeronautical transport, network, and routing protocols for the iNET Communication Link Standards and for verification of the protocols through simulations and a fielded prototype; efforts will include architectural design of the protocol suite - High-rate, High-speed Forward Error Correction: developing architectures for aeronautical telemetry to apply forward error correction by demodulating and decoding the waveforms					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Dynamic Software Commutation/Decommutation: optimizing network performance by making real-time changes to test article telemetry content and sample rate; will demonstrate the optimization method in the field with a prototype network - Dynamic Spectrum Access: developing a network quality of service management scheme which will use explicit control of both frequency and digital access slot assignments - Low-Cost Orthogonal Frequency Division Multiplexing: developing a transceiver to demonstrate the waveform developed under the T&E/S&T-funded Advanced Orthogonal Frequency Division Multiplexing project (completed FY 2008); innovative modulator and demodulator firmware will be ported into the flight-rated transceiver with a tunable transmit/receive module - Multipath Modeling and Mitigation using Multiple Antennas: constructing empirically validated multipath channel models for flight line and helicopter pad environments, and developing multipath mitigation techniques using the multipath channel models - Transmission Control Protocol/Internet Protocol for Aeronautical Networks: developing a performance-enhancing-proxy for the wired/wireless interface to maximize data throughput by minimizing the latency of individual packets - Disruption-Tolerant Terrestrial iNET: developing wide area wireless network technology in support of unmanned and autonomous systems testbeds for ground vehicles and small unmanned aerial systems; efforts will address poor wireless channel coverage, bandwidth allocation and utilization, and low cost implementation Initiated a Broad Agency Announcement (BAA) in FY 2009 to select efforts for FY 2010 award.					
FY 2010 Plans: Complete efforts initiated in prior fiscal years. - Dynamic Spectrum Access - High-rate, High-speed Forward Error Correction - Low-Cost Orthogonal Frequency Division Multiplexing Transceiver - Transmission Control Protocol/Internet Protocol for Aeronautical Networks - Multipath Modeling and Mitigation using Multiple Antennas					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Continue efforts initiated in prior fiscal years. - Aeronautical Network Transport Protocols - Dynamic Software Commutation/Decommutation - Disruption-Tolerant Terrestrial iNET Initiate new research efforts. - Management and Operations with Policy Controls: develop a distributed policy-based network management system - Effort(s) to develop time-frequency management tools to enhance network management by monitoring network activity over time and frequency and by adjusting network resources for improved performance - Effort(s) to develop two-way, packetized, digital radio frequency communication Initiate a BAA in FY 2010 to select efforts for FY 2011 award.					
FY 2011 Base Plans: Complete efforts initiated in prior fiscal years. - Aeronautical Network Transport Protocols - Disruption-Tolerant Terrestrial iNET - Dynamic Software Commutation/Decommutation Continue efforts initiated in prior fiscal years. - Management and Operations with Policy Controls - Effort(s) to develop time-frequency management tools to enhance network management by monitoring network activity over time and frequency and by adjusting network resources for improved performance - Effort(s) to develop two-way, packetized, digital radio frequency communication Initiate new research efforts to address T&E technology challenges in this focus area. - Effort(s) to provide higher data rates through existing available bandwidth - Effort(s) to provide new network telemetry technology for every test vehicle to augment the high speed serial streaming data link					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Effort(s) to enable high performance wireless telemetry over an encrypted network. Initiate a BAA in FY 2011 to select efforts for FY 2012 award. *FY 2011 OCO Plans:* N/A					
Accomplishments/Planned Programs Subtotals	4.847	6.210	10.753	0.000	10.753

C. Other Program Funding Summary ($ in Millions)

N/A

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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COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
3: *Multi-Spectral Test*	11.421	18.780	16.294	0.000	16.294	12.794	12.836	13.029	13.237	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Multi-Spectral Test focus area develops technologies to test multi-spectral and hyperspectral weapon systems and intelligence, surveillance, and reconnaissance systems. Current methods for testing multi- and hyperspectral sensors rely heavily on expensive field test programs that leave several critical gaps. Imagery can be collected and stored to mitigate this deficiency in part, but the process is expensive and cannot cover the full spectrum of environments required for complete test article evaluation and performance analysis. The test and evaluation (T&E) community needs the ability to test these advanced seekers and sensors in a repeatable, objective fashion before and after they are integrated into warfighting systems. Without these new T&E innovations, DoD will be unable to perform adequate test and evaluation of the multi- and hyperspectral weapon systems of the future.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	**FY 2010**	**FY 2011 Base**	**FY 2011 OCO**	**FY 2011 Total**
Multi-Spectral Test	11.421	18.780	16.294	0.000	16.294
FY 2009 Accomplishments: Completed efforts initiated in prior fiscal years. - Sub-Array Light-Emitting Diode: developed a new ultraviolet light-emitting diode device to provide variable-intensity ultraviolet radiation to demonstrate full spatial, temporal, and power performance objectives required by open-air range missile warning system stimulators. Continued efforts initiated in prior fiscal years. - Cell-based Hyperspectral Atmospheric Radiation Model: developing software and hardware technology to provide three-dimensional, hyperspectral, atmospheric, radiative transport modeling at real time rates - Hyperspectral Imaging Projector: developing a two-dimensional visible/short wave infrared/ mid-wave infrared hyperspectral projector capable of generating dynamic images for multi- and hyperspectral sensor testing, fiber characterization, and an amplified spontaneous emission source					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Hyperspectral Test Suite: developing projector and spectrograph technologies required to achieve synchronized, co-registered, multi-band operation with high temperature, fast frame rate, high resolution, and wide dynamic range - Multispectral Plasma Emitter: developing a family of plasma-based prototype emitters which uses gas mixtures to generate any user-defined mid-wave and long-wave infrared spectral output with selectable emissions, wide dynamic ranges, and fast frame rates - Multi-Spectral and Hyperspectral Polarized Scene Projector: developing technology for polarization mapping assembly and an optical projection engine for testing sensors to project scenes with controlled wavelength and realistic accuracy - Superlattice Light-Emitting Diodes: developing an emitter for large field-of-view scenes to project high apparent scene temperatures at fast frame rates and with selectable wavelengths and thermal management - Fiber-optic Infrared Countermeasures T&E Technology: developing a squared, stacked, 6x6 chalcogenide fiber to test infrared countermeasures and missile warning systems - Multi-Spectral Passive Long-Wave Infrared Polarization: developing technology to generate large area, multi-wave, polarimetric scenes with high spatial resolution, high radiometric fidelity, and realistic infrared signature simulations applicable to multiple platforms - Read-In Integrated Circuit: developing large format scene projectors with wide field-of-view, high apparent temperature, and fast frame rates to support testing of sensors, seekers, and infrared countermeasures systems Initiated new research efforts. - Sky Imaging Mapping System: developing technology to obtain seamless sky background measurements with very high spatial, spectral, and temporal resolution Initiated a Broad Agency Announcement (BAA) in FY 2009 to select efforts for FY 2010 award. *FY 2010 Plans:* Complete efforts initiated in prior fiscal years: - Read-in Integrated Circuits for Infrared Scene Projection					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Continue efforts initiated in prior fiscal years. - Cell-based Hyperspectral Atmospheric Radiation Model - Multi-Spectral and Hyperspectral Polarized Scene Projector - Multi-Spectral Passive Long-Wave Infrared Polarization - Hyperspectral Imaging Projector - Hyperspectral Test Suite - Sky Imaging Mapping System - Fiber-optic Infrared-Countermeasure T&E Technology - Multispectral Plasma Emitter - Superlattice Light-Emitting Diodes Initiate new research efforts to address T&E technology challenges in this focus area. - Reconfigurable Arbitrary Waveform Scene Projector - Ultra-High Temperature Scene Projector - Effort(s) to develop hyperspectral near infrared/short-wave infrared projector technology to complete the entire spectrum of interest from near infrared to long-wave infrared (when combined with the Hyperspectral Testbed and Hyperspectral Test Suite projects) - Effort(s) to develop a suite of tests designed for systems that detect improvised explosive devices and signatures - Effort(s) to develop multi-spectral/hyperspectral data fusion T&E technology to enable the combination of all scene generation techniques, including all bandwidths from infrared to long-wave infrared, into one highly detailed, information rich battle scene - Effort(s) to develop multi-spectral/hyperspectral field characterization system technology for further characterization and classification of realistic battle scene imagery - Effort(s) to develop multi-spectral/hyperspectral technology to generate ground targets and to alleviate the use of software license costs and associated issues when dealing with third party target generation databases Initiate a BAA in FY 2010 to select efforts for FY 2011 award.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: Complete efforts initiated in prior fiscal years: - Fiber-optic Infrared-Countermeasure T&E Technology - Sky Imaging Mapping System - Superlattice Light-Emitting Diodes Continue efforts initiated in prior fiscal years: - Hyperspectral Test Suite - Cell-based Hyperspectral Atmospheric Radiation Model - Multi-Spectral and Hyperspectral Polarized Scene Projector - Multi-Spectral Passive Long-Wave Infrared Polarization - Multispectral Plasma Emitter - Reconfigurable Arbitrary Waveform Scene Projector - Ultra-High Temperature Scene Projector - Sky Imaging Mapping System - Effort(s) to develop hyperspectral near infrared/short-wave infrared projector technology - Effort(s) to develop a suite of tests designed for systems that detect improvised explosive devices and signatures - Effort(s) to develop multi-spectral/hyperspectral data fusion T&E technology - Effort(s) to develop multi-spectral/hyperspectral field characterization system technology - Effort(s) to develop multi-spectral/hyperspectral technology to generate ground targets Initiate new research efforts to address T&E technology challenges in this focus area: - Effort(s) to develop advanced radar stimulator - Effort(s) to develop large area scene projectors - Effort(s) to develop data collection and analysis engine technologies - Effort(s) to develop dynamic targets and surrogates models - Effort(s) to develop whole sky clutter models Initiate a BAA in FY 2011 to select efforts for FY 2012 award.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603941D8Z: *Test and Evaluation/Science and Technology*	**PROJECT** 3: *Multi-Spectral Test*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	11.421	18.780	16.294	0.000	16.294

C. Other Program Funding Summary ($ in Millions)

N/A

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: PB 2011 Office of Secretary Of Defense											DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				**R-1 ITEM NOMENCLATURE** PE 0603941D8Z: *Test and Evaluation/Science and Technology*				**PROJECT** 4: *Advanced Instrumentation Systems Technology*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
4: *Advanced Instrumentation Systems Technology*	5.414	6.069	6.672	0.000	6.672	8.680	9.964	10.105	10.259	Continuing	Continuing

A. Mission Description and Budget Item Justification

This focus area, formerly Non-Intrusive Instrumentation, has been renamed Advanced Instrumentation Systems Technology (AIST) to better reflect emerging test and evaluation (T&E) needs and focus area content. Instrumentation requirements for systems under test, hardware-in-the-loop testing, and training are increasing exponentially for new weapons systems. On-board/ personnel-borne equipment and instrumentation are required for sensing and collecting critical performance data; determining accurate time, space, position, and attitude information; interfacing with command and control data links; monitoring and reporting system-wide communications; reporting human operator performance; and storing and transmitting data. The AIST focus area addresses the requirements driven by the need to enable technologies for miniaturized, non-intrusive instrumentation suites with increased survivability in harsh environments. Minimal space is available to add instrumentation to new or existing weapon systems subsequent to their development; moreover, additional weight and power draw can adversely affect weapon system signature and performance. Instrumentation for humans-in-the-loop, such as dismounted soldiers, should neither adversely affect soldier performance nor create operational burden. New technologies can be exploited to integrate small, non-intrusive instrumentation into new platforms during design and development, and, in some cases, into existing platforms. This class of instrumentation can provide the data required for T&E, training, and logistics throughout system lifecycle, and can provide the ability to collect critical system performance data during combat missions.

In 2008 the Test Resource Management Center determined that requirements and transition partners must be better defined and understood. Accordingly, this focus area did not initiate any FY 2009 new start projects, but, while continuing ongoing projects, developed a new AIST T&E technology roadmap to determine the best path forward. AIST released a Broad Agency Announcement (BAA) in spring 2009 and will fund new projects in FY 2010 based upon the updated roadmap.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	**FY 2010**	**FY 2011 Base**	**FY 2011 OCO**	**FY 2011 Total**
Advanced Instrumentation Systems Technology	5.414	6.069	6.672	0.000	6.672
FY 2009 Accomplishments: Completed efforts initiated in prior fiscal years. - Revised NII Roadmap to refine T&E technology challenges in this focus area					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603941D8Z: *Test and Evaluation/Science and Technology*	**PROJECT** 4: *Advanced Instrumentation Systems Technology*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- High Speed & Temperature Diagnostics: developed four probes to measure turbine engine gas species, total temperature, total pressure, and Mach/flow angularity - Open Modular Embedded Architecture: developed an open, modular, scalable, embedded systems architecture for military land, air, sea, and space applications; this technology was demonstrated in the Air Force Multi-Megawatt Electric Power System developed for directed energy weapons applications Continued efforts initiated in prior fiscal years. - Chip Scale Atomic Clock: developing technology for high accuracy clocks integrated with acoustic modems on the seafloor for accurate measurement of time, space, position information (TSPI) on submarine and torpedo systems under test - Joint Advanced Missile Instrumentation Multipath Analysis: developing software modifications to the Global Positioning System (GPS) sensor unit to reject multipath signals; will validate software changes through simulation and ground and flight testing - Multi-Species Gas Sensor Array: developing a high temperature, multi-chemical sensor array for analysis of critical constituents in turbine engine exhaust products - Triply-Redundant Integrated Navigation and Asset Visibility System: developing a personnel/asset location system to combine an inertial navigation system, an agile wide-area radio frequency location scheme, and an optional reference GPS receiver for accurate and reliable navigation in GPS-denied or degraded environments - Ultra High Dynamics GPS: developing GPS receivers with high-dynamic, multi-frequency, anti-jamming technology to provide TSPI in GPS-denied environments to support range safety, system analysis, optimization, and end game scoring of highly dynamic objects - Wide Band Location Positioning System: developing technology to locate soldiers and unmanned ground vehicles in GPS-denied or impaired areas, such as inside buildings and complex structures Initiated a BAA in FY 2009 to select efforts for FY 2010 award. *FY 2010 Plans:* Complete efforts initiated in prior fiscal years. - Chip Scale Atomic Clock					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603941D8Z: *Test and Evaluation/Science and Technology*	**PROJECT** 4: *Advanced Instrumentation Systems Technology*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Joint Advanced Missile Instrumentation Multipath Analysis - Multi-Species Gas Sensor Arrays - Triply-Redundant Integrated Navigation and Asset Visibility System - Ultra High Dynamics GPS - Wide Band Location Positioning System Initiate new research efforts. - Effort(s) to develop advanced micro-power sources to power non-intrusive test instrumentation components via advanced chemistry cells and batteries, energy harvesting devices, active power generators, charging devices, and load management devices - Effort(s) to develop advanced sensor transducers to measure high-temperature, electric field strength, and magnetic field strength - Effort(s) to develop data transformation software to support virtual/synthetic instrumentation, adaptive computing for self-configuration, and self-calibration of instrumentation - Effort(s) to develop leading edge electronic component miniaturization technologies (e.g., application-specific integrated circuits and field programmable gate arrays) for advanced sensor electronics - Effort(s) to develop instrumentation attachment technologies that are reliable in extreme temperatures and high dynamic environments - Effort(s) to develop multi-modal transducers capable of measuring two or more phenomena simultaneously (e.g., temperature and pressure) at the same point - Effort(s) to develop small volume data storage technologies capable of withstanding high shock - Effort(s) to develop technologies to tap into an optical data bus non-intrusively without injecting optical noise or modifying or corrupting data carried on the bus - Effort(s) to develop technologies to protect sensor electronics under environmental conditions that significantly exceed ranges specified in military standards - Effort(s) to develop technologies for testing to support dismounted soldiers in GPS-denied environments such as urban, underground, and dense vegetation Initiate a BAA in FY 2010 to select efforts for FY 2011 award.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603941D8Z: *Test and Evaluation/Science and Technology*	**PROJECT** 4: *Advanced Instrumentation Systems Technology*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: Continue efforts initiated in FY 2010. - Effort(s) to develop advanced micro-power sources to power non-intrusive test instrumentation components via advanced chemistry cells and batteries, energy harvesting devices, active power generators, charging devices, and load management devices - Effort(s) to develop advanced sensor transducers to measure high-temperature, electric field strength, and magnetic field strength - Effort(s) to develop data transformation software to support virtual/synthetic instrumentation, adaptive computing for self-configuration, and self-calibration of instrumentation - Effort(s) to develop leading edge electronic component miniaturization technologies (e.g., application-specific integrated circuits and field programmable gate arrays) for advanced sensor electronics - Effort(s) to develop instrumentation attachment technologies that are reliable in extreme temperatures and high dynamic environments - Effort(s) to develop multi-modal transducers capable of measuring two or more phenomena simultaneously (e.g., temperature and pressure) at the same point - Effort(s) to develop small volume data storage technologies capable of withstanding high shock - Effort(s) to develop technologies to tap into an optical data bus non-intrusively without injecting optical noise or modifying or corrupting data carried on the bus - Effort(s) to develop technologies to protect sensor electronics under environmental conditions that significantly exceed ranges specified in military standards - Effort(s) to develop technologies for testing to support dismounted soldiers in GPS-denied environments such as urban, underground, and dense vegetation Initiate new projects for award based on the AIST Roadmap effort and Broad Agency Announcement process: - Effort(s) to develop advanced sensors for non-intrusive applications - Effort(s) to develop advanced power/energy technologies for non-intrusive applications					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603941D8Z: *Test and Evaluation/Science and Technology*	**PROJECT** 4: *Advanced Instrumentation Systems Technology*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Effort(s) to develop advanced TSPI technologies for non-intrusive applications - Effort(s) to develop advanced data transformation technologies for non-intrusive applications Initiate a BAA in FY 2011 to select efforts for FY 2012 award. *FY 2011 OCO Plans:* N/A					
Accomplishments/Planned Programs Subtotals	5.414	6.069	6.672	0.000	6.672

C. Other Program Funding Summary ($ in Millions)

N/A

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: PB 2011 Office of Secretary Of Defense											DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				**R-1 ITEM NOMENCLATURE** PE 0603941D8Z: *Test and Evaluation/Science and Technology*				**PROJECT** 5: *Directed Energy Test*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
5: *Directed Energy Test*	16.542	20.033	21.044	0.000	21.044	19.329	19.660	19.937	20.241	Continuing	Continuing

A. Mission Description and Budget Item Justification

Directed energy test technologies are transitioning rapidly into acquisition programs and Joint Concept Technology Demonstrations. These weapon technologies, primarily consisting of High Energy Lasers (HEL) and High Power Microwaves (HPM), are outpacing the supporting test technologies. HEL and HPM advancements have created a new class of weapon systems in which energy is placed on a target instantaneously; traditional test techniques for evaluating conventional munitions (with flight times ranging from seconds to minutes) are not applicable to test and evaluation (T&E) of these types of systems. Consequently, new 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 two principal assessments: weapon performance, and the specific interaction of energy and target. Current assessment of these systems is based on effects testing, i.e., determining if and when a target was destroyed; however, these test capabilities do not provide the detailed data required to understand directed energy system performance. Military utility of these weapons will depend upon the knowledge acquired through T&E to gage how much to trust the technologies under development and how best to use them. The T&E/S&T Directed Energy Test focus area is developing the technologies necessary for quantitative assessment of HEL and HPM performance and target interaction to support thorough testing of directed energy systems.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Directed Energy Test	16.542	20.033	21.044	0.000	21.044
FY 2009 Accomplishments: Completed efforts initiated in prior fiscal years. - Bi-static Optical Imaging Sensor: designed and fabricated a prototype ground-based HEL diagnostics sensor to measure HEL engagement on target through spatial, spectral, and temporal characteristics of laser interaction on target - Multiple Wave Temperature Sensor: developed a four-band infrared imaging camera with detectors sensitive to multiple distinct color bands to measure external surface temperature of stationary ground targets heated by laser beams					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603941D8Z: *Test and Evaluation/Science and Technology*	**PROJECT** 5: *Directed Energy Test*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Cine Radiography Imagery Measurement: developed a compact, flash X-ray source for testing of HPM munitions - Microwave Rotary Attenuator: developed technology for direct measurement of radiated power using a vacuum rotary microwave tube with adjustable power density for improved HPM narrow-band threat system testing against friendly systems - Spectrographic Magnetic Field Sensor: developed a non-intrusive, magneto-optical field sensor using magnetic moment coupling material with spectroscopic infrared detection techniques to measure magnetic fields inside a component or system exposed to HPM Continued efforts initiated in prior fiscal years. - Holographic Target Board: designing, fabricating, and testing an HEL target board using photo-thermo-refractive glass to measure HEL irradiance of an incident laser beam - Magneto-Optical Field Sensor: developing fiber-coupled optical sensors using the Faraday effect for non-intrusive capture of magnetic fields during HPM irradiation - Quantum Well Infrared Photodetector: integrating an indium antimonide (InSb) focal plane array with the computed tomographic imaging spectrometer to create a camera system for off-board analysis of HEL beam interaction with a target - Scanning Target Board: developing an HPM target board that uses an array of compact, multi-layered patch antennas to map the power spectrum of an HPM source - T&E Adaptive Optics System: integrating and testing an adaptive optics system to support remote measurement of HEL temperature with high spatial and temporal accuracy - Temperature and Irradiance Sensor Matrix: developing a matrix of conformal, onboard, photoconductive detectors to determine target irradiance and temperature profiles - Advanced Polymer Optical Source: developing a non-intrusive, large dynamic range, high bandwidth sensor to measure incident HPM magnetic field amplitude, internal cavity fields, and circuit board currents - Integrated Atmospheric Characterization System: developing stationary, ground-based measurement of slant path transmission and turbulence effects for ranges of approximately 10 km and at arbitrary slant paths					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603941D8Z: *Test and Evaluation/Science and Technology*	**PROJECT** 5: *Directed Energy Test*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Dual Oscillator Microwave Generation: developing technology to extend center frequency of spark gap oscillators from 500 MHz to 2.5 GHz, providing a test source for improved HPM wide-band threat system testing against friendly systems - Heat Flux Sensor Array: integrating a low-cost, high-resolution temperature sensor with an inverse heat conduction model in an instrument that can determine heat placed on a target by an HEL system - Inversion-Derived Resistive Temperature Sensor: developing a non-intrusive, high spatial resolution, advanced sensor technology and visualization tool to determine laser energy deposition on a target Initiated new research efforts. - Precision Radiometric Surface Temperature Sensor: developing a stand-off surface temperature measurement system to account for dynamic surface emissivity - Surface Temperature Estimation Tool: developing a software tool to extract a surface temperature map of the area within and near an HEL spot on target from multi-band irradiance measurements - Beam Irradiance on Target System: developing an HEL target board capable of measuring spatially and temporally resolved temperature and irradiance of a target under HEL illumination - Irradiance Imaging System: developing a high accuracy stand-off sensor that does not interfere with weapon system performance, remotely measures irradiance on an HEL target, and corrects for atmospheric effects with a probe laser - Integrated Electro-Magneto-Optical Sensor: developing a compact, highly sensitive, integrated, non-intrusive, electro- and magneto-optical three-axis sensor for simultaneous measurement of electric and magnetic fields - Skin Heating and Electric Field: developing a multichannel sensor system to measure electric field and temperature on personnel involved in testing of W-band HPM systems - Terahertz Imaging Profiler Array: developing a hyperspectral terahertz beam-profiling sensor with associated optics, readout electronics, and visualization graphics to characterize terahertz sources - Tri-Service Study Update: updating the architecture and roadmap for directed energy test requirements					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603941D8Z: *Test and Evaluation/Science and Technology*	**PROJECT** 5: *Directed Energy Test*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Rotary Waveguide Attenuator: designing and building an attenuator for the Narrow Band Threat source used for HPM survivability testing - Resistive Step Twist Polarizer: designing and building a polarizer for insertion into the Narrow Band Threat source used for HPM survivability testing Initiated a Broad Agency Announcement (BAA) in FY 2009 to select efforts for FY 2010 award. *FY 2010 Plans:* Complete efforts initiated in prior years. - T&E Adaptive Optics - Quantum Well Infrared Photodetector - Holographic Target Board - Magneto-Optical Field Sensor - Scanning Target Board Continue efforts initiated in prior fiscal years. - Precision Radiometric Surface Temperature Sensor - Surface Temperature Estimation Tool - Beam Irradiance on Target System - Irradiance Imaging System - Integrated Electro-Magneto-Optical Sensor - Skin Heating and Electric Field - Terahertz Imaging Profiler Array - Rotary Waveguide Attenuator - Resistive Step Twist Polarizer - Temperature and Irradiance Sensor Matrix - Integrated Atmospheric Characterization System - Heat Flux Sensor Array - Radiography Imagery Measurement - Advanced Polymer Optical Source					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603941D8Z: *Test and Evaluation/Science and Technology*	**PROJECT** 5: *Directed Energy Test*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Dual Oscillator Microwave Generation - Inversion-Derived Resistive Temperature Sensor - Tri-Service Study Update Initiate new research efforts. - Effort(s) to develop soil electromagnetic properties sensor - Effort(s) to develop advanced technology to test HEL irradiance and temperature on target - Effort(s) to perform risk reduction for HEL lethality testing laser - Effort(s) to develop adaptive optics for remote imagery of HEL engagements - Effort(s) to develop advanced technology to measure HPM effects on target Initiate a BAA in FY 2010 to select efforts for FY 2011 award.					
FY 2011 Base Plans: Complete efforts initiated in prior fiscal years - Rotary Waveguide Attenuator - Resistive Step Twist Polarizer - Temperature and Irradiance Sensor Matrix - Integrated Atmospheric Characterization System - Heat Flux Sensor Array - Inversion-Derived Resistive Temperature Sensor - Radiography Imagery Measurement - Advanced Polymer Optical Source - Dual Oscillator Microwave Generation - Tri-Service Study Update Continue efforts initiated in prior fiscal years. - Precision Radiometric Surface Temperature Sensor - Surface Temperature Estimation Tool - Beam Irradiance on Target System - Irradiance Imaging System					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603941D8Z: *Test and Evaluation/Science and Technology*	**PROJECT** 5: *Directed Energy Test*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Integrated Electro-Magneto-Optical Sensor - Skin Heating and Electric Field - Terahertz Imaging Profiler Array - Effort(s) to develop soil electromagnetic properties sensor - Effort(s) to develop advanced technology to test HEL irradiance and temperature on target - Effort(s) to perform risk reduction for HEL lethality testing laser - Effort(s) to develop adaptive optics for remote imagery of HEL engagements - Effort(s) to develop advanced technology to measure HPM effects on target Initiate new research efforts. - Effort(s) to generate HEL beam irradiance profile for diagnostics - Effort(s) to measure thermal response of laser weapons to assess effectiveness - Effort(s) to perform HEL lethality tests to determine weapon capabilities - Effort(s) to estimate atmospheric propagation characteristics to determine the effect of surface-to-surface, surface-to-air, and air-to-air HEL engagements - Effort(s) to predict, in real-time, the HPM test hazard effect to improve safety - Effort(s) to develop sensors to measure magnetic, electrical, and thermal fields to assess HPM lethality and support safety - Effort(s) to generate dynamic imaging of HPM explosive during development test - Effort(s) to develop surrogate HPM sources to support vulnerability testing against wideband HPM spectral content above 2.0 GHz Initiate a BAA in FY 2011 to select efforts for FY 2012 award. *FY 2011 OCO Plans:* N/A					
Accomplishments/Planned Programs Subtotals	16.542	20.033	21.044	0.000	21.044

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense		**DATE:** February 2010
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C. Other Program Funding Summary ($ in Millions)

N/A

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: PB 2011 Office of Secretary Of Defense											DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603941D8Z: *Test and Evaluation/Science and Technology*				PROJECT 6: *Netcentric Systems Test*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
6: *Netcentric Systems Test*	11.072	12.478	17.672	0.000	17.672	18.095	18.362	18.634	18.930	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Netcentric Systems Test (NST) focus area is pursuing test and evaluation (T&E) technologies to keep pace with advancements in Joint Net-Centric Operations (JNO). Advanced netcentric systems will address the needs of Joint forces and coalition partners who need rapid access to relevant, accurate, and timely information, as well as the ability to create and share the knowledge required to make superior decisions in an assured environment amid unprecedented quantities of operational data. The JNO needs these abilities to meet the requirement for an integrated global network that will enable parties to share the right information at the right time so that our warfighters can act before the enemy. JNO links a multitude of people, sensors, operating centers, and decision aids. These sources of information produce relevant, up-to-the second, accurate, and credible information to allow informed decisions in routine, planned, or crisis events. The result is faster decision making, increased collaboration, and better decisions based on access to more information. Successful implementation of these transformational capabilities will necessitate a corresponding transformation in DoD test and evaluation (T&E) capabilities for netcentric systems. The NST focus area addresses the T&E scenarios, technologies, and analysis tools required to ensure that operational networked systems delivered to the warfighter provide an assured capability to acquire, verify, protect, and assimilate information necessary for battlefield dominance within a complex netcentric environment.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Netcentric Systems Test	11.072	12.478	17.672	0.000	17.672
FY 2009 Accomplishments: Completed efforts initiated in prior fiscal year. - Executable Architecture Analysis Modeling: developed test technologies and created executable models of netcentric architectures comprised of integrated combat, communications, and process models - Dynamic Utility for Collaborative Architecture-Centric T&E: developed T&E tools for creating test architectures, assigning test measures, and visualizing and testing Joint command and control systems in a service oriented architecture environment					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Analyzer for Netcentric Systems Test Confederations: developed and demonstrated web-based technologies to automate netcentric test planning and scenario development - Technologies for Tactical Video: developed a battlespace awareness tool that integrates sensor imagery data with other Joint mission effectiveness test data in a distributed network environment - Flexible Analysis Services: developed generic message protocol translation prototypes (initially Link 16 capability) with a parser rule and profile creation user interface, and a generic message parser - Rapid Reconfiguration Module: developed a prototype rapid reconfigurable control station for individual or simultaneous control of 200 computers to minimize setup time and maximize test time Continued efforts initiated in prior fiscal years. - Dynamic Distributed Networking for T&E: developing tools for dynamic configuration of communications networks within the netcentric systems test infrastructure - Joint Mission Environment Support Using Data Farming: developing models to capture command and control structures, design of experiment, rapid scenario generation, and automated red teaming - Multi-Level Security Cross Layer Scheme: developing multi-level security features into distributed, decentralized, quality of service, medium access control while preserving power and bandwidth - Policy-Based Adaptive Network and Security Management Technology for Network Centric Systems Testing: developing a policy-based management system for controlling cross-domain multi-level security and automated network quality of service controls through recognition of applications based on the Test and Training Enabling Architecture (TENA) Initiated new research efforts. - Middleware Enhancements to Netcentric Simulation Architecture: follow-on effort to refine coding techniques to address testing requirements; techniques will enable dynamic optimization of information delivery, minimize network congestive failures, and overcome unreliable network environments - Netcentric Systems T&E Capability Model: developing technology for effective characterization and replication of JNO mission threads and architectures for T&E - Network Effects Emulation System: developing an enterprise tool capable of simulating a wide range of network and host-based effects that can be centrally managed and controlled					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- TENA in a Resource Constrained Environment: developing technologies to recreate the netcentric battlespace with increased bandwidth and to support high throughput users with the flexibility to transmit critical information at higher priorities Initiated a Broad Agency Announcement (BAA) in FY 2009 to select efforts for FY 2010 award. *FY 2010 Plans:* Complete efforts initiated in prior fiscal years. - Dynamic Distributed Networking for T&E - Joint Mission Environment Support Using Data Farming - Multi-Level Security Cross Layer Scheme - Middleware Enhancements to Netcentric Simulation Architecture - Netcentric Systems T&E Capability Model Continue efforts initiated in prior fiscal years. - Policy-Based Adaptive Network and Security Management Technology for Network Centric Systems Testing - TENA in a Resource Constrained Environment - Network Effects Emulation System Initiate new research efforts. - Netcentric Environment Instrumentation and Visualization: develop intelligent T&E analytic and visualization tools that will support Joint mission effectiveness, net readiness, and joint interoperability evaluation requirements - Effort(s) to recreate the netcentric battlespace through the simulation of networks and network interfaces - Effort(s) to measure and analyze the netcentric test environment in order to measure and assess Joint mission effectiveness Initiate a BAA in FY 2010 to select efforts for FY 2011 award.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603941D8Z: *Test and Evaluation/Science and Technology*	**PROJECT** 6: *Netcentric Systems Test*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: Complete efforts initiated in prior fiscal years. - Policy-Based Adaptive Network and Security Management Technology for Network Centric Systems Testing - Modern Link Manager Protocols - Network Effects Emulation System Continue efforts initiated in prior fiscal years. - TENA in a Resource Constrained Environment - Netcentric Environment Instrumentation and Visualization - Effort(s) to recreate the netcentric battlespace through the simulation of networks and network interfaces - Effort(s) to measure and analyze the netcentric test environment in order to measure and assess Joint mission effectiveness Initiate new research efforts. - Effort(s) to generate high fidelity simulation of the netcentric battlespace and to model systems in a mission environment - Effort(s) to provide automated analysis to support certification of Joint mission effectiveness, interoperability, and net-readiness - Effort(s) to enable dynamic construction, monitoring, and control of a distributed netcentric test environment Initiate a BAA in FY 2011 to select efforts for FY 2012 award. *FY 2011 OCO Plans:* N/A					
Accomplishments/Planned Programs Subtotals	11.072	12.478	17.672	0.000	17.672

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense		**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603941D8Z: *Test and Evaluation/Science and Technology*	**PROJECT** 6: *Netcentric Systems Test*

C. Other Program Funding Summary ($ in Millions)

N/A

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: PB 2011 Office of Secretary Of Defense											DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				**R-1 ITEM NOMENCLATURE** PE 0603941D8Z: *Test and Evaluation/Science and Technology*				**PROJECT** 7: *Unmanned and Autonomous System Test*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
7: *Unmanned and Autonomous System Test*	5.073	6.371	6.300	0.000	6.300	6.475	6.489	6.582	6.684	Continuing	Continuing

A. Mission Description and Budget Item Justification

The next generation of unmanned warfighting support systems is under development and will transition rapidly from research efforts into acquisition programs. In addition, on-going research into autonomous and semi-autonomous systems indicates that such systems soon will emerge as a new test challenge. The Unmanned and Autonomous Systems Test (UAST) focus area addresses current and emerging challenges associated with test and evaluation (T&E) of these important warfighting assets. As the complexity of unmanned and autonomous systems (UAS) increases, the capability to test these systems also must be developed. UAS T&E technology advancements are required to enable testing of the behavior of learning UAS. Ranges and installed system test facilities must be able to characterize UAS responses to mission priorities in densely-packed battlespaces and to predict from the data how these systems will respond in the future. The Department of Defense must have the capability to test the ability of these systems to interact safely and effectively with large groups of humans and to determine how these systems respond to unscripted scenarios. This capability requires the development of technology to collect and compare accurate situational awareness of autonomous systems with ground truth; to test unmanned systems in a netcentric environment; to maintain non-line-of-sight tracking; and to execute controlled, repetitive, and realistic stimulation of systems under test.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Unmanned and Autonomous System Test	5.073	6.371	6.300	0.000	6.300
FY 2009 Accomplishments: Completed efforts initiated in prior fiscal years: - High Fidelity Communication Modeling and Analysis: developed modeling and simulation tools to provide controlled, repetitive, realistic stimulation of systems under test - Micro-Beacon Tracking of Autonomous Systems: developed time, space, position information instrumentation by building a tracking station architecture consisting of antennae and signal processing					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603941D8Z: *Test and Evaluation/Science and Technology*	**PROJECT** 7: *Unmanned and Autonomous System Test*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Reconfigurable Wireless Measurement System: developed a three-board, wireless sensor stack (consisting of a global positioning system, data acquisition, telemetry, and analog-to-digital converter components) for both truth and perceived truth data - Flexible Command and Control System: developed and demonstrated a system for UAS performance assessment - Software and Hardware for Multi-Resolution Maps and Models: developed and demonstrated a system for multi-level situational awareness models - Intelligent Agent Based Framework: developed preplanning techniques for proper characterization of communications links to support UAS operations in complex environments - Remote Embedded Systems Test: developed technology to improve power summing by controlling power distribution and improving extensions to increase connectivity with multiple systems under test Continued efforts initiated in prior fiscal years. - Cognitive Autonomous System Tester: developing a set of cognitive evaluation tools to convert stored knowledge into actions for T&E for unmanned vehicles - Virtual Autonomous Teaming Tool Test Configuration: developing technology to predict the changes produced within UAS as a result of modifications to external stimuli Initiated research efforts. - Prescriptive and Adaptive Testing Analysis Framework: developing a decision support tool to perform risk management analysis on test programs - Simulated Cooperative Unmanned Underwater Laboratory: developing a reduced-order modeling and control environment to analyze the behavior of cooperative unmanned underwater vehicles Initiated a Broad Agency Announcement (BAA) in FY 2009 to select efforts for FY 2010 award. *FY 2010 Plans:* Complete efforts initiated in prior fiscal years. - Cognitive Autonomous Systems Tester - Virtual Autonomous Teaming Tool Test Configuration Continue efforts initiated in prior fiscal years.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603941D8Z: *Test and Evaluation/Science and Technology*	**PROJECT** 7: *Unmanned and Autonomous System Test*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Prescriptive and Adaptive Testing Analysis Framework - Simulated Cooperative Unmanned Underwater Laboratory Initiate new research efforts. - Effort(s) to develop technology to model semi-autonomous and autonomous systems for prediction of UAS performance to supplement development and operational T&E events - Effort(s) to develop techniques to conduct T&E in deep sea operations, including data rates, telemetry, way points, and off-board sensors for unmanned undersea vehicles Initiate a BAA in FY 2010 to select efforts for FY 2011 award. *FY 2011 Base Plans:* Continue efforts initiated in prior fiscal years. - Prescriptive and Adaptive Testing Analysis Framework - Simulated Cooperative Unmanned Underwater Laboratory - Effort(s) to develop technology to model semi-autonomous and autonomous systems for prediction of UAS performance to supplement development and operational T&E events - Effort(s) to develop techniques to conduct T&E in deep sea operations, including data rates, telemetry, way points, and off-board sensors for unmanned undersea vehicles - Effort(s) to develop methods to test autonomous space systems, including accessibility, latency, and safety/health hazards in an operationally relevant environment - Effort(s) to develop tools to evaluate the cognitive behavior and predict the future performance of learning algorithms in semi-autonomous and autonomous systems Initiate new research efforts to address T&E technology challenges in the focus area. - Effort(s) to develop technology to model semi-autonomous and autonomous systems - Effort(s) to develop techniques to conduct T&E in deep sea operations - Effort(s) to develop methods to test autonomous space systems, including accessibility, latency, and safety/health hazards in an operationally relevant environment - Effort(s) to develop tools to evaluate the cognitive behavior and predict the future performance of learning algorithms in semi-autonomous and autonomous systems					

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense		**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603941D8Z: *Test and Evaluation/Science and Technology*	**PROJECT** 7: *Unmanned and Autonomous System Test*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Initiate a BAA in FY 2011 to select efforts for FY 2012 award. *FY 2011 OCO Plans:* N/A					
Accomplishments/Planned Programs Subtotals	5.073	6.371	6.300	0.000	6.300

C. Other Program Funding Summary ($ in Millions)

N/A

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: PB 2011 Office of Secretary Of Defense											DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				**R-1 ITEM NOMENCLATURE** PE 0603941D8Z: *Test and Evaluation/Science and Technology*				**PROJECT** 8: *Common Range Integrated Instrumentation System*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
8: *Common Range Integrated Instrumentation System*	18.500	6.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Department of Defense has a critical need for enhanced T&E instrumentation to support advanced aircraft, avionics, and weapons system testing. The Common Range Integrated Instrumentation System (CRIIS) is a Tri-Service project that provides a family of capabilities to improve time-space-position information (TSPI) accuracy in low- to high-dynamic test environments and data link throughput capabilities using spectrally efficient data links. CRIIS participant packages will be highly miniaturized in both pod-mounted and internally-mounted configurations. CRIIS is highly dependent upon advanced technology development in the areas of high-accuracy TSPI and spectrally efficient, high throughput data transmission. CRIIS will replace the aging Advanced Ranged Data System, developed in the mid-1980s, which suffers from parts obsolescence is unable to provide the accuracy and data throughput required by advanced weapon systems.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Common Range Integrated Instrumentation System	18.500	6.500	0.000	0.000	0.000
FY 2009 Accomplishments: - Initiated Phase I risk reduction and technology maturation for high throughput, spectrally efficient data link - Initiated Phase I risk reduction and technology maturation for high accuracy TSPI - Conducted system requirements reviews, interim baseline review #1, and system functional reviews					
FY 2010 Plans: - Complete Phase I risk reduction and technology maturation for high throughput, spectrally efficient data link - Complete Phase I risk reduction and technology maturation for high accuracy TSPI - Conduct interim baseline review #2 and preliminary design review - Accomplish field test demonstration and technology readiness assessment					

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense		**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603941D8Z: *Test and Evaluation/Science and Technology*	**PROJECT** 8: *Common Range Integrated Instrumentation System*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Down-select to a single prime contractor *FY 2011 Base Plans:* N/A					
Accomplishments/Planned Programs Subtotals	18.500	6.500	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

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: PB 2011 Office of Secretary Of Defense											DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603941D8Z: *Test and Evaluation/Science and Technology*				PROJECT 9: *Multi-Level Security*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
9: *Multi-Level Security*	0.000	0.000	0.000	0.000	0.000	4.601	4.908	4.998	5.094	Continuing	Continuing

A. Mission Description and Budget Item Justification

Multilevel security (MLS) has posed a challenge to the computer security community since the 1960s. MLS will allow information to flow freely between recipients in a computing system who have appropriate security clearances while preventing leaks to unauthorized recipients. MLS systems must incorporate two essential features: first, the system must enforce these restrictions regardless of the actions of system users or administrators, and second, MLS systems must enforce these restrictions with incredibly high reliability. This has led developers to implement specialized security mechanisms and to apply sophisticated techniques to review, analyze, and test those mechanisms for correct and reliable behavior.

Despite this, MLS systems have rarely provided the degree of security desired by their most demanding customers in the military services, intelligence organizations, and T&E activities. Incorporating MLS into telemetry for T&E would allow all users of the data to have access to the same data stream and computer network according to their security clearance level and need-to-know. This would significantly increase efficiency and generate cost savings. MLS will also allow more streamlined testing with coalition partners.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Multi-Level Security	0.000	0.000	0.000	0.000	0.000
FY 2009 Accomplishments: N/A					
FY 2010 Plans: N/A					
FY 2011 Base Plans: N/A					
Accomplishments/Planned Programs Subtotals	0.000	0.000	0.000	0.000	0.000

Exhibit R-2A, **RDT&E Project Justification:** PB 2011 Office of Secretary Of Defense		**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603941D8Z: *Test and Evaluation/Science and Technology*	**PROJECT** 9: *Multi-Level Security*

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603942D8Z: *Technology Transfer and Transition*

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	6.033	13.558	23.310	0.000	23.310	20.951	21.082	13.755	14.718	Continuing	Continuing
P942: *Technology Transfer*	6.033	13.558	2.153	0.000	2.153	2.162	2.182	2.218	2.258	Continuing	Continuing
P949: *Technology Transition Initiative*	0.000	0.000	21.157	0.000	21.157	18.789	18.900	11.537	12.460	Continuing	Continuing

Note

FY 2011 and out reflect realignment of resources from the following program element into Technology Transfer and Transition to benefit management communications, fiscal tracking, budget justification and overall program resource management of Transfer/Transition efforts:

PE 0603826D8Z Quick Reactions Special Projects, Technology Transition Initiative (Transfer into P949).

A. Mission Description and Budget Item Justification

The Technology Transfer and Transition (TT&T) program (Program Element 0603942D8Z) has two sub-elements: the Technology Transfer program (P942), and Technology Transition Initiative (P949).

Defense Technology Transfer (P942) was referred to in previous budgets as Defense Technology Link (TechLink). This change serves to distinguish the Technology Transfer program from one of the program's successful contractors, TechLink of Montana State University. Defense Technology Transfer's three-fold mission is (1) integration of advanced commercial-sector technologies into Defartment of Defense (DoD) systems, particularly from nontraditional defense contractors; (2) spin-off of DoD-developed technologies to industry for product development and to make these technologies available for military acquisition; and (3) establishment of collaborative Research and Development (R&D) projects with the private sector for cost-sharing of new dual-use technology development.

Defense Technology Transfer has been highly successful at helping the Department transfer its technologies to U.S. companies, and making these technologies available for both military and commercial applications. Technology Transfer is highly cost-effective with elements achieving significant Return on Investment (ROI) to DoD. For example, TechLink and has provided a ROI to DoD of 4:1 on funds expended to date. This efficiently run organization currently accounts for 50 percent of all DoD patent license agreements (PLA) and has brokered over 450 Cooperative Research and Development Agreements (CRADA) and other R&D partnerships involving innovative companies new to DoD.

Exhibit R-2, **RDT&E Budget Item Justification:** PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603942D8Z: *Technology Transfer and Transition*

Beginning in FY 2004, Congress has appropriated funds for an activity identified as MilTech to provide DoD with a manufacturing technical assistance capability for small and mid-size companies in areas such as improved product design, manufacturability, establishing reliable supply chain relationships, and achieving production sustainability in ramping up to meet critical DoD needs. MilTech works hands-on with DoD Program Managers and these companies to achieve accelerated deliverable product outcomes for military use. MilTech design or design review assistance to DoD Program Managers have resulted in up to 50% reductions in product development lead times. Manufacturing technical assistance has led to improved on-time delivery, thereby reducing shipping delays and back orders of critical items by as much as 50-70%. MilTech assistance in providing design best practices early on in the product development process is helping companies reduce product costs by 10-30% and improved quality of design is reducing pre-shipping and field failures by 10-30%.

The Technology Transition Initiative (P949), authorized by Title 10 and Section 215 of the FY2003 Defense Authorization Act, facilitates the rapid transition of new technologies from the DoD science and technology (S&T) base into DoD acquisition programs. The program addresses the funding gaps that exist between the time a mature technology is demonstrated and the time it can be funded and procured for use in an intended weapons system or operational capability for the warfighter. The Technology Transition Initiative (TTI) program is mandated by Congress and receives high congressional interest.

Since the program inception in FY 2003, 75 projects have been initiated and 37 are complete. Of the 37 completed projects, 27 (73%) have successfully transitioned to DoD Acquisition Programs of Record or procurement contracts for operational use and subsequent fielding; exceeding the objective of 30% for demonstration programs (Strategic Objective 4-3, Office of the Under Secretary of Defense, Acquisition, Technology & Logistics (OUSD (AT&L). Technology Transition Initiative (TTI) projects are selected by the Technology Transition Manager (DDR&E Research Directorate) in consultation with representatives of the Technology Transition Council (TTC). (The TTC is comprised of the Acquisition and S&T executives from each Service and Defense Agency and representatives from the Joint Requirements Oversight Council (JROC.) The call for TTI proposals is distributed to the DoD Services and Agencies through the Technology Transition Working Group (TTWG) members, designated by the TTC. The TTWG members receive proposals from their Service/Defense Agency S&T base, conduct a prioritization based on Joint, Service or Agency capabilities needed and submit them to the Office Secretary of Defense (OSD) TTI Program Manager. The Technology Manager's senior staff consolidates the proposal submissions, evaluates the Service/Agency recommendations, reviews new start selection options based on available resources, and prepares a recommended new start selection list to the Technology Transition Manager for funding. The Technology Transition Manager selects the highest priority proposals for funding.

The OSD FY 2011 proposal call memo will be signed out by the Technology Transition Manager in February 2010, requesting the Services, Agencies and Combatant Commands provide their prioritized inputs by April. OSD is looking for candidate proposals that demonstrate a strong commitment from the operational and acquisition communities to transition improved capabilities to operational use or an acquisition program of record. These proposals are being evaluated against the following evaluation criteria: TTI funding must accelerate product transition, the technology must be from the DoD Science and Technology (S&T) base, Component cost sharing to leverage funding, project duration less than four years, established exit criteria, potential for joint use, value to the warfighter, sufficient technology maturity, and commitment to transition/acquisition. Final selection of FY 2011 TTI new start projects will be determined in the August 2010 timeframe. A listing of initiatives under review for selection by OSD can be provided to congressional staff members during the budget review.

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603942D8Z: *Technology Transfer and Transition*

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	2.171	2.219	0.000	0.000	0.000
Current President's Budget	6.033	13.558	23.310	0.000	23.310
Total Adjustments	3.862	11.339	23.310	0.000	23.310
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	-0.111			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	0.414	0.000			
• SBIR/STTR Transfer	-0.152	0.000			
• Funding Realignment of Technology Transition Initiative	0.000	0.000	23.310	0.000	23.310
• R&DFY09: Congressional Distributed Actions	3.600	0.000	0.000	0.000	0.000
• FY10 Congressional Adjustment	0.000	11.450	0.000	0.000	0.000

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

	FY 2009	FY 2010
Project: P942: *Technology Transfer*		
Congressional Add: *FirstLink*	1.989	2.400
Congressional Add: *MilTech Expansion Program*	1.591	1.600
Congressional Add: *Center for Innovation at Arlington*	0.000	2.700
Congressional Add: *National Radio Frequency Research*	0.000	4.000
Congressional Add: *Program Increase*	0.000	0.750
Congressional Add Subtotals for Project: P942	3.580	11.450
Congressional Add Totals for all Projects	3.580	11.450

Exhibit R-2, **RDT&E Budget Item Justification:** PB 2011 Office of Secretary Of Defense	**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603942D8Z: *Technology Transfer and Transition*

Change Summary Explanation

FY 2011 and out reflect realignment of resources from the following program element into Technology Transfer and Transition to benefit aligned management communications, fiscal tracking, budget justification and overall program resource management of Transfer/Transition efforts.

PE 0603826D8Z Quick Reactions Special Projects, Technology Transition Initiative (Transfer into P949).

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense											DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603942D8Z: *Technology Transfer and Transition*				PROJECT P942: *Technology Transfer*			
COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
P942: *Technology Transfer*	6.033	13.558	2.153	0.000	2.153	2.162	2.182	2.218	2.258	Continuing	Continuing

A. Mission Description and Budget Item Justification

Defense Technology Transfer was referred to in previous budgets as Defense Technology Link (TechLink). This change serves to distinguish the Technology Transfer program from one of the program's successful contractors, TechLink of Montana State University.

Defense Technology Transfer is an element in the Department's technology transfer, transition, and acquisition activities. Its three-fold mission is (1) integration of advanced commercial-sector technologies into Department of Defense (DoD) systems, particularly from nontraditional defense contractors; (2) spin-off of DoD-developed technologies to industry to make these technologies available for military acquisition; and (3) establishment of collaborative Research & Development (R&D) projects with the private sector for cost-sharing of new dual-use technology development.

Defense Technology Transfer has been highly successful at helping the Department transfer its technologies to U.S. companies, and first responders making these technologies available for both military and commercial applications.

Technology Transfer is highly cost-effective with elements achieving significant Return on Investment (ROI) to DoD. For example, TechLink and has provided a ROI to DoD of 4:1 on funds expended to date. This efficiently run organization currently accounts for 50 percent of all DoD patent license agreements (PLA) and has brokered over 450 Cooperative Research and Development Agreements (CRADA) and other R&D partnerships involving innovative companies new to DoD.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Marketing of DoD technologies	1.472	1.209	1.270	0.000	1.270
Actively market DoD-developed technologies to US companies to establish Patent License Agreements to commercialize these technologies for both civilian and military applications. The multiple objectives of this technology marketing activity are to (1) accelerate the transition of DoD-developed technologies to the warfighter; (2) lower the cost of DoD technology acquisition by developing a larger commercial					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
market for dual-use technologies; (3) provide a return of revenue to DoD labs from commercial spin-off of defense technologies; and (4) fulfill DoD's Congressionally mandated technology transfer directives. *FY 2009 Accomplishments:* Actively marketed DoD-developed technologies to US companies to establish Patent License Agreements to commercialize these technologies for both civilian and military applications. As an example, TechLink (Montana Status University), the Technology Transfer contractor, facilitated two licensing agreements for a revolutionary new Navy-developed corrosion prevention compound known as "Navguard." Developed by the Naval Air Systems Command - Patuxent River, this technology promises to save the DoD millions of dollars annually in its corrosion prevention on military air frames, ships, and ground vehicles. TechLink marketed Navguard nationally. Two companies decided to license the technology for commercialization: Armick, Inc. of Kentwood, MI - who offers contract cleaning and corrosion-control services for military and civilian aircraft; and Corrosion Technologies Corporation of Dallas, TX - who offers a full line of rust and corrosion control products for military, defense industry, and other customers *FY 2010 Plans:* Continue active marketing of DoD-developed technologies to US companies to establish Patent License Agreements to commercialize these technologies for both civilian and military applications. The multiple objectives of this technology marketing activity are to (1) accelerate the transition of DoD-developed technologies to the warfighter; (2) lower the cost of DoD technology acquisition by developing a larger commercial market for dual-use technologies; (3) provide a return of revenue to DoD labs from commercial spin-off of defense technologies; and (4) fulfill DoD's Congressionally mandated technology transfer directives.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603942D8Z: *Technology Transfer and Transition*	**PROJECT** P942: *Technology Transfer*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: Continue active marketing of DoD-developed technologies to US companies to establish Patent License Agreements to commercialize these technologies for both civilian and military applications. The multiple objectives of this technology marketing activity are to (1) accelerate the transition of DoD-developed technologies to the warfighter; (2) lower the cost of DoD technology acquisition by developing a larger commercial market for dual-use technologies; (3) provide a return of revenue to DoD labs from commercial spin-off of defense technologies; and (4) fulfill DoD's Congressionally mandated technology transfer directives.					
Dual Use Technology Development	0.638	0.584	0.574	0.000	0.574
Actively promote and broker Cooperative Research and Development Agreements (CRADAs) between DoD labs and industry for development of technology with both commercial and military applications. This activity will particularly focus on nontraditional defense contractors and is intended (1) to help lower the expense of new defense-related technology development through cost-sharing with industry, and (2) to help DoD benefit from private-sector technology investments and innovations. As an example TechLink facilitated a CRADA and a PLA between the Army Edgewood Chemical Biological Center (ECBC) and BVS, Inc. of Missoula, Montana for an advanced integrated virus screening detection system. This system can rapidly screen for a wide variety of viruses that affect humans, wildlife, and livestock such as avian influenza in chickens. The CRADA provides for BVS to contribute to development of a comprehensive viral database at ECBC. *FY 2009 Accomplishments:* Continued to actively promote and broker Cooperative Research and Development Agreements (CRADAs) between DoD labs and industry for development of technology with both commercial and military applications. Broker new CRADAs between DoD labs and industry, thereby enabling DoD and industry to leverage technology development efforts by both parties.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2010 Plans: Continue to actively promote and broker Cooperative Research and Development Agreements (CRADAs) between DoD labs and industry for development of technology with both commercial and military applications. Broker new CRADAs between DoD labs and industry, thereby enabling DoD and industry to leverage technology development efforts by both parties. *FY 2011 Base Plans:* Continue to actively promote and broker Cooperative Research and Development Agreements (CRADAs) between DoD labs and industry for development of technology with both commercial and military applications. Broker new CRADAs between DoD labs and industry, thereby enabling DoD and industry to leverage technology development efforts by both parties.					
Spin-In of Advanced Commercial-Sector Technologies Actively promote the DoD Small Business Innovation Research (SBIR) (focus on Phase III contracts) and Independent Research and Development (IR&D) programs to companies throughout the United States in order to help DoD identify, fund, acquire, and integrate private-sector innovations and advanced commercial technologies into DoD systems. *FY 2009 Accomplishments:* Actively promoted the DoD Small Business Innovation Research (SBIR) (focus on Phase III contracts) and Independent Research and Development (IR&D) programs to companies throughout the United States in order to help DoD identify, fund, acquire, and integrate private-sector innovations and advanced commercial technologies into DoD systems. As an example, TenXsys, Inc. is a technology firm in Eagle, ID that specializes in networked sensor systems for biological monitoring. TechLink (Montana State University), the Technology Transfer contractor, assisted TenXsys in winning US Army Research Institute of Environmental Medicine sponsored Phase I and II SBIR awards for an advanced physiological monitoring system for amputees	0.343	0.315	0.309	0.000	0.309

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
that accelerates the rehabilitation of soldiers with prothestic devices. To help TenXsys with further development of its Phase II technology, TechLink supported TenXsys in meetings with In-Q-Tel, the Central Intelligence Agency's venture capital arm. As a result of these interactions, In-Q-Tel made a major investment in TenXsys to support development of specialized field-capable advanced telemetry technology in support of US intelligence activities. *FY 2010 Plans:* Continue to actively promote the DoD Small Business Innovation Research (SBIR) (focus on Phase III contracts) and Independent Research and Development (IR&D) programs to companies throughout the United States in order to help DoD identify, fund, acquire, and integrate private-sector innovations and advanced commercial technologies into DoD systems. *FY 2011 Base Plans:* Continue to actively promote the DoD Small Business Innovation Research (SBIR) (focus on Phase III contracts) and Independent Research and Development (IR&D) programs to companies throughout the United States in order to help DoD identify, fund, acquire, and integrate private-sector innovations and advanced commercial technologies into DoD systems.					
Accomplishments/Planned Programs Subtotals	2.453	2.108	2.153	0.000	2.153

	FY 2009	FY 2010
Congressional Add: FirstLink *FY 2009 Accomplishments:* FirstLink - a congressionally added effort - is officially called the Department of Defense's National Center of Excellence for Commercialization and Technology Transfer for First Responder Technologies.	1.989	2.400

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
Accomplished: FirstLink assessed user needs and priorities, collected and evaluated potential DoD technologies for first responder use, identified non-DoD technologies that address DoD and first responder needs, and created and executed a marketing plan for these technologies. Measures of success include technologies made available for first responder use. As an example, FirstLink helped the Army to license a patent for a 'Field Expedient Bleeding Simulation Systems (FEBSS). This system was developed by an Army combat medic who worked with the Army Medical Research and Material Command to patent the technology. FirstLink facilitated a PLA and a CRADA with Skedco, Inc. of Tualatin, Oregon to complete the product engineering to take this to market. Both the U.S. military and several foreign military activities are purchasing this technology that has now been transitioned back to DoD for use. Several universities are also purchasing the unit to train civilian emergency management technicians. *FY 2010 Plans:* FirstLink - a congressionally added effort - is officially called the Department of Defense's National Center of Excellence for Commercialization and Technology Transfer for First Responder Technologies.		
Congressional Add: MilTech Expansion Program *FY 2009 Accomplishments:* MilTech Expansion is a congressionally added effort to facilitate Technology Transfer functions, focused specifically on providing critical engineering, manufacturing, and business development assistance to small companies. MilTech is a non-profit entity of Montana State University. Accomplished: Assisted the transition of technologies from innovative small companies to DoD operational use, supporting the Technology Transfer functions of marketing of DoD technologies, dual use technology deployment, and spin-in of advanced commercial-sector technologies.	1.591	1.600

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
As as example, MilTech helped Crimson Trace Corporation, Beaverton, OR, to ruggedize and waterproof its "Lasergrips" sighting system for pistols. Squeezing the pistol grips activates an eye-safe red laser beam that indicates precisely where the pistol is pointing. This device reduces pistol training time, discourages would-be attackers, and increases lethality. SOCOM and other DoD branches asked Crimson Trace to enhance the Lasergrips by ruggedizing the switch mechanism and making the circuitry waterproof. Crimson Trace lacked the in-house expertise to undertake design modifications requested by DoD. MilTech assisted by working with a design group familiar with military specifications, and Crimson Trace selected among three design options. The result is a collaborative effort that resulted in improved technology to meet DoD needs and was applicable to civilian requirements. *FY 2010 Plans:* MilTech Expansion is a congressionally added effort to facilitate Technology Transfer functions, focused specifically on providing critical engineering, manufacturing, and business development assistance to small companies. MilTech is a non-profit entity of Montana State University.		
Congressional Add: Center for Innovation at Arlington *FY 2010 Plans:* Center for Innovation at Arlington is a congressionally added effort to facilitate Technology Transfer functions	0.000	2.700
Congressional Add: National Radio Frequency Research *FY 2010 Plans:* National Radio Frquency Research is a congressionally added effort to facilitate Technology Transfer functions	0.000	4.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
Congressional Add: Program Increase *FY 2010 Plans:* Congressional add for program increase	0.000	0.750
Congressional Adds Subtotals	3.580	11.450

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

Not applicable for this item.

E. Performance Metrics

For FY 2009: established patent license agreements (PLAs) totaling approximately 30 percent of all DOD PLAs and assist in the brokering of over 400 Cooperative Research and Development Agreements (CRADAs)

For FY 2010: establish patent license agreements (PLAs) totaling approximately 30 percent of all DOD PLAs and assist in the brokering of over 400 Cooperative Research and Development Agreements (CRADAs)

For FY 2011: establish patent license agreements (PLAs) totaling approximately 30 percent of all DOD PLAs and assist in the brokering of over 400 Cooperative Research and Development Agreements (CRADAs)

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense											DATE: February 2010
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COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P949: *Technology Transition Initiative*	0.000	0.000	21.157	0.000	21.157	18.789	18.900	11.537	12.460	Continuing	Continuing

Note

In FY 2011, TTI resources were transferred from Quick Reaction Special Projects (PE 0603826D8Z) to Technology Transfer and Transition (PE 0603942D8Z) as part of an effort to more effectively align interwoven program efforts that will benefit management communications, budget justification, fiscal tracking and improve overall program resource management of Transfer/Transition efforts.

A. Mission Description and Budget Item Justification

The Technology Transfer and Transition (TT&T) program (Program Element 0603942D8Z) has two sub-elements: the Technology Transfer program (P942), and Technology Transition Initiative (P949). The fiscal controls above represent the investment of the TT&T Program funding for the TTI Program (P949). The Technology Transition Initiative (TTI), authorized by Title 10 and Section 215 of the FY2003 Defense Authorization Act, facilitates the rapid transition of new technologies from the Department of Defense (DoD) science and technology (S&T) base into DoD acquisition programs. The program addresses the funding gaps that exist between the time a mature technology is demonstrated and the time it can be funded and procured for use in an intended weapons system or operational capability for the warfighter. The TTI program is mandated by Congress and receives high congressional interest.

Since the program inception in FY 2003, 75 projects have been initiated and 37 are complete. Of the 37 completed projects, 27 (73%) have successfully transitioned to DoD Acquisition Programs of Record or procurement contracts for operational use and subsequent fielding; exceeding the objective of 30% for demonstration programs (Strategic Objective 4-3, Office of the Under Secretary of Defense, Acquisition, Technology & Logistics (OUSD (AT&L). Technology Transition Initiative (TTI) projects are selected by the Technology Transition Manager (DDR&E Research Directorate) in consultation with representatives of the Technology Transition Council (TTC). (The TTC is comprised of the Acquisition and S&T executives from each Service and Defense Agency and representatives from the JROC.) The call for TTI proposals is distributed to the DoD Services and Agencies through the Technology Transition Working Group (TTWG) members, designated by the TTC. The TTWG members receive proposals from their Service/Defense Agency S&T base, conduct a prioritization based on Joint, Service or Agency capabilities needed and submit them to the Office Secretary of Defense (OSD) TTI Program Manager. The Technology Manager's senior staff consolidates the proposal submissions, evaluates the Service/ Agency recommendations, reviews new start selection options based on available resources, and prepares a recommended new start selection list to the Technology Transition Manager for funding. The Technology Transition Manager selects the highest priority proposals for funding.

The OSD FY 2011 proposal call memo will be signed out by the Technology Transition Manager in February 2010, requesting the Services, Agencies and Combatant Commands provide their prioritized inputs by April. OSD is looking for candidate proposals that demonstrate a strong commitment from the operational and acquisition

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communities to transition improved capabilities to operational use or an acquisition program of record. These proposals are being evaluated against the following evaluation criteria: TTI funding must accelerate product transition, the technology must be from the DoD S&T base, Component cost sharing to leverage funding, project duration less than four years, established exit criteria, potential for joint use, value to the warfighter, sufficient technology maturity, and commitment to transition/ acquisition. Final selection of FY 2011 TTI new start projects will be determined in the August 2010 timeframe. A listing of initiatives under review for selection by OSD can be provided to congressional staff members during the budget review.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Electronic Image Intensifier for Pilotage (Army) This project will integrate Electronic Image Intensifier (EI2) technology into a lightweight sensor for the Apache Modernized-Pilot's Night Vision System (M-PNVS). Two form-fit, function and flight ready EI2 prototypes will be developed, built, and delivered to Program Manager-Apache for aircraft qualification and users evaluation flights. The EI2 camera will provide performance that is equal to or greater than the current aviator's night vision goggles and at the same time allow for image fusion with the second generation Forward Looking Infrared (FLIR) on the Apache helicopter. Program Outputs and Efficiencies: meet pilotage requirements for dynamic motion, resolution, and contrast through improved readout electronics and high definition format (1920 x 1080); exit criteria to be met include Aviator's Night Vision Imaging System (ANVIS) performance and $35 thousand per camera; two pre-production prototype cameras delivered for operational flight testing in FY 2010. TTI funding accelerates the transition of this capability by two to three years. This project is funded in FY 2009 & FY 2010 via the Quick Reaction Special projects program element. *FY 2011 Base Plans:* This project will integrate into Apache aircraft; complete aircraft qualification, operational flight testing and initiate procurement activities.	0.000	0.000	1.315	0.000	1.315
Medium Caliber Cartridge Improvements using Micro Electro-Mechanical Systems and Direct Write Explosive Ink	0.000	0.000	1.570	0.000	1.570

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
40 millimeter (mm) M433 and M430 cartridges have been in service since the 1950's and 1970's respectively, and are used with the M203 and MK-19 by all services. Both cartridges use point detonating fuzes with mechanical safe and arm devices which do not reliably detonate on soft impact targets or high graze angles. The objective of this effort is to incorporate a Micro Electro-Mechanical Systems (MEMS)-based Safe and Arm (S&A) device with automated explosive loading technology into current 40mm combat cartridges. Outputs and efficiencies: Incorporate impact sensors that will sense initial impact and electronically send a signal to initiate the explosive train for improved lethality and improved reliability on soft targets (from 50 percent to 90 percent), and also significantly reduce the number of duds on the battlefield and training ranges. The MEMS S&A will also require less volume which will allow room for improvements in lethality or other future alternate applications. This Technology Transition Initiative accelerates transition of this technology by approximately three years. This project is funded in FY 2009 & FY 2010 via the Quick Reaction Special projects program element. *FY 2011 Base Plans:* Complete verification hardware build, conduct independent assessment, qualify fuze, and perform evaluation which will result in changes to technical data package.					
Precision Fires Image (PFI) Software Suite Handheld Capability (Navy) Currently Overseas Contingency Operations (OCO) missions on the ground are planned using traditional means and require dismounted operators, (conventional and Special Operations Forces), who do not carry laptop computers. The mission set is currently supported by paper (maps, printouts of images, etc.). The objective of this program is to integrate Battlespace Awareness (Mission Planning, Force Protection, Direct Action, etc.) capability on a Windows CE/mobile handheld computer by building upon already proven and deployed technology. The availability of these software tools on a handheld	0.000	0.000	1.710	0.000	1.710

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
computer will immediately advance warfighter capabilities by enhancing situational awareness, precision targeting, and rapid employment at the tactical level. Program Outputs and Efficiencies: This program will generate and transition a Government-Off-The-Shelf (GOTS) software suite that provides image, video, and geographical capabilities on the Army's Pocket Sized Forward Entry Devices (PFED) and compatible Special Operations Forces Windows mobile handheld computers. These forward operating Battlespace Awareness applications will be built around the previously transitioned and deployed Precision Fires Image (PFI), which is a National Geospatial-Intelligence Agency (NGA) validated, U.S. Central Command (CENTCOM) approved, image-based targeting tool for coordinate-seeking weapons. Integration to the handheld computer will be advantageous in achieving advanced mission capability with less weight, space, and provide shorter operational readiness delays. The TTI funding will accelerate the acquisition and integration of this handheld software capability by two to three years. This project is funded in FY 2009 & FY 2010 via the Quick Reaction Special projects program element. *FY 2011 Base Plans:* The third year we will integrate Key Length Variable (KLV) data from Unmanned Aerial Systems (UAS) sensor video feeds through rover capability providing sensor point of interest on precision imagery; integrate various Laser Range Finder (LRF) data from operator suites for automatic target reporting and visual representation; incorporate digital communications to support Variable Message Format (VMF) Close Air Support (CAS) missions from the handheld to various dismounted radio combinations; transmit Gridded Reference Graphics (GRG) data to another PFI viewer for Situational Awareness (SA) and battlefield updates, and transition capability to other Program of Records.					
Hellfire Height of Burst (HOB) Sensor (Army)	0.000	0.000	1.050	0.000	1.050

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
The Hellfire Height of Burst Sensor is a miniaturized radio frequency (RF) or laser based target detection device that will be integrated into the new Electronic Safe and Arm Device (ESAD) being incorporated into the next generation Hellfire missile (Hellfire R). The HOB sensor provides for improved lethality against targets in the open by detonating the warhead at a height above ground optimized for these targets. This TTI project funds the final design and engineering of the HOB sensor optimized for Hellfire, provides component and system level environmental and hardware-in-the-loop testing, and allows two flight tests of HOB sensor equipped missiles. Program Outputs and Efficiencies: HOB sensor for the Hellfire AGM-114R missile. The HOB sensor will be integrated into the Hellfire missile and undergo hardware-in-the-loop, environmental, and flight testing as part of the TTI effort. The final outcome will be two missile flights incorporating the HOB sensor. The first flight will replace the warhead with a telemetry package to record the missile flight data as well as the point at which the HOB sensor triggers the warhead. The second flight will incorporate both the HOB sensor and the Hellfire warhead. Lethality data will be collected to validate the modeled performance against targets in the open. Simulation has shown that the HOB sensor will significantly increase the lethality when fired from platforms that allow a steep angle of impact. The Technology Transition Initiative accelerates the transition of this caplability by two years. *FY 2011 Base Plans:* Test reports validating the lethality improvement will be completed and HOB hardware delivery is scheduled. Incorporate design changes in baseline configuration to be included in production missile procurement.					
Accelerated Interlocking Mortar Increment Container Technology (Army)	0.000	0.000	0.525	0.000	0.525
The objective of this project is to accelerate the transition of interlocking mortar increment container (MIC) design and fabrication technology to ensure uniform propellant ignition and reduce differential pressures which will eliminate a noted safety critical mechanism and reduce the possibility of critical					

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	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
short rounds (<80% of intended range) due to shearing of fin blades and asymmetrical burn. The interlocking MIC design eliminates the potential alignment of the open ends of the propelling charges and will greatly reduce the chances of more propellant being on one side of the mortar fin boom. This eliminates the imbalance of the energetics and associated potential problematic pressure differential within the mortar tube. The warfighter will have no chance of a sheared fin failure due to unexpected alignment of propelling charges which, in turn, will reduce the possibility of a critically short flight 120mm rounds in theater. Accelerating the maturation, transition, and insertion of this interlocking "high hat" mortar increment container technology into the 120mm mortar ammo program of record (POR) will improve safety and accuracy for our light and dismounted ground forces. It will also lay the foundation for potential subsequent application to 60mm and 81mm mortar ammo if warranted. Program Outputs and Efficiencies: Provides the warfighter with safer mortar ammunition; further prevents the possibility of unexpected short flight of 120mm mortar rounds in theater; improves soldier safety during training. TTI funding accelerates the transition of the capability by 18 months. This project is funded in FY 2010 via the Quick Reaction Special projects program element. *FY 2011 Base Plans:* Generate drawings, specifications, and implement Engineering Change into current 120mm Mortar Propelling Charge Contract.					
Integrated Information Management System (IIMS) Transition (Air Force) The IIMS is a collaborative situational awareness tool which aids in the management of conventional and Chemical, Biological, Radiological, and Nuclear (CBRN) events at fixed, expeditionary and incident response sites. IIMS includes detector/ warning networks, access to CBRN models, and information exchange with civil sector and coalition partner organizations. IIMS is one of the applications in the Air Force Theater Battle Management Core System – Unit Level/Unit Command and Control (TBMCS-UL/	0.000	0.000	1.182	0.000	1.182

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
UC2) and integrated with TBMCS-UL/UC2 through web services. IIMS is also a Command and Control (C2) framework used to conduct joint service Research and Development (R&D) into challenges associated with C2, Information Management, Information Exploitation, Data Fusion and Cyber Defense. The objective of this project is to complete and extend the transition of IIMS into TBMCS-UL/UC2 Increment Two, and to fully transition IIMS into the final TBMCS-UC2 Increment One. The additional IIMS capabilities will augment the fielded TBMC-UL/UC2 to extend original capabilities, provide a stand-alone capability, and to incorporate joint CBRN tools. A successful transition of IIMS to TBMCS-UC2 through this spiral development process will significantly increase the capabilities available to the warfighter. Outputs and efficiencies: The transition of IIMS into the TBMCS-UC2 N-tier Service Oriented Architecture; transition of new capabilities into TBMCS-UC2 through the IIMS framework; the adjudication of any Priority I or Priority II software trouble reports at the time of transition; the software will adhere to general quality and reliability standards and include standard software product sets upon delivery (i.e. source code, executable code, documentation, test results); documentation including complete instructions for developers to create a development environment and build components within the framework; a successful test and demonstration in an operationally relevant environment such as a TBMCS-UL/UC2 site, the Port of Ash Shuaybah in Kuwait or the Statue of Liberty National Monument; evaluation by the Air Force 46th Test Squadron for Developmental Test (DT), Functional Test (FT) and Information Assurance (IA) testing resulting in a favorable Authority to Connect (ATO) recommendation; and a Signed Authority to Connect (ATO) for TBMCS-UC2 with IIMS for DoD networks. TTI funding accelerates the availability of this capability by a minimum of one year. This project is funded in FY 2010 via the Quick Reaction Special projects program element. *FY 2011 Base Plans:* Full transition to the TBMCS-UC2 Increment One N-tier Service Oriented Architecture is scheduled for July 2011. The capabilities include: a generic interface to sensor/detector/warning networks; tools					

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	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
for accessing and processing asset data including operational impact and consequence management assessments; tools for evaluating incident response plans; the Joint Battlespace Infosphere publish and subscribe prioritized use of limited bandwidth; integration of the Chemical Hazard Estimation Method Risk Assessment (CHEMRAT) model; multi-level data fusion of sub-threshold data; the Global Strike Near Real-Time Battle Damage Assessment; and the final third party developer documentation and framework. Testing at the Air Force 46th Test Squadron is scheduled for Q3 FY 2011. Adjudication of integration issues is scheduled for Q4 FY 2011 and Q1 FY 2012.					
Transition Initiatives The Annual Call for Technology Transition Initiative Proposals will be released in the January/February for response by April, and OSD review, prioritization and selection during the June/July timeframe. A listing of initiatives under review for selection by OSD can be provided to congressional staff members during the budget review. *FY 2011 Base Plans:* The FY 2011 Annual Call for TTI Proposals will be released in February 2010 for response by April 2010, and OSD review, prioritization and selection during the July/August timeframe. Approximately 30% of FY 2011 program funds are expected to be dedicated to funding tails from prior year projects, providing the remaining approximate 70% to support FY 2011 New Start selections.	0.000	0.000	13.805	0.000	13.805
Accomplishments/Planned Programs Subtotals	0.000	0.000	21.157	0.000	21.157

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

Not applicable for this item.

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603942D8Z: *Technology Transfer and Transition*	**PROJECT** P949: *Technology Transition Initiative*

E. Performance Metrics

Project performance metrics are specific to each effort and include measures identified in the project plans identified above as well . In addition, program completion and success will be monitored against program schedule and deliverable stated in the proposals. The metrics include items such as target dates from project work break down schedules, production measures, production goals, production numbers and demonstration goals and dates. Generic performance metrics applicable to the Technology Transition Initiative (TTI) program includes attainment of Strategic Objective 4-3, "Speed technology transition focused on warfighting needs". The metrics for this objective and the objective of TTI is to transition 30% of completing demonstrations program per year. In FY 2009, (while TTI was under the QRSP/PE 0603826D8Z program), the Technology Transition Initiative demonstrated a transition rate of 66% and exceeded the 30% goal identified in Strategic Objective 4-3.

FY 2011 Goal: New start of 10 projects per year and conclude the activities on continuing projects with the results of at least 12 technologies transitioning to the warfighter.

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