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Exhibit R-2, RDT&E Budget Item Justification						Date: February 2005		
Appropriation/Budget Activity RDT&E,DW/BA 3				R-1 Item Nomenclature: Medical Advanced Technology, PE 0603002D8Z				
Cost (\$ in millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Total PE Cost	5.915	4.691	0.000	0.000	0.000	0.000	0.000	0.000
Medical Adv. Technology/P506 Subtotal Cost	5.915	4.691	0.000	0.000	0.000	0.000	0.000	0.000
<b>A. Mission Description and Budget Item Justification:</b>								
<p>(U) This program supports applied research for advanced development of biomedical strategies to prevent, treat and assess health consequences from exposure to ionizing radiation. It capitalizes on findings under PE 0602787DZ, Medical Technology, and from industry and academia to advance novel medical countermeasures into and through pre-clinical studies toward newly licensed products. Program objectives focus on mitigating the health consequences from exposures to ionizing radiation that represent the highest probable threat to US forces under current tactical, humanitarian and counter-terrorism mission environments. Findings from basic and developmental research are integrated into highly focused advanced technology development studies to produce the following: (1) protective and therapeutic strategies; (2) novel biological markers and delivery platforms for rapid, field-based individual dose assessment; and (3) experimental data needed to build accurate models for predicting casualties from complex injuries involving radiation and other battlefield insults. The Armed Forces Radiobiology Research Institute (AFRRI), because of its multidisciplinary staff and exceptional laboratory and radiation facilities, is uniquely positioned to execute the program as prescribed by its mission. Because national laboratories operated by the Department of Energy no longer support advanced research relevant to military medical radiobiology, AFRRI is currently the only national resource carrying out this mission.</p>								
<b>B. Program Change Summary:</b>								
	<u>FY 2004</u>	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>				
Previous President's Budget:	5.941	2.063	2.539	2.590				
Current FY 2006 President's Budget Submission:	5.915	4.691	0.000	0.000				
Adjustments to Appropriated Value:	-0.026	+2.628	-2.539	-2.590				
Congressional Program Reductions:	-0.026	-0.072						
Congressional Rescissions:								
Congressional Increases:		+2.700						
Reprogrammings:					-2.539*		-2.590*	
SBIR/STTR Transfers:								
Program Adjustment:								

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\*NOTE 1: Program transfers effective FY 2006 from RDT&E Budget Activity 3, Program Element 0603002D8Z to Defense Health Program (DHP). Plans for FY 2006 and beyond remain unchanged under DHP.

NOTE 2: FY 2005 congressional add of \$1.2 million for Integrated Medical Information Technology Systems to be transferred to appropriate agency for execution.

C. Other Program Funding Summary: Not applicable

**D. Acquisition Strategy:** Not applicable

**E. Performance Metrics:**

By FY 2005 obtain “investigational new drug” status for a therapeutic agent to mitigate radiation injury.

By FY 2006 provide software tools for biodosimetric assessment.

By FY 2010 transition 4 new drugs for FDA approval for treatment of radiation injury.

By FY 2010 provide forward-fieldable biodosimetric tools.

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Exhibit R-2a, RDT&E Project Justification						Date: February 2005		
Appropriation/Budget Activity RDT&E, DW/BA 3					Project Name and Number Medical Advanced Technology, PE 0603002D8Z			
Cost (\$ in millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Medical Advanced Technology/ P 506	5.915	4.691	0.000	0.000	0.000	0.000	0.000	0.000
Subtotal Cost								
<b>A. (U) Mission Description and Budget Item Justification:</b>								
(U) This program supports applied research for advanced development of biomedical strategies to prevent, treat and assess health consequences from exposure to ionizing radiation. It capitalizes on findings under PE 0602787D8Z, Medical Technology, and from industry and academia to advance novel medical countermeasures into and through pre-clinical studies toward newly licensed products.								
<b>B. (U) Accomplishments/Planned Program:</b>								
Cost (in \$ Millions)	FY 2004		FY 2005		FY 2006		FY 2007	
5-AED Preclinical Studies	0.553		0.020		0.000		0.000	
<p>FY 2004 Accomplishments: In FY 2003, in compliance with FDA requirements, pharmacokinetic and toxicity studies for 5-androstenediol were initiated in a large animal model through contract with a GLP certified laboratory. In vitro toxicity assessments on the contract did not demonstrate any toxicity. However, because the test article was unavailable from the pharmaceutical company for the primate studies, the contract was put on hold. The studies will resume early in FY 2005.</p> <p>FY 2005 Plans: Obtain results from toxicology and pharmacokinetic studies in primates. Contract out GLP efficacy studies on primates. Submit IND application to FDA/CDER. Transition to advanced development for Phase I clinical trials.</p>								
Cost (in \$ Millions)	FY 2004		FY 2005		FY 2006		2007	
Ex-Rad Radioprotectant (Congressional add)	1.000		1.500		0.000		0.000	
<p>FY 2004 Accomplishments: Collaborating with Onconova Therapeutics to evaluate the cellular and molecular mechanism by which Ex-Rad ON01210 exerts its radioprotective effects. Initiated studies on the toxicity, and pharmacology of the radioprotectant. Some of these studies will be performed by contract laboratories.</p> <p>FY 2005 Plans: Continue preclinical safety and toxicology studies in animal models in compliance with regulatory and quality assurance standards of the FDA.</p>								
Cost (in \$ Millions)	FY 2004		FY 2005		FY 2006		FY 2007	
Radiation Dose Assessment: Improving the Throughput	0.735		0.254		0.000		0.000	

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<p><b>FY 2004 Accomplishments:</b> Defined high throughput approaches for dose assessment of mass casualties, to include improvements in quality control and quality assurance with data logging and bar-coding for example. In addition, demonstrated proof of concept that high throughput systems for lymphocyte isolation and metaphase spread preparation will work and are amenable to automation. Supplemental funding from NIAID allowed the purchase of necessary equipment for laboratory automation.</p> <p><b>FY 2005 Plans:</b> Integrate the automation process for dicentric assay, including tracking system and automated assay preparation.</p>				
Cost (in \$ Millions)	FY 2004	FY 2005	FY 2006	FY 2007
Biodosimetry Assay Validation of PCC Assay	0.705	0.296	0.000	0.000
<p><b>FY 2004 Accomplishments:</b> Initiated collaborative studies to assess the effect of sampling delay on the persistency of chromosome damage using the mouse. Continued validation of PCC assay using samples from accident victims and radiotherapy patients.</p> <p><b>FY 2005 Plans:</b> Complete time-course study to determine the effect of sampling delay on the PCC assay. Establish multicolor chromosome aberration analysis. Continue validation of assays using samples from accident victims and radiotherapy patients.</p>				
Cost (in \$ Millions)	FY 2004	FY 2005	FY 2006	FY 2007
Biodosimetry Assay Validation of Molecular Markers	0.973	0.360	0.000	0.000
<p><b>FY 2004 Accomplishments:</b> Demonstrated that the gene expression markers developed in peripheral blood lymphocytes irradiated ex vivo were up regulated in vivo in an animal model and in human radiotherapy patients. Developed a 4 target QRT-PCR assay for gene expression to increase assay throughput, increase the number of observable targets, conserve sample, and reduce assay cost.</p> <p><b>FY 2005 Plans:</b> Using radiotherapy patients whenever possible, continue to validate the assays for both protein and gene expression markers. Initiate validation studies for gene expression and protein biomarkers in rodent exposed to radiation in vivo. Initiate studies to assess the responses follow partial body exposures. Begin development of fieldable protocols for blood collection, stabilization of sample, sample isolation, and assay.</p>				
Cost (in \$ Millions)	FY 2004	FY 2005	FY 2006	FY 2007
Biodosimetry Assessment Tool (BAT) and Blood Markers for biodosimetry	0.638	0.258	0.000	0.000

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<p>FY 2004 Accomplishments: Created the preliminary version of the “First Responder Radiological Assessment Triage” (FRAT) which is the PDA version of the software tool for dose prediction, “Biodosimetry Assessment Tool” (BAT). Evaluated accuracy of hematology analyzer and initiated testing of reliability, accuracy and dynamic range. Initiated development of hematology protocol with necessary quality control. Created hematology database from REAC/TS accident registry including photon and criticality exposure scenarios and initiated analysis of lymphocyte depletion kinetics for consideration to use to expand BAT and FRAT. FY 2005 Plans: Incorporate dose-dependent time window on lymphocyte depletion data analysis into BAT. Incorporate neutron criticality lymphocyte depletion data set into BAT. Complete FRAT software application. Complete hematology protocol development and exercise deployable hematology system.</p>				
Cost (in \$ Millions)	FY 2004	FY 2005	FY 2006	FY 2007
Assessment of uranium exposure	0.111	0.083	0.000	0.000
<p>FY 2004 Accomplishments: Began assessment of commercially available resins to concentrate urinary uranium to increase the sensitivity of methodology for the rapid detection. Continued synthesis of imprinted polymers capable of sequestering uranium. FY 2005 Plans: Assess the utility of imprinted polymers to concentrate urinary uranium. Assess the utility of chelation chromatography methodologies for the concentration of uranium in urine.</p>				
Cost (in \$ Millions)	FY 2004	FY 2005	FY 2006	FY 2007
Integrated medical information technology systems (Congressional add)	0.000	1.200	0.000	0.000
NOTE : Funds to be transferred to appropriate agency for execution				
Cost (in \$ Millions)	FY 2004	FY 2005	FY 2006	FY 2007
Infection Therapies	1.200	0.720	0.000	0.000
<p>FY 2004 Accomplishments: Demonstrated a non-specific biological response modifier (beta-1,3-1,6 glucan) and the antimicrobial agent ceftriazone enhanced survival of opportunistic infection with K. pneumoniae in sublethally irradiated mice. The combination therapy was superior to either the beta glucan or the antibiotic alone. FY 2005 Plans: Determine the pharmacokinetics of gatifloxacin, ciprofloxacin, and moxifloxacin in mice after irradiation. Evaluate a variety of antibiotics for their efficacy to treat gram-positive and gram-negative infections that result after lethal irradiation.</p>				
<p><b>C. Other Program Funding Summary:</b> Not applicable.</p> <p><b>D. Acquisition Strategy:</b> Not applicable.</p> <p><b>E. Major Performers:</b> Armed Forces Radiobiology Research Institute, Bethesda, MD.</p>				

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Exhibit R-2, RDT&E Budget Item Justification						February 2005		
Appropriation/Budget Activity RDT&E.DW/BA3		R-1 Item Nomenclature: SO/LIC Advanced Development - PE 0603121D8Z						
Cost (\$ in millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Total PE Cost	32.861	35.586	34.529	35.021	35.982	36.856	37.495	38.366
Explosive Ordnance Disposal/Low-Intensity Conflict/P206	11.087	9.411	9.343	9.487	9.440	9.909	10.109	10.333
Special Reconnaissance Capabilities /P207	19.804	23.179	21.214	21.501	22.529	22.734	23.087	23.640
Information Dissemination Concepts /P208	1.970	2.996	3.972	4.033	4.013	4.213	4.299	4.393

### A. Mission Description and Budget Item Justification:

P206, Explosive Ordnance Disposal/Low-Intensity Conflict (EOD/LIC). The EOD/LIC program provides advanced technology and equipment solutions 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 primarily on the 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).

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 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 Global War on Terrorism (GWOT) 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). Information Dissemination Concepts (IDC) is a new program within the SO/LIC Advanced Development PE0603121D8Z. 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. Program Change Summary:**

	<u>FY2004</u>	<u>FY2005</u>	<u>FY2006</u>	<u>FY 2007</u>
Previous President's Budget	31.300	32.723	33.752	34.100
Current President's Budget	32.861	35.586	34.529	35.021
Total Adjustments				
Congressional program reductions				
Congressional rescissions				
Congressional increases	2.800	3.700		
Reprogrammings	1.561	2.863	.777	.921
SBIR/STTR Transfer	(.592)			
Other Program Adjustments	(.647)	(.041)	(.017)	

**C. Other Program Funding Summary: NA****D. Acquisitions Strategy: NA****E. Performance Metrics:**

SO/LIC Advanced Development - PE 0603121D8Z; Explosive Ordnance Disposal/Low-Intensity Conflict/P206; Special Reconnaissance Capabilities /P207; Information Dissemination Concepts /P208	
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.	
Performance Indicator and Rating:	
FY 2004 Target	<ul style="list-style-type: none"> <li>• 70% of currently funded research projects completed on time and within budget</li> <li>• 5% increase in the number of research projects accepted</li> <li>• Complete 90% of scheduled R&amp;D tasks</li> </ul>
FY 2004 Rating	ON TARGET
FY 2005 Target	<ul style="list-style-type: none"> <li>• 70% of currently funded research projects are completed on time and within budget</li> <li>• 5% increase in the number of research projects accepted</li> <li>• Transition scheduled projects to user communities</li> </ul>
FY 2006 Target	<ul style="list-style-type: none"> <li>• 70% of currently funded research projects are completed on time and within budget</li> <li>• 5% increase in the number of research projects accepted</li> </ul>
FY 2007 Target	<ul style="list-style-type: none"> <li>• 70% of currently funded research projects are completed on time and within budget</li> </ul>

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	<ul style="list-style-type: none"><li>• 5% increase in the number of research projects accepted</li></ul>
Basis of FY 2004 to Date Performance Rating	Currently the number of funded research projects are on track to be completed per the target
Verification	The SO/LIC 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.
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; and enable sustained information operations in denied areas - thus the Department's personnel and interests at home and abroad are safer.

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Exhibit R-2a, RDT&E Project Justification						February 2005		
Appropriation/Budget Activity		Project Name and Number						
RDT&E.DW/BA3		SO/LIC Advanced Development 0603121D8Z						
Cost (\$ in millions)	FY2004	FY2005	FY2006	FY2007	FY2008	FY2009	FY2010	FY2011
Explosive Ordnance Disposal/Low-Intensity Conflict/P206	11.087	9.411	9.343	9.487	9.444	9.909	10.109	10.333

**A. Mission Description and Budget Item Justification:** P206, Explosive Ordnance Disposal/Low-Intensity Conflict (EOD/LIC). The EOD/LIC program provides advanced technology and equipment solutions for military EOD operators and SOF to meet the challenges of improvised explosive devices (IEDs), force protection and the war on terrorism. EOD/LIC efforts focus primarily on the 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).

**B. Accomplishments/Planned Program**

	FY 2004	FY 2005	FY 2006	FY2007
Accomplishment/Effort/Subtotal Cost	11.087	9.411	9.343	9.487

FY2004 Accomplishments: Developed a limpet mine neutralization tool for use by EOD divers to destroy explosive threats to warships. Developed and evaluated the EOD underwater search remotely operated vehicle (ROV) for identification of bottom and moored seamines. Developed the EOD dispersion suppressive system for containment of blast from improvised explosive devices (IED). Developed a real-time radiography system for rapid x-ray imaging of large improvised explosive devices. Developed and demonstrated the Tele-present Remote Aiming Platform (TRAP) on the Autonomous Remote Transport System (ARTS) robot for remote neutralization of scattered submunitions. Developed a miniature diver display system (MDDS) to display sonar imagery to military divers. Developed a remote automated munitions clearance system for remote aiming of a variety of military weapons. Developed an EOD improved incendiary tool for nonexplosive burnout of explosive fill material in conventional ordnance. Designed and evaluated a launching ramp for new Naval Special Clearance Team – One surface craft. Evaluated and demonstrated the military utility of the Segway Human Transporter for improved mobility of explosive ordnance disposal technicians. Multiple Segways were deployed in CENTCOM. Deployed the MK 6 Benign Case Entry System to an operational EOD team.

FY2005 Plans:

Complete development of an improved underwater demolition charge to facilitate the destruction of sea mines. Demonstrate new ballistic protection for the Special Operations Craft – Riverine (SOC-R). Complete development of a laser aiming and ranging system for robotic platforms. Finish development of a new recoilless explosive disruption system to neutralize IEDs. Demonstrate tactical decision aids for Special Operations Forces. Field a joint digital reporting system for EOD incidents. Evaluate commercial active thermal protection systems for cooling EOD technicians while wearing personal protective ensembles. Demonstrate an advanced lift balloon for EOD divers.

Advance the development of an auxiliary module for the standard Remote Activation Munitions System (RAMS) to initiate shock tube remotely. Commercialize the Combat Diver Display Mask (IDDM) for Marine Corps divers. Transition a low-cost, expendable ground robotic vehicle for IED disruption into an acquisition program. Demonstrate an unmanned riverine reconnaissance vehicle for use by Navy Special Warfare. Demonstrate a prototype wall breaching system for inclusion in the fielded SOF Demo Kit. Continue the development of low-cost, field supportable robotic ground vehicles. Design a radar IED detection system for use on tactical vehicles. Demonstrate a prototype database of navy ships for use in underwater hull searches.

Develop a low-cost tactical training round for the MK 40 long range disrupter. Initiate development of a radiography system with a capability for port mortuary operations while deployed. Integrate the current EOD digital radiography system with commercial photographic capabilities and a fiber optics control link. Design a limpet mine removal tool for use by EOD divers. Initiate development of a command and control link for unmanned ground vehicles using magnetic inductive technology. Prototype a explosive threat simulation system for student evaluation at EOD School.

FY2006 Plans:

Finalize development of integrated dive mask for military divers to improve safety. Complete development of a low-cost unmanned ground vehicle for IED neutralization. Demonstrate an enhanced prototype unmanned riverine reconnaissance vehicle for Navy Special Warfare. Provide fieldable prototype Navy ship hull database. Provide a tactical wall-breaching capability for Special Operation Forces. Demonstrate a combination camera/digital x-ray for use in aiming EOD explosive disruption tools, and a fiber-optic command and control option when radio use is denied.

Continue the development of a low-cost tactical training round for the MK 40 Explosive Disrupter. Demonstrate a radiography capability for deployed EOD port mortuary operations. Fabricate a radar for the detection of roadside IEDs. Demonstrate a diver operated tool for the removal of limpet mines from ship hulls. Demonstrate magnetic inductive technology in a command and control link for unmanned ground vehicles. Demonstrate an improved simulator at EOD School for training and evaluating students.

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Initiate the development of an expert system for selecting appropriate EOD tools in the field. Begin design of frangible 7.62mm and .50 caliber ammunition to improve safety during small munitions disruption. Develop a sidearm with a low magnetic signature. Develop a decelerator to safely catch slugs from EOD standoff disruption tools. Initiate the development of a catalogue of types of ballistic protection materials.

FY2007 Plans:

Finalize development of a low-cost tactical training round for the MK 40 Explosive Disrupter. Complete demonstration of a radiography capability for deployed EOD port mortuary operations. Demonstrate a decelerator to safely catch slugs from EOD standoff disruption tools. Transition a diver operated tool for the removal of limpet mines from ship hulls. Complete development of magnetic inductive technology in a command and control link for unmanned ground vehicles.

Continue the development of an expert system for selecting appropriate EOD Tools in the field. Develop prototype frangible 7.62mm and .50 caliber ammunition to improve safety during small munitions disruption. Demonstrate a sidearm with a low magnetic signature. Populate a catalogue of types of ballistic protection materials.

Initiate the development of back blast protection for operator launched missiles. Improve fuel tank safety on board small boats. Develop of a low cost disposable remote firing set receiver for use on expendable vehicles.

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Exhibit R-2a, RDT&E Project Justification						February 2005		
Appropriation/Budget Activity		Project Name and Number						
RDT&E.DW/BA3		SO/LIC Advanced Development 0603121D8Z						
Cost (\$ in millions)	FY2004	FY2005	FY2006	FY2007	FY2008	FY2009	FY2010	FY2011
Special Reconnaissance Capabilities /P207	19.804	23.179	21.214	21.205	22.529	22.734	23.087	23.640

**A. Mission Description and Budget Item Justification:** 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 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 Global War on Terrorism (GWOT) and maintains DoD's on-line catalog of tools in order to minimize crisis response time for special reconnaissance and surveillance.

**B. Accomplishments/Planned Program**

	FY 2004	FY 2005	FY 2006	FY 2007
Accomplishment/Effort/Subtotal Cost	19.804	23.179	21.214	21.205

FY 2004 Accomplishments: Program provided technology support to GWOT to include variants of unattended ground sensor prototypes for maritime and ground persistent surveillance missions with associated technology training. Assessed, evaluated, and initiated the integration of various tag capabilities for end-to-end operations in concert with user CONOPS. Demonstrated radio frequency (RF) tagging capability using national and theater sensor platforms. Enhanced and evaluated military utility of next generation optical tags. Developed and performed end-to-end assessment of next generation small beacon TTL device. Assessed and began integration of an improved day and night optics capabilities into remoted capabilities. Integrated and demonstrated improved reliable unattended electro-optics, acoustic, magnetic, seismic, and other unattended ground sensors into the remoted capabilities. Initiated the integration of GPS and remote wake up into remoted capabilities. Developed and demonstrated the capability to automatically detect, acquire and exfiltrate a target moving past a remoted camera. Improved power management, endurance and reliability of remoted capabilities. Enhanced functionality and expanded access of on-line information to supporting commands, DoD activities and OGAs. Assessed more than 10 reconnaissance capabilities and conducted four technology evaluations to assess operational capabilities. Leveraged advanced sensing, tracking, communications and power technologies with DoD and OGA to accelerate the transition of advanced SR technology to operational community.

FY 2005 Plans: Integrate new micro sensors into prototype remoted capabilities. Conduct end-to-end testing of extremely small, power efficient, beacon device. Continue the following tasks: to provide technology support to the Global War on Terrorism to include, technology training and variants of unattended ground sensor prototypes for maritime and ground persistence surveillance; to

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identify, evaluate and operationalize sensor and tagging, tracking, and locating technologies to enhance the technical performance of reconnaissance and surveillance missions; to insert operational capable prototypes into operator training exercises to vet tactics, techniques and procedures for employment; to refine family of tags for both end-to-end operations, mission specific, emplacement for installation and removal capabilities in concert with user CONOPS; to enhance and evaluate Radar TTL capability; to enhance and evaluate the capabilities of optical tags; to research, evaluate and integrate remote and TTL emplacement; to improve data infiltration and exfiltration capabilities through the integration of advanced technology and new communications links; to improve SR optic capabilities through the integration of advanced optic technology and processing; to improve SR power capabilities through the integration of advanced power technologies and device redesign; to exploit remote control capabilities by reducing form factors, improving power management, and integrating air droppable and maritime capabilities; to perform field evaluations of selected SR technologies and document results in on-line SRC knowledgebase; to support cooperative projects and evaluate technology maturity for new capabilities with the DoD and OGA that accelerates the transition of advanced SR and TTL technology to operational the community.

FY 2006 Plans: Provide technology support to DoD with emerging SR precise location prototype technologies. Develop micro sensor controller for hand emplacement, and air and maritime employment. Continue the following projects: to provide technology support to the Global War on Terrorism to include, technology training and variants of TTL and unattended ground sensor prototypes for maritime and ground persistence surveillance; to engage the research and development community for technical solutions and candidate technologies to improve DoD SR mission capabilities; to evaluate and operationalize sensor and tagging, tracking, and locating capabilities through insertion of maturing mini and micro technologies to enhance the technical performance of SR missions; to insert operationally capable prototypes into operator training exercises to vet technologies and to develop tactics, techniques and procedures for employment; to research, evaluate and integrate enhanced tagging and sensing capabilities to enable remote and standoff emplacement; research, evaluate and integrate emerging netted sensor technologies into remoted capabilities; to integrate improved SR data infiltration and exfiltration capabilities through the development and integration of advanced technology and new communications links; to perform field evaluations of selected SR technologies and document results in on-line SRC knowledgebase; and to support cooperative projects with DoD and OGA to accelerate the transition of advanced SR technologies to operational community.

FY 2007 Plans: Insert operationally capable prototypes into operator training exercises to vet technologies and new develop tactics, techniques and procedures for employment. Continue to: provide technology support to the Global War on Terrorism to include, technology training and variants of TTL and unattended ground sensor prototypes for persistence surveillance; engage the research and development community for technical solutions and candidate technologies to improve DoD SR mission capabilities; evaluate and operationalize sensor and tagging, tracking, and locating 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, fingerprinting, emerging precise location technologies, and improved netted SR data infiltration and exfiltration capabilities; research, evaluate and integrate emerging netted sensor technologies into remoted capabilities; perform field evaluations of selected SR technologies and document results in on-line SRC knowledgebase; and support cooperative

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projects with the DoD and OGA Intelligence Agencies to accelerate the transition of advanced R&S technology to operational community.

Exhibit R-2a, RDT&E Project Justification						February 2005		
Appropriation/Budget Activity RDT&E.DW/BA3		Project Name and Number SO/LIC Advanced Development 0603121D8Z						
Cost (\$ in millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Information Dissemination Concepts/P208	1.970	2.996	3.972	4.033	4.013	4.213	4.299	4.393

**A. Mission Description and Budget Item Justification:** The Information Dissemination Concepts (IDC) program addresses technology shortfalls 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. IDC also includes other aspects of information operations to include advanced analysis and planning techniques.

**B. Accomplishments/Planned Program**

	FY 2004	FY 2005	FY 2006	FY 2007
Accomplishment/Effort/Subtotal Cost	1.970	2.996	3.972	4.033

FY 2004 Accomplishments: This is the first year of this program. The Multimedia Alert Processing Systems (MAPS) is in prototype development and being evaluated by USSOCOM and USCENTCOM. All other efforts are either new starts or accelerating other efforts. Continue efforts on the psychological operations (PSYOP) analysis support environment (PSYASE) in order to conduct impact analysis of PSYOP campaigns. Began effort to install a Ku-band satellite antenna and a video/audio receive capability on the EC-130J Commando Solo aircraft. This capability will enable the EC-130J to receive PSYOP products while on station increasing the responsiveness of providing distribution of products into denied areas. Started project to test and evaluate commercial compression software in an effort to reduce the amount of transponder bandwidth and downlink power required for PSYOP support as well as reducing the operational costs.

FY 2005 Plans: Continue RD&TE efforts on PSYASE, as well as facilitating the testing of prototype PSYASE technology to the USSOCOM Global Reach ACTD. Multimedia Alert Processing System (MAPS) development will continue in order to deploy additional prototypes into the USSOCOM and USCENTCOM area of responsibility. A new focus area for FY 2005 is Scatterable Media Technologies, which identifies the capability to project information into denied areas of operations in support of psychological operations. This project will examine technologies, which will specifically address information dissemination techniques into physically denied areas that possess mature information infrastructures.

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FY 2006 Plans: Support counter-terrorism and combating terrorism operations by continuing the development of information operations tools and technologies, and expanding translation capabilities and monitoring of local radio and Internet dissemination of foreign news services. Develop information dissemination requirements in support of instability and counter- narcotic operations. Start new projects defined through collaboration efforts to address technology shortfalls.

FY 2007 Plans: Continue to expand IDC in support of all SO/LIC missions. Work closely with the Information Operations community in order to leverage information technology development across DoD agencies with the focus of supporting military operations.

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Exhibit R-2, RDT&E Budget Item Justification						February 2005		
Appropriation/Budget Activity		R-1 Item Nomenclature:						
RDT&E.DW/BA3		Combating Terrorism Technology Support (CTTS) - PE 0603122D8Z						
Cost (\$ in millions)	FY2004	FY2005	FY2006	FY2007	FY2008	FY2009	FY2010	FY2011
Total PE Cost	94.720	97.661	55.301	66.624	79.391	82.754	85.327	89.140
Combating Terrorism Technology Support/P484	94.720	97.661	55.301	66.624	79.391	82.754	85.327	89.140

**A. Mission Description and Budget Item Justification:** This program develops technology and prototype equipment that address needs and requirements with direct operational application in the national effort to combat terrorism. Projects support antiterrorism, counter terrorism, intelligence, and terrorism consequence management activities to: conduct tactical operations; protect military forces, civilian personnel, installations, infrastructure elements and the general populace from terrorist attack; detect, neutralize, and mitigate the effects of conventional and unconventional devices; conduct surveillance and tracking of terrorists; conduct threat and incident assessments; and process and disseminate information. The program integrates Defense advanced development efforts with government-wide and international efforts to combat terrorism. The Assistant Secretary of Defense for Special Operations and Low-Intensity Conflict oversees and is responsible for execution of the CTTS program, which addresses defense, interagency, and international combating terrorism technology requirements.

**B. Program Change Summary:**

	<u>FY2004</u>	<u>FY2005</u>	<u>FY2006</u>	<u>FY2007</u>
Previous President's Budget	60.526	46.778	44.575	44.980
Current President's Budget	94.720	97.661	55.301	66.624
Total Adjustments				
Congressional program reductions				
Congressional rescissions				
Congressional increases	38.200	52.116	10.726	21.644
Reprogrammings				
SBIR/STTR Transfer	(2.128)			
Other program adjustments	(1.878)	(2.323)		

**C. Other Program Funding Summary: NA**

**D. Performance Metrics:**

Combating Terrorism Technology Support - PE 0603122D8Z	
D. 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 R&D agreements with the United Kingdom, Canada and Israel to leverage technology; and initiate full cooperative R&D programs with two new foreign partners.	
Performance Indicator and Rating:	
FY 2004 Target	<ul style="list-style-type: none"> <li>• 70% of currently funded research projects completed on time and within budget</li> <li>• 5% increase in the number of research projects accepted</li> <li>• Negotiate MOAs with new foreign partners</li> <li>• Initiate threat/technology solutions workshop program</li> </ul>
FY 2004 Rating	ON TARGET
FY 2005 Target	<ul style="list-style-type: none"> <li>• 70% of currently funded research projects are completed on time and within budget</li> <li>• 5% increase in the number of research projects accepted</li> <li>• Initiate pilot cooperative R&amp;D program with new foreign partners</li> <li>• Continue threat/technology solutions workshop program</li> </ul>
FY 2006 Target	<ul style="list-style-type: none"> <li>• 70% of currently funded research projects are completed on time and within budget</li> <li>• 5% increase in the number of research projects accepted</li> <li>• Expand pilot R&amp;D programs with two new foreign partners to full cooperative programs</li> <li>• Continue threat/technology solutions workshop program</li> </ul>
FY 2007 Target	<ul style="list-style-type: none"> <li>• 70% of currently funded research projects are completed on time and within budget</li> <li>• 5% increase in the number of research projects accepted</li> <li>• Continue full R&amp;D programs with existing and new foreign partners</li> </ul>
Basis of FY 2004 to Date Performance Rating	Currently the number of funded research projects are on track to be completed per the target
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 which 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 Department's personnel and interests at home and abroad are safer from terrorism.

Exhibit R-2a, RDT&E Budget Item Justification						February 2005		
Appropriation/Budget Activity		Project Name and Number						
RDT&E.DW/BA3		Combating Terrorism Technology Support - PE 0603122D8Z						
Cost (\$ in millions)	FY2004	FY2005	FY2006	FY2007	FY2008	FY2009	FY2010	FY2011
Combating Terrorism Technology Support	94.720	97.661	55.301	66.624	79.391	82.754	85.327	89.140

**A. Mission Description and Budget Item Justification:** This program develops technology and prototype equipment that address needs and requirements with direct operational application in the national effort to combat terrorism. Projects are distributed among ten mission categories: Chemical, Biological, Radiological, and Nuclear Countermeasures; Explosives Detection; Improvised Device Defeat; Infrastructure Protection; Investigative Support and Forensics; Physical Security; Training Technology Development; Surveillance, Collection, and Operations Support; Tactical Operations Support; and VIP Protection. This program is a non-system, advanced technology development effort that demonstrates the utility or cost reduction potential of technology when applied to combating terrorism requirements. It includes technology development and proof-of-principle demonstrations in field applications and coordination to transition from development to operational use.

**B. Accomplishments/Planned Program**

CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR COUNTERMEASURES

	FY 2004	FY 2005	FY 2006	FY 2007
Accomplishment/Effort/Subtotal Cost	15.452	8.148	3.500	3.997

FY 2004 Accomplishments: Developed and tested advanced personal protective equipment and clothing. Designed and tested advanced systems to collect and detect biological and chemical agents and toxic industrial chemicals. Identified biological markers to quantify an individual's exposure to ionizing radiation. Evaluated new tools to detect food-borne attacks. Tested and operationally evaluated the portable water treatment system for critical facilities. Tested a cold-plasma system for decontamination against EPA standards. Assessed ozone as a decontamination agent for the building disinfection byproducts database. Developed a software application to facilitate improving chemical and biological (CB) protection capabilities for buildings. Tested the chemical sensor for the networked decontamination monitoring system. Evaluated the biological agent preservation system.

Conducted testing and field demonstration of a fiber-optic-based Distributed Chemical Sensor system. Validated the Electrostatic Decontamination System against chemical and biological agents. Tested the high-volume aerogel-based sampler collection system for aerosolized BW agents. Initiated lessons-learned database from bioterrorism exercises for use by the first responder community.

FY 2005 Plans: Develop and field-test the tactical self-contained breathing apparatus (SCBA) for specialized response units and advanced protective clothing for incident response personnel. Test new designs for CB escape hoods and conduct live-agent testing of

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the personal hydration CBR filtration system. Validate field methods for quantifying biological markers for personal exposure to ionizing radiation. Test a heat stress calculator for use by safety officers to manage worker heat-related health conditions. Deliver the final building disinfection byproducts database. Field-test the advanced high-volume air sampling systems for BW and CW agents. Develop and test the CW and BW water collection and detection system. Validate improved handheld BW immunoassays. Test initial prototypes of a small portable radio repeater system to maintain voice communication for military and first responders operating in underground environments. Evaluate protocols for a food security test kit for personnel protection at high-threat overseas government facilities.

Test the first building-scale installation of the fiber-optic-based Distributed Chemical Sensor system. Perform efficacy and toxicity testing of the Electrostatic Decontamination System to meet EPA requirements. Deploy initial lessons learned database from agricultural bioterrorism exercises and natural outbreak responses for use by the agricultural responder community.

FY 2006 Plans: Complete field testing of an advanced high-volume water sampling system for BW and CW agents. Field-test a small portable radio repeater system to maintain voice communication for first responders operating in underground environments. Operationally evaluate a food security test kit for personnel protection at high-threat overseas government facilities. Review initial designs for advanced personal protective equipment with improved heat stress management capabilities. Perform initial laboratory testing of a small personal toxic chemical and contact poison detector and dosimeter. Evaluate designs for toxic chemical release mitigation methods in an urban environment.

FY 2007 Plans: Conduct initial field and user tests on advanced personal protective equipment with improved heat stress management capabilities. Complete field tests for laboratory testing of a small personal toxic chemical and contact poison detector and dosimeter. Conduct modeling and initial user tests for toxic chemical release mitigation methods in an urban environment.

EXPLOSIVES DETECTION

	FY 2004	FY 2005	FY 2006	FY 2007
Accomplishment/Effort/Subtotal Cost	8.023	6.937	4.500	5.330

FY 2004 Accomplishments: Conducted laboratory testing of trace explosives detection portals used in conjunction with metal detectors to evaluate concept of combining multiple explosives and weapons detection technologies into one system. Completed false alarm reduction for an explosive detection system that combines nuclear quadrupole resonance (NQR) with computed tomography. Characterized degree of canine ability to generalize from domestic to foreign explosives. Built NQR laboratory test bed for screening of mid size vehicles. Measured NQR signature for unconcealed explosives in laboratory test bed.

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FY 2005 Plans: Develop system for screening bottles for explosives and hazardous materials. Develop methods to improve canine handler selection and training. Evaluate methods to optimize canine performance. Determine feasibility of NQR for detection of large vehicle bombs. Conduct feasibility studies to assess emerging technologies for standoff explosives detection.

FY 2006 Plans: Demonstrate system for screening bottles for explosives and hazardous materials. Conduct comparative study of methods to optimize canine performance. Complete breadboard systems for standoff detection of explosives.

FY 2007 Plans: Test and evaluate breadboard systems for standoff detection. Implement canine optimization methods in operational pilot program.

IMPROVISED DEVICE DEFEAT

	FY 2004	FY 2005	FY 2006	FY 2007
Accomplishment/Effort/Subtotal Cost	7.300	6.481	4.500	5.330

FY 2004 Accomplishments: Completed lab testing of recoilless variable velocity disruption system. Completed commercial transfer of the Standoff Connectivity Control Unit. Conducted an operational assessment of Explosive ordinance disposal (EOD) remote controlled vehicles (RCV) to identify and quantify user requirements. Field tested the fragmentation-free, field-expedient explosive access tool. Field tested and commercially transitioned a ruggedized radio frequency remote firing device. Completed development and field testing of a PDA based First Responders Tool for real-time information access. Completed safety characterization and testing of an EOD backpack toolkit and the first phase characterization of precision and general disruption EOD tools. Finished testing a downsized high-energy access and disablement device.

FY 2005 Plans: Initiate development of the First Responder Automated Data Tool (FRAT) Real Time Information Sharing System for web-based information support to bomb squads and First Responders. Develop and field test lightweight recoilless disrupters for small RCV platforms. Complete characterization of a recoilless breech for the PAN disrupter. Develop a tactical timed firing device for EOD operations. Develop and field test a multiple improvised explosive device (IED) disruption system that will integrate with existing robotic platforms. Develop an X-Ray emissions mitigation system. Develop and field test a vehicle bomb improvised explosive device (VBIED) integrated diagnostic & neutralization system. Continue evaluation and characterization of precision and general disruption tools.

FY 2006 Plans: Complete development of a tactical timed firing device, multiple IED disruption system and a VBIED integrated diagnostic & neutralization system. Develop a VBIED single sided diagnostic system that is fully integrated onto a robotic platform. Complete evaluation and characterization of precision and general disruption tools.

FY 2007 Plans: Complete development of a single-sided diagnostic system for VBIEDs that is fully integrated onto a robotic platform, and enhanced VBIED disablement tools.

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## INFRASTRUCTURE PROTECTION

	FY 2004	FY 2005	FY 2006	FY 2007
Accomplishment/Effort/Subtotal Cost	1.731	2.279	1.700	1.999

FY 2004 Accomplishments: Developed a prototype encryption algorithm and hardware platform for supervisory control and data acquisition (SCADA) system protection. Delivered two components of the Network Isolation Tool for integration testing. Developed software tool to protect against the insider threat to information systems. Developed and deployed the Pipeline Net software tool.

FY 2005 Plans: Deploy and test a software tool to model computer virus propagation and implement better mitigation strategies. Expand the deployment of the Pipeline Net software tool.

FY 2006 Plans: Develop and field a prototype early warning system for critical drinking water infrastructure. Develop and deploy configuration-based network security technologies.

FY 2007 Plans: Research more secure communication platforms for air traffic controllers. Develop improved tools for cyber security. Research methods to improve the monitoring and control systems for electric power substations.

## INVESTIGATIVE SUPPORT AND FORENSICS

	FY 2004	FY 2005	FY 2006	FY 2007
Accomplishment/Effort/Subtotal Cost	5.074	4.734	4.200	5.330

FY 2004 Accomplishments: Fielded advanced video tape enhancement and advanced audio tape enhancement software. Distributed forensic computer clandestine data capture devices. Developed questioned identification document software system with data link analysis. Designed computer counter-encryption modules. Evaluated and delivered advanced technology for audio voice identification. Proved concept of forensic link analysis of computers and their media through reach back signals. Continued advancement of forensic document examination methodology.

FY 2005 Plans: Complete and distribute forensic tools to recover and capture data from operating computers, cellular phones and personal digital assistants. Field counter-encryption tool based on distributed networking. Improve first responder-emergency software tools. Design virtual training simulators for forensic scientists. Complete and field forensic references in explosive residues, improvised explosive device components, commercial explosive, and pipe bombs. Validate and distribute advanced techniques for analysis of deoxyribonucleic acid (DNA) for physical traits and age of biological samples. Provide working versions of computer facial recognition tools. Publish criteria for forensic document examination methodology. Field advanced wireless video surveillance system. Distribute a validated language speaker recognition corpus. Field pocket fingerprint recovery kit, a firearms identification system and an improvised explosive device (IED) forensics software tool.

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FY 2006 Plans: Provide report on stable isotope analysis of hair techniques to determine likely geolocation of suspected terrorists. Publish reports on standardized evaluation of latent print developers and statistical analysis of friction ridge matching criteria. Field a three dimensional crime scene modeling system. Develop systems and procedures for mass casualty identification. Coordinate and effect international forensic data exchange. Develop comprehensive steganalysis detection and decryption software.

FY 2007 Plans: Develop efficient gunshot residue testing for non-conventional ammunition. Field comprehensive steganalysis detection and decryption software. Advance evidence collection procedures and processing in chemical and biologically contaminated areas. Design and develop real time remote crime scene forensic support and examinations. Develop a streamlined encompassing forensic processing model for rapid examinations of IED post-blast evidence. Coordinate forensic processes with intelligence gathering systems. Design the next generation of speaker recognition system. Advance the state-of-the-art of computer forensics examinations.

PHYSICAL SECURITY

	FY 2004	FY 2005	FY 2006	FY 2007
Accomplishment/Effort/Subtotal Cost	16.245	21.671	11.800	13.991

FY 2004 Accomplishments: Developed a portable, automated tester for walk-through metal detectors to validate compliance with the National Institute of Standards and Technology test standard. Operationally tested an advanced entry-point vehicle/driver identification system. Developed and fielded an enhanced expeditionary version. Evaluated a commercial, automated, under-vehicle inspection system. Published inspection/screening guides for screening rail cars and personnel for explosives or other contraband at entry points. Developed and field tested a lightweight, portable boom and underwater swimmer detection system to protect ships in port. Conducted a proof-of-concept test for a perimeter intrusion detection system using airport ground surveillance radar. Developed a wireless tactical video surveillance system for perimeter intrusion detection. Evaluated commercial smart video systems for detection and assessment of possible vehicle bomb threats. Operationally tested a long-range, optical, intrusion detection, tracking, and assessment system. Evaluated badging technologies for credentialing government employees, contractors, and visitors entering government facilities. Tested on redesigned and/or retrofitted structural and non-structural building components for blast effects from enhanced explosive mixtures. Delivered a simulation and prediction blast injury code for secondary debris field injuries. Developed, tested, and deployed a light, low-cost retrofit polymer armor solution for tactical vehicles that can be applied in the field. Developed a database to archive blast test data and make it easily accessible to government and military planners and engineers. Improved structural design models and validated modeling simulations by performing blast tests on columns and other structural and non-structural components using conventional high explosives and enhanced novel explosives. Performed dynamic testing of commercial-off-the-shelf blast resistant retrofit products. Characterized and calibrated a blast simulator that mimics the effects of enhanced novel explosives and conventional explosives at varying standoff distances and blast strengths. Deployed two web based information library portals that provide historical and on-going reports and research and development information on human lethality in a blast environment as well as blast effects and mitigation.

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Conducted blast performance tests on tactical protective equipment for soldiers and first responders.

FY 2005 Plans: Field test a portable, automated tester for walk-through metal detectors. Develop a remotely operated, concealed weapons detection capability using magnetic anomaly detection. Develop and lab test a faster, more accurate vehicle image recognition system at vehicle entry points. Develop and evaluate an enhanced mobile backscatter x-ray screening system for detecting explosives in vehicles and intermodal cargo containers. Conduct a pilot test of a credentialing system integrating a fingerprint biometric device with a smart card reader to enhance entry point security without hindering throughput. Develop a merchant vessel inspection guide to consolidate existing tactics, techniques, and procedures for Visit, Board, Search and Seizure teams and security personnel. Operationally evaluate a smart video intrusion detection system providing enhanced situational awareness for perimeter and area security. Demonstrate and transition a perimeter intrusion detection and tracking system using airport ground surveillance radar. Operationally test an improved, long-range, optical intrusion detection, tracking, and assessment system. Develop guidance for deployment of non-standard vehicle barriers in tactical and non-tactical applications. Begin development of an integrated security system architecture using existing or new radars, optical devices, and security sensors incorporating a rules-based alerting and secure, digitally authenticated communications. Continue to develop improved polymer materials for blast resistant protective coatings on tactical vehicles. Improve structural design models and validate modeling simulations by performing blast tests on columns and other structural and non-structural components using conventional high explosives and enhanced novel explosives. Promulgate performance criteria for structures in a blast environment. Investigate the use of fiber material to reinforce concrete bridge decks, columns and arches. Continue to research the efficiency of protective equipment in blast environments. Develop robust models of forward base fortifications and how they respond in a blast environment. Publish retro-fit techniques for suspension bridges, arch bridges, movable bridges and long span bridge. Construct a full size urban test facility to develop dynamic computational codes of results of enhanced novel explosives in an urban environment. Perform field testing on bridge structures and bridge components to verify vulnerability to explosive loads. Conduct vulnerability assessment of tunnels against the effects of conventional and enhanced novel explosives.

FY 2006 Plans: Conduct field tests and an operational evaluation of a remotely operated concealed weapons detection system using magnetic anomaly detection. Transition a portable, automated walk-through metal detector tester to commercial production. Develop an automatic remote identification system for vehicle drivers. Develop a paint which will show evidence of tampering when subjected to UV light. Develop a fingerprint-actuated padlock. Develop a portable ticket verifier with trace explosives detection, GPS positioning, and wireless alarm reporting. Develop an integrated suite of explosive detection tools to meet the high-throughput requirements of vehicle ferries. Field test an automatic under-vehicle inspection system. Publish a user manual for emplacing non-standard vehicle barriers in tactical and non-tactical applications. Continue development of an for an integrated security system architecture using existing and new radars, optical devices, and security sensors incorporating a rules-based alerting and secure digitally authenticated information processing. Begin development of a simulator for evaluating tactics, techniques, and procedures for operating a remotely operated weapons system. Develop a low-cost, wireless, self-organizing sensor system for protection in depth. Develop a swimmer interdiction system with a scalable response from notification through use of deadly force. Begin

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development of a harbor/port air defense system which does not disrupt the local electromagnetic spectrum and devices. Identify, assess and evaluate relevant commercial-off-the-shelf blast mitigation and hardening technologies for tunnels, bridges and railways against conventional high explosives and novel enhanced explosives; certify results and convert the information into useful engineering guidance and code. Model and field test existing commercial-off-the-shelf retrofit and hardening technologies to increase tunnel blast resistance. Develop advanced high fidelity instrumentation for measuring the tactical performance of improvised explosives to include thermal, optical, and seismic signatures. Use blast simulator test data for walls, columns, and other structural elements of buildings to validate computer models. Provide enhanced engineering and design guidance for retrofits and new construction. Conduct field tests and computer simulation modeling to demonstrate and determine blast response to field fortifications from enhanced novel explosive detonation. Determine the existing blast threshold capability of substations and cell towers to determine vulnerability and identify levels of protection utilizing commercial-off-the-shelf technology. Validate the integrity of barriers, barricades, bollards, and integral structural blast reinforcement techniques against multiple threat scenarios. Develop biofidelic physical surrogates that accurately represent human physiological response to a blast environment to further advancements in protective equipment.

FY 2007 Plans: Evaluate next generation biometric identification technologies for inclusion in integrated access control systems. Evaluate next generation weapons, explosives, and other contraband screening systems for facilities, public venues, and intermodal cargo terminals. Field test an automatic remote identification system for vehicle drivers. Field test a paint which will show evidence of tampering when subjected UV light. Field test a fingerprint-actuated padlock. Continue development of a portable ticket verifier with trace explosives detection, GPS positioning, and wireless alarm reporting. Field test an integrated suite of explosive detection tools to meet the high throughput requirements of vehicle ferries. Demonstrate an integrated security system architecture using existing and new radars, optical devices, and sensors incorporating a rules-based alerting and secure digitally authenticated information processing. Operationally evaluate a simulator for evaluating tactics, techniques, and procedures for operating a remotely operated weapons system. Field test a low-cost, wireless, self-organizing sensor system for protection in depth. Evaluate a swimmer interdiction system with a scalable response from notification through use of deadly force. Continue development a harbor/port air defense system which does not disrupt the local electromagnetic spectrum and devices. Convert and promulgate data on structural blast reinforcement into meaningful engineering and code guidance to the military, industrial and civil engineering community. Develop and test personal protective gear that improves survivability against injuries from enhanced novel and novel explosive blasts.

SURVEILLANCE, COLLECTION, AND OPERATIONS SUPPORT

	FY 2004	FY 2005	FY 2006	FY 2007
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Accomplishment/Effort/Subtotal Cost	10.757	8.176	7.800	9.327
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FY 2004 Accomplishments: Developed capability of monitoring multimedia broadcast information through automated language translation, key-word search and topic alerting. Improve intelligence analyst automation tools for dealing with large volumes of data including video and audio and including speech technology aids. Integrated multi-sensor systems for improved collection and targeting. Improved facial recognition, speech identification, and other technology biometric to assist in identifying terrorists on a watch list. Developed operational facial recognition database being used by the law enforcement community.

FY 2005 Plans: Develop system to triage and prioritize of foreign language media that includes filtering and fusion of information important to senior decision makers. Develop autonomous, networked collection systems that include next generation imaging sensors. Enhance unattended ground sensors through fusion and integration of multiple sensors. Apply advances in joint tagging, tracking and locating technology to improve maritime tagging and tracking. Improve access to open source media by providing broader language domains. Increased capability for long-range audio surveillance. Develop various plug and play sensors to support various UAV platforms. Integrate facial recognition technology into surveillance systems by including the application of multi-spectral imaging. Transition facial recognition database to the military.

FY 2006 Plans: Integrate multiple tagging, tracking and location technologies as a cue for other sensors or action. Continue to develop maritime tagging and tracking capability. Develop geolocation aids that do not rely on GPS. Improve long-range audio surveillance and processing capabilities. Investigate biometric and other novel technology areas to improve tagging, tracking, locating. Continue UAV sensor development.

FY 2007 Plans: Improve access to open source media through new language processing technologies for multimedia information from degraded input sources. Develop biometric and novel technology areas to improve tagging, tracking, locating. Apply the gains in facial recognition technology to long-range video surveillance. Enhance UAV collection capabilities with multi-sensor integration into plug and play architecture.

## TACTICAL OPERATIONS SUPPORT

	FY 2004	FY 2005	FY 2006	FY 2007
Accomplishment/Effort/Subtotal Cost	13.605	7.410	4.700	5.996

FY 2004 Accomplishments: Delivered fiber optic antenna extension system for satellite communications radios to provide remote positioning of the antenna from the transmitter using fiber optic connection. Delivered a wireless boat interior communications system for high-speed assault craft. Completed first independent assessment of commercial radiation detectors, using the new American National Standards Institute standard, and catalogued the validated performance. Completed tactical survey of potential terrorist targeted buildings (Commander Navy Region Southwest, the U. S. Naval Academy, and NASA Kennedy Space Center) to improve threat assessment, identification of vulnerabilities, and responder planning. (Congressional Add). Completed two simulated

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large terrorist incident training scenarios to evaluate and exercise coordination of command and control and responder activity involving different federal, military, state and local agencies under the direction of the Asymmetric Warfare Center. Conducted detailed workshop to assess the state of the art for 3D through wall imaging technologies.

FY 2005 Plans: Deliver prototype close quarter battle carbine and a prototype dual sensor night imaging weapons sight. Deliver a line of sight version of the fiber optic antenna extension system. Develop first generation Augmented Reality Training System for tactical assault teams. Improve tactical operator safety of a reduced fragmentation initiation device during explosive breaching missions. Enhance safety and distraction effect of next generation diversionary device for tactical teams. Develop advanced high power in-line sniper scope for enhanced viewing in all lighting conditions. Complete tactical surveys for select critical installations (e.g. Strategic Petroleum Reserve, San Diego International Airport) and conduct additional terrorism event scenarios under Asymmetric Warfare Center direction. Develop a powered ascending device to lift a tactical team member to heights of 100 ft at variable speeds.

FY 2006 Plans: Deploy advanced augmented reality training system to selected tactical response teams. Deliver reduced fragmentation initiation device to select tactical teams to enhance breaching operations. Deliver next generation diversionary device to tactical response teams for operational assessment. Conduct initial testing of a high power in-line sniper scope. Deliver powered climbing device to lift fully equipped assaulter up climbing rope for operational assessment.

FY 2007 Plans: Conduct operational assessment of high power in-line sniper scope. Upgrade and deliver improved augmented reality system based on user feedback. Deliver final assaulter climbing device. Begin development of integrated aim point and day/night scope with improved tactical effectiveness and reduced weight to enhance tactical weapon effectiveness.

TRAINING TECHNOLOGY DEVELOPMENT

	FY 2004	FY 2005	FY 2006	FY 2007
Accomplishment/Effort/Subtotal Cost	3.439	13.321	2.200	2.665

FY 2004 Accomplishments: Developed Advanced Distributed Learning (ADL) software tools to provide intelligent tutoring for web-based courses and interoperability among commercial and custom-built learning/training management systems. Completed design and development of technology-enhanced training on small watercraft inspection, personnel screening, rail inspection, suicide bomber countermeasures, application of poly-urea coating for armor enhancement, and IED awareness. Conducted a proof of concept to adapt and enhance existing university programs to support training needs within the combating terrorism community. Fielded ADL training focused on the psychological aspects of terrorism and WMD events, and transitioned CBRN mobile laboratory technician training to the National Guard Bureau WMD Civil Support Team program.

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FY 2005 Plans: Develop of the next generation ADL delivery architecture for DoD. Create ADL software tools to design integrated on-line training and virtual reality training. Design and deliver performance and knowledge based training assessments. Produce a chemical and radiological stimulant kit that is intrinsically safe. Conduct training requirements analyses in support of CBRNE installation response training under the Guardian Program. Develop ADL training in chemical and biological counterterrorism awareness; command, control, and communications; force protection; medical surveillance and recovery; and, consequence management equipment for the Guardian Program. Validate end-user requirements for distributed, web-based simulation technologies in support of regional and large scale terrorism training exercises.

FY 2006 Plans: Analyze intelligent, open communication architectures, environments, tools, and services for integration with DoD delivery architecture. Integrate ADL software design and assessment tools into the DoD ADL delivery architecture. Develop training aids and devices to complement recently fielded TSWG advanced technologies.

FY 2007 Plans: Create knowledge management architectures, tools, and services to integrate performance and mission support systems with DoD ADL delivery architecture. Continue design and development of ADL training in CBRNE counterterrorism awareness; command, control, and communications; force protection; medical surveillance and recovery; and, consequence management. Integrate interactive simulation technologies with training and mission performance support capabilities.

VIP PROTECTION

	FY 2004	FY 2005	FY 2006	FY 2007
Accomplishment/Effort/Subtotal Cost	4.732	10.683	4.826	5.997

FY 2004 Accomplishments: Validated advanced vehicle armor design for protection against tungsten carbide armor piercing bullets. Successfully tested of large aluminum oxynitride (AION) transparent armor for multiple hit performance. Delivered advanced cooling vest for wear under body armor and other protective clothing. Completed analysis of ballistic blunt trauma effects on female body armor. Coordinated the development of standards for fully armored passenger vehicles that includes ballistic, blast, transparent armor and performance protocols.

FY 2005 Plans: Continue to coordinate an integrated fully armored passenger vehicle standard, based on ballistic, blast, and transparent armor protocols. Deliver testing and characterization assessment of Spinel transparent armor. Develop processes for producing full scale AION windows in test vehicle. Begin operational evaluation of the full scale AION window performance in typical on and off road scenarios. Complete evaluation of selected environmental effects on body armor performance to improve NIJ body armor standards. Test, evaluate and deliver enhanced deployable shield system to allow rapidly erected VIP protection. Evaluate Instantaneous Personnel Protection Shield System (IPPS) for enhanced VIP protection. Begin development of highly reliable bullet detection system for integration into the IPPS. Evaluate integrated VIP vehicle tamper alerting system. Develop and evaluate laser detection system for windows to provide warning of laser activity. Assemble and integrate components of a rapidly deployable VIP security kit for use in temporary venues. Develop duress system for VIPs to alert protection details of threatening

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situations. Conduct advanced evaluation of body armor performance in multi-hit scenarios and evaluate metrics for dynamic effects of ballistic blunt trauma. Deliver RCIED ECM Joint Testing Protocol to DOD for operational implementation.

FY 2006 Plans: Deliver the Instantaneous Personnel Protection Shield System and continue development of sensor system for automated activation. Deliver VIP vehicle tamper detection and alerting system. Deliver window laser detection system for early warning of laser targeting activity. Deliver deployable VIP security kit. Upgrade previously developed Projectile Data Base to include new threat ammunition and frangible ammunition. Deliver VIP Duress System. Provide upgraded body armor testing standards to address multi-hit scenarios. Develop methodology to assess deterioration of personnel body armor and to determine criteria for taking armor out of service.

FY 2007 Plans: Evaluate methods for rapid detection of a broad range of laser energy that may be directed at VIPs. Provide broadened standards for assessment of body armor over the life of the system. Coordinate the development of advanced lightweight ceramic transparent armor. Assess blast effects on armored passenger vehicles and develop of methods to mitigate damage and personnel injury. Develop a fragmentation and IED blast/fragmentation test protocol to determine effects on VIP and protective detail armored vehicle.

PROGRAM MANAGEMENT

	FY 2004	FY 2005	FY 2006	FY 2007
Accomplishment/Effort/Subtotal Cost	8.362	7.821	5.575	6.662

FY 2004 Accomplishments: Provided program management oversight and technical support for CTTS R&D projects. Augmented the CTTS program office with contract, financial and security management personnel. Managed an additional \$70 million in funds from other agencies. Managed cooperative R&D programs with the United Kingdom, Canada and Israel. Initiated new cooperative R&D agreements with Australia and Singapore. Established interfaces to other government agencies for CTTS-related initiatives and to reinforce interagency and international participation in the identification and prioritization of CTTS mission area requirements. Solicited proposals, via Broad Agency Announcement, for new projects and tasks based on prioritized requirements. Directed the program, planning and execution of projects and associated contracts, including the daily management and reporting for more than 280 separate contracts and tasks. Developed and implemented improvements for the BAA Information Delivery System (BIDS) solicitation process including the establishment of collaborative source evaluation and selection tools. Developed and implemented process improvement initiatives for procurement request tracking and a Business Information System database.

FY 2005 Plans: Provide program management oversight and technical support for CTTS R&D projects including funds from other agencies and management of cooperative R&D programs with international partners. Establish goals, objectives, and 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 internal and external reporting responsibilities.

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FY 2006 Plans: Provide program management oversight and technical support for CTTS R&D projects including funds from other agencies and management of cooperative R&D programs with international partners. 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 internal and external reporting responsibilities.

FY 2007 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.

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R-1 Shopping List Item No. 27

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Exhibit R-2, RDT&E Budget Item Justification							Date: February 2005	
Appropriation/Budget Activity RDT&E, Defense Wide/BA 3			R-1 Item Nomenclature: Joint DoD/DOE Munitions PE 0603225D8Z					
Cost (\$ in millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Total PE Cost DoD/DoE Munitions/P225	23.843	25.202	25.102	25.460	26.613	26.074	26.608	27.220
<b>(U) A. Mission Description and Budget Item Justification:</b>								
<p>(U) The Joint DoD/DOE Munitions Technology Program has the mission of exploration and development of technologies intended to bring about major improvements in non-nuclear munitions technology. A memorandum of understanding between DoD and DOE provides the necessary basis for long-term commitment of resources of the DOE and a similar long-term commitment of the enabling DoD support for this effort. The continuous fusion of DOE technology with Service needs has provided major advances in warfighting capabilities and plays a crucial role in the exploration, development, and transition of new technologies of interest to the Services. The program provides a unique opportunity for the collaboration of DoD and DOE scientists to explore technologies of programmatic interest to both departments, within a structured program of established Departmental reviews and milestones. The interdepartmental collaboration allows exchange of information and the focusing on achievement of goals of interest to the Department, utilizing the substantial investment in the scientific resources of the DOE. The budgeted program funds represented here are supplemented by additional matching DOE funds.</p> <p>(U) Over the last four years, there has been an increased programmatic emphasis on developing technologies of particular value to counter-terrorism capabilities and asymmetric warfare. Initial successes have already emerged from this focus with products currently in the field. The increase in Budget for FY 2004 and beyond was designed specifically to focus additional program efforts on exploring and developing technologies to transform the operational capabilities of the warfighter. Two specific efforts were targeted for this increase: The first is a new and rapidly emerging technology employing inert-loaded explosives which will enable precision lethality munitions usable in urban settings with minimal collateral damage; The second is the significant payoffs in capability and life cycle costs resulting from an understanding of sub-detonon response of energetic materials. This understanding is vital to addressing insensitive munition requirements compliance as well as exploiting deflagration and other sub-detonon response to achieve selectable weapon output. The inclusion of precision lethality munitions within the Joint Program is significant from a number of points of view. The program goal is the development of the understanding as well as the demonstration of the capability for a precision lethality munition, which combines substantially increased lethality within a prescribed region, with a low collateral damage beyond that region. Other anticipated characteristics of the precision lethality munitions are a reduced size over current munitions and satisfaction of insensitive munition requirements. The attainment of this goal requires simultaneous developments in the multiple program areas of energetic materials, computations and modeling, composites, penetration and warhead technology. This integrated effort within the Joint Program is a new approach which we believe will speed the transition of new technology through the development process. This effort has the strong support of all the Services and Special Operations Command. The sub-detonon mode of energetic material response is an area of research which has not received much attention. However, the ability to reliably predict the behavior of energetics subject to various insults such as bullet/fragment impact and thermal cook-off is essential to the</p>								

acquisition approval of all new systems. In addition, this same regime of sub-detonic behavior can be exploited to achieve multi-function, special purpose, and selectable yield weapons. All Services have programs which will greatly benefit from the results of these efforts.

(U) The program effort is divided into five technology areas of interest to Department munitions, each of which is described below. The names of some of the technology areas have been modified to better reflect the content of the projects contained within.

(U) Sensors and fuzing are critical components in every Department munition system. A fuze must ensure personnel safety by preventing unintended weapon detonation, know when to allow arming of a firing mechanism, detect the target through the use of sensors, and initiate detonation when required. With a current need for robust hard target defeat capability, advanced fuze systems must be able to survive and function in increasingly higher-velocity, higher-g penetration environments. One method of surviving high-g environments is through the miniaturization, integration, and/or robust packaging of conventional fuze components such as detonators, switches, transformers, capacitors, and sensors. In support of this technology area this program 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 miniature capacitive discharge units (CDUs). This focus builds on recent advances in micro-detonic/energetic materials research, and MEMS Safe and Arm Devices (MEMS-SAD). Efforts in this portion of the program generally advance fuze technology development and ultimately provide the DoD and DOE with viable fuzing components for all weapons, particularly hard-target-defeat munitions (penetrators) and small, intelligent low-cost applications (artillery). Over the next five years this portion of the program will work toward demonstrating emerging technologies that support robust, intelligent fuzing that can survive and function in environments exceeding 30,000 G's. Advanced initiation technology is an enabler for the next generation of warheads that will be aimable, target adaptable, and survivable.

(U) There is a requirement in the United States to develop weapons that offer the dual advantages of enhanced lethality against a variety of targets and increased safety of handling, transportation, and logistics. To realize this goal, energetic materials (EM) and their response to planned and unplanned insults must be developed, characterized, understood, and predictable. Lighter and/or less bulky munitions significantly impact the logistics burden on military actions. Similarly, a decrease in hazard classification brought about by the use of insensitive energetic materials and better design will greatly decrease transportation and storage logistics costs. Smarter munitions, capable of selectable, differential output, are another boon to military agility. Hence, there is also need for advanced EMs that can be used in small-scale devices such as distributed fuzing systems. In addition, as the intended environments have become more severe, EM's must survive setback forces in guns and severe impact forces in hard-target penetration applications.

Work in energetic materials is aligned with the recommendations from the DoD 2004 Weapons Technology Area Review and Assessment (TARA) and is coordinated with the national initiative in advanced energetic materials. This aspect of the program is aimed at developing the next-generation of EMs that have increased energy density over those in our current inventory while remaining insensitive to extreme environments. An additional requirement is that the energy be released in an appropriate time scale to allow optimized coupling to the target. For enhanced lethal effects the energy must be released either in the detonation reaction zone, or early enough in the expansion so that it couples to impulse loading or sustains high temperatures. Material ingredients that

contribute to energy release later than that offer no enhancement in lethality. A fundamentally new approach to increasing lethality while simultaneously reducing collateral damage is being investigated. Holding much potential for modern warfighting scenarios, this new material formulation provides increased performance while meeting insensitive munition standards. For microdevices 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.

A new area of interest and effort is to understand and characterize the sub-detonic, non-detonation region, of explosive behavior. This response results from stimuli that are insufficient in intensity to initiate a full detonation of the material, but sufficient to cause a sub-detonic response, such as combustion or deflagration. This area of behavior is vitally important to the design of Insensitive Munitions compliant weapons and can be exploited to produce selectable yield, multi-function weapons. Like advanced initiation, advanced energetic materials understanding is an enabling technology for the next generation of weapon systems that will be safer, more affordable, and more lethal.

(U) The ability to accurately predict the behavior of weapons in their operating environment of extreme pressure, temperature, and velocity 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 capabilities using high-performance computing hardware and software that are sufficient to carry out a broad class of continuum mechanics simulations where shock waves, nonlinear dynamics, and multi-material gas dynamics are important. In particular, this aspect of the program focuses on numerical and algorithmic improvements to enhance our problem solving capabilities for munitions development, advanced energetics, and target lethality predictions with significantly improved material models that accurately represent the material in dynamic states. Three general classes of codes offer solutions to the varied requirements posed by the defense community in the shock analysis regime. Eulerian shock physics tools are effective for a large number of conventional weapons and advanced energetics related simulations. Anywhere there is very large 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. A third class of tools combines 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 across a wide range of time scales, which cannot be addressed adequately with either Eulerian or Lagrangian codes. These codes and associated validated material models represent the future in modeling complex dynamics encountered in a broad spectrum of applications across the defense community. To date, the Department utilization of these capabilities is primarily in the S&T community. It is desirable to extend developing modeling and simulation tools into the engineering design community and this program will continue to provide supporting computational tools.

(U) There is a worldwide trend to harden more military facilities. Increasingly, these 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. A major thrust of this program 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 with high angles of attack experience violent dynamic responses that can fail their cases 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. This program 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 WMD facilities, the application of energy to target must be thoroughly controlled and understood. This requirement places new demands on warhead output, which are being pursued under this program.

(U) DoD and DOE efforts toward munitions lifecycle technologies including stockpile aging, surveillance, demilitarization and disposal are coordinated under the auspices of this program. 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 it is expanding by about 70,000-100,000 tons per year. As the long term focus for demilitarization and disposal in DoD turns from open-burn and open-detonation to resource recycle and recovery, alternative technologies are required to turn waste materials into useful products. The technologies developed in this portion of the program enhance DoD capabilities to field safe, cost-effective processes for disposal, resource recovery, and reutilization of munitions and munitions components. For an aged weapons stockpile that has not reached end of useful life, reliability and surety will change with time because of the 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 this program is focused on improving our ability to understand, measure, predict, and mitigate safety and reliability problems caused by materials aging degradation in weapons systems. Together with complementary demilitarization 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. Efficient management of existing stockpile assets is an economically necessary precursor to weapon system modernization.

**B. Program Change Summary:**

	<u>FY 2004</u>	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>
Previous President's Budget:	24.648	23.319	25.256	25.552
Current FY2006 President's Budget Submission:	23.843	25.202	25.102	25.460
Adjustments to Appropriated Value:	-0.805	+1.883	-0.154	-0.092
Congressional Program Reductions:	-0.186	-0.567		
Congressional Rescissions:				
Congressional Increases:		+2.450*		
Reprogrammings:				
SBIR/STTR Transfers:	-0.619			
Other:			-0.154	-0.092

\*Congressional increase will be transferred to DARPA for execution

**C. Other Program Funding Summary: N/A****D. Acquisition Strategy. N/A**

**E. Performance Metrics:** An annual Five Year Plan is prepared for this program which contains detailed descriptions of the approximately forty individual projects under this funding line. Each project description includes a task schedule with associated milestones, whereby progress against the end goals can be measured. Technical progress against these milestones is reviewed by DoD participants at semi-annual Technical Coordinating Group meetings.

Exhibit R-2a, RDT&E Project Justification							Date: February 2005											
Appropriation/Budget Activity RDT&E, Defense Wide/BA 3				Project Name and Number Joint DoD/DOE Munitions PE 0603225D8Z														
Cost (\$ in millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011										
DoD/DOE Munitions/P225	23.843	25.202	25.102	25.460	26.613	26.074	26.608	27.220										
<p><b>(U) A. Mission Description and Budget Item Justification:</b></p> <p>(U) This R&amp;D program is a cooperative, jointly funded effort between DoD and DOE to pursue new and innovative warhead, explosive, and fuze technologies in order to bring about major improvements in non-nuclear munitions. This program supports the development and exploration of new munitions concepts and technology preceding system engineering development. Through our funding arrangement with DOE, DoD resources are matched. More importantly, this relatively small DoD contribution effectively taps the annual billion-dollar DOE RDT&amp;E investment by accessing the specialized skills, scientific equipment, facilities and computational tools not available in DoD.</p> <p>(U) The effort exploits the extensive and highly developed technology base resident in the National Laboratories relevant to achieving the goal of developing capable, cost-effective conventional munitions, and leverages DoD investments with matching DOE investments. The current program supports 44 projects in warhead technology, energetic materials, advanced initiation and fuze development, munitions lifecycle technology, and munitions modeling and simulation. A specific Service laboratory sponsors each of these projects. The program is administered and reviewed by a Joint Technical Advisory Committee composed of members from the Army, Navy, Air Force, Special Operations Command, OSD, and DOE. Projects are peer-reviewed semi-annually by DoD Service Laboratory/Technical Center personnel in order to monitor technical excellence and ensure that the technologies under development address priority DoD needs. The program is integrated with Service efforts through the Project Reliance Weapons Panel and participation in the Defense Technology Area Plan for Conventional Weapons. The program is reviewed under the Technology Area Review and Assessment process. After reviewing the program, the most recent Weapons TARA panel assessed the program as follows: broad range of products transitioned to DoD as a result of program efforts; effectively leverages DOE expertise and funding; critical computational tools provided to DoD; well integrated into Service efforts; Technology Coordination Groups provide an effective forum for technical collaboration.</p> <p><b>B. Accomplishments/Planned Program</b></p> <table border="1"> <thead> <tr> <th>Accomplishment/Effort/Subtotal Cost</th> <th>FY 2004</th> <th>FY 2005</th> <th>FY 2006</th> <th>FY 2007</th> </tr> </thead> <tbody> <tr> <td>Initiation, Fuzing, and Sensors</td> <td>5.021</td> <td>4.920</td> <td>4.990</td> <td>4.484</td> </tr> </tbody> </table>									Accomplishment/Effort/Subtotal Cost	FY 2004	FY 2005	FY 2006	FY 2007	Initiation, Fuzing, and Sensors	5.021	4.920	4.990	4.484
Accomplishment/Effort/Subtotal Cost	FY 2004	FY 2005	FY 2006	FY 2007														
Initiation, Fuzing, and Sensors	5.021	4.920	4.990	4.484														

(U) FY 2004 Accomplishments:

(U) A new project was started with a focus on millimeter scale initiation and detonation. This work attempted to understand the behavior and response of thin layers and small quantities of explosives, as are required for all MEMS based fuzing and microfiresets. This was a key enabling technology for miniature munitions and remains a largely unstudied field. Specific work plans for 2004 included measurement of run to detonation and failure diameter studies on HNS-IV, CL-20 and high surface area PETN. Development and demonstration of improved components and architectures for robust, low-cost, miniature safing, arming and firing systems will continue. Individual control of multiple initiation sites within a warhead using silicon fireset circuits was demonstrated. Initial testing of extrudable explosive formulations was completed with a focus on the energy required for direct slapper initiation. Component development and evaluation continued and commercial sources for a robust manufacturing technology base were explored. An integrated capacitor and switch in a single package was demonstrated for use as a next generation microfuze component. Current state of the art micro-fuze technology was applied and focused on Special Operations Forces (SOF) requirements in order to enhance and expand SOF capabilities in various mission scenarios. The latest miniaturization technology was transitioned to production-type facilities and to the Services in order to begin exploitation. The study to understand and predict instabilities in multiple-slapper, highly miniaturized systems was completed towards the design of highly reliable and uniquely flexible ordnance systems. Experiments were performed that enabled development of the theory and models of explosive behavior in very small geometries (microdetonics). Materials resulting from new formulations and the sol-gel process were characterized and performance tested. MEMS devices were characterized and tested in stressing high-g environments. Completed most subsystems of the miniSAR and formed an industrial partnership to develop components, where appropriate.

(U) FY 2005 / FY 2006 / FY 2007 Plans:

(U) Conduct tests to demonstrate and evaluate the utility of rapidly prototyped multipoint initiation systems to enhance the performance of munitions. Evaluate reduction in development cycle time and cost achieved by rapid prototyping, as well as improvement in multi-point bridge performance gained from careful control of individual bridge geometry. Continue component miniaturization and cost reduction efforts. Demonstrate a packaged microtransformer for use in miniaturized munitions. Complete streak photography and VISAR diagnostic measurements for improved slapper detonator efficiency. Perform Detonation Shock Dynamics (DSD) analysis of initiation system transfer into a main charge. Implement viable multipoint diagnostics, such as magnetic probes or PVDF gauges, onto an array for use in warhead evaluation tests. Continue Development of MEMS CDU components. Demonstrate a packaged MEMS-SAD. Complete set of environmental tests on second generation Silicon Fireset assemblies. Implement a 6 kV single n-MCT switch sufficient for initiating a multipoint array. Design a minimum energy slapper and extrudable explosive system for use in adaptable warheads. Towards a miniature, optically charged fireset, complete development of very small 10 layer capacitors and begin integration of nanostructure multilayer capacitor and switch. Continue detonator designs requiring reduced micro joules of stored energy to fire. Complete prototype impact triggered MEMS fuze. Transition rapid prototyping technology. Complete and fly the initial phase 1 version of miniSAR.

Accomplishment/Effort/Subtotal Cost	FY 2004	FY 2005	FY 2006	FY 2007
Energetic Materials	6.123	5.911	6.901	7.116

(U) FY 2004 Accomplishments:

(U) Efforts to synthesize, characterize and scale-up new energetic materials with increased or tailored performance and decreased sensitivity were continued. Coordination with the national advanced energetics initiative also continued towards re-invigorating the energetic materials skill base within the Department. A summary report documenting the synthesis and scale up of LLM-105 as a booster explosive was distributed to the energetics and fuzing communities in completion of the effort. FY 2003 advances in sol-gel metal oxide chemistry were applied and focused on applications development and testing in support of specific Service requests for readily processed reactive materials and high performance thermitics. Energy and performance measurements of CO-derived and nitrogen HEDM's macro-samples were completed and the synthesis of additional extended solid HEDMs were explored. In FY 2004, Cheetah 4 released to the DoD community for performance predictions of an extended set of energetic materials. Development of ignition phenomenology models and design of ignition location experiments were completed in support of the effort to validate and expand codes for predicting weapon system performance and response in accident situations. The effort to preserve and transition energetic materials technology generated by the community continued with the distribution of an extended APEX database that will include over 500 energetic materials of different molecular structure. Support of enabling energetic materials technologies for low collateral damage munitions expanded with the development of near-field and far-field product equations of state for the baseline explosive fill selected in FY 2003. Energetic materials requirements for SOF focused microfuzer technology activities were supported through testing of different nano-fuel/oxidizer formulations and incorporation of multi-layer energetic materials into propagation micro-channels.

(U) FY 2005 / FY 2006 / FY 2007 Plans:

(U) Continue development of nanoscale, microscale and mesoscale energetic materials with enhanced performance that are less sensitive and cost effective enablers for defense transformation. Demonstrate and characterize sensitivity and burning of hydrogen and nitrogen mixtures with nano-metals. Continue processing, scale-up, and performance characterization of low collateral damage energetic materials. In the area of high nitrogen energetic materials, continue measurements of burn rates and pressure-time histories for burning HN mixtures with nano Al, metals, and MIC; complete performance and sensitivity testing of azo-formamidines. Continue updating APEX explosives database on an 18 month cycle. Complete synthesis of ANTZ based target molecules as a new insensitive energetic material ingredient and synthesis precursor. Complete sol-gel metal oxides weaponization. Complete analysis of Navy fast cookoff experiments. Deliver high explosive grain scale continuum model for use in predicting the performance of plastic bonded explosives.

Accomplishment/Effort/Subtotal Cost	FY 2004	FY 2005	FY 2006	FY 2007
Computational Mechanics and Material Modeling	6.112	6.213	7.391	7.216

(U) FY 2004 Accomplishments:

(U) Note that the large increase in funding for this technology area stems from the re-allocation of projects which previously were located in the Energetic Materials area. The increase in funding level does not indicate significant increase in activity. The new projects in this area relate to the modeling of the mechanical properties of explosive, polymers, and the generation of test data to validate the computational models. The development of Eulerian, Lagrangian, coupled and ALE codes relevant to the design and evaluation of munitions continued. Efforts continued in the development, implementation and validation of material constitutive and failure models supporting the simulation of warhead formation and warhead/target interactions. The program also provided a conduit to the improved materials models emerging from the DOE Advanced Strategic Computing Initiative providing high resolution, accurate predictions of materials behavior and failure relevant to the analyses of weapon systems. The transition and support of these tools and models along with user training were provided as needed. A particular growing effort in this year was the development of a mixed phase flow calculational capability to describe inert particle loaded explosives. This capability is essential to the understanding of low collateral damage phenomena.

(U) FY 2005 / FY 2006 / FY 2007 Plans:

(U) Continue to develop, extend and apply the hydrocodes and associated materials models for warhead design and evaluation. Ongoing code and material model development will continue to focus on greater accuracy, improved physics, and extension to mixed phase flow problems. Continue to support the transition of these tools, the training, and consulting for the DoD user community. Complete tensile plasticity and damage model extension for use within warhead design codes. Towards a robust, mesh free warhead design tool, begin extension of Dual Particle Dynamic (DPD) methodology to three dimensions. Complete integration of CTH and NEVADA design tools. Complete fragment explosive initiation modeling in support of DoD initiatives. Continue advanced material model implementation for warhead design and evaluation. Validate predictive capability for low collateral damage munition performance and effect..

Accomplishment/Effort/Subtotal Cost	FY 2004	FY 2005	FY 2006	FY 2007
Warhead Technology & Integration	3.999	3.272	3.014	4.124

(U) FY 2004 Accomplishments:

(U) Integration of all the components necessary for a low collateral damage munitions concept occurred. Energetic formulation, composite, case, and performance predictions based on modeling to date, were combined in this effort. Near term applications of this technology are believed possible based on these tests. Efforts to provide enabling technologies for defeat of hardened military targets continued. Dynamic compression studies of ES-1 and high-alloy steels were completed and documented. Three axis oblique penetration experiments into concrete targets to generate a data base for the DoD and DOE communities for code and model benchmarking. The focus was on obtaining data that revealed the dynamic rotations of the penetrator during entry and the resulting trajectory. The data provided to the DoD community for use in validating and benchmarking hard target design tools. Several new tasks were initiated to look at penetration in multi-layer targets, angle of attack effects on penetration and payload survivability, and a boosted penetrator concept as a means to increase penetration depth. The development and integration of the computational, explosive, penetration, and composite material technologies required for an enhanced alternative to the use of inert munitions against soft targets in urban areas were accelerated. Low collateral versions of existing bomb, such as Mk 82, are being fabricated and prepared for comparative test evaluation. The processing contribution of metal liner materials to enhanced performance continued with the emphasis on studying special grain boundaries. Previous work in the commercial arena has demonstrated significant mechanical and corrosion resistance properties are achievable through control of grain boundaries. Temperature measurements of shocked materials were applied to a variety of metals shocked to various stress states. Focus continued on the science-based technology projects relating warhead performance to material properties under dynamic conditions as a prelude to improved computational modeling and the transition of improved warhead designs to developmental and fielded weapon systems. The simulations of the Ta liner test-bed experiments continued in order to assess the utility of the new materials models in the warhead design process.

(U) FY 2005 / FY 2006 / FY 2007 Plans:

(U) Continue low collateral damage verification and validation testing in comparison with current best baseline munition. Use test data to evaluate simulation capability in predicting target damage. Continue the study of advanced hard target penetrator concepts and adapt designs to state-of-the-art materials and manufacturing methods. Complete instrumented oblique penetration tests using the 3 axis data recorder. Complete target size penetration tests aimed at reducing the cost of penetration tests for the community by obtaining evidence of a size scale effect. Continue target diameter benchmarking efforts in support of size-scale effect testing. Continue improvements in modeling of target entry dynamics and trajectory predictions via field testing and analysis. Complete characterization of low cost, high hardness candidate penetrator materials. In the area of design improvements for hard target penetrators, complete survivability design concepts. Continue improvements to the hard target response predictive capability established in the Peridynamic design tool. Complete push control studies using alternative reactive warhead materials. Continue efforts towards an FY 2006 demonstration of energy coupling enhancement through initiation.

Accomplishment/Effort/Subtotal Cost	FY 2004	FY 2005	FY 2006	FY 2007
Munitions Lifecycle Technologies	2.588	2.436	2.806	2.520

(U) FY 2004 Accomplishments:

(U) Mid-scale testing of sensors that can detect particle emissions in explosive events commenced. The small and mid-scale sensor test results were used to generate a data base and analysis tools for standoff identification and specification of particles generated in detonation events. Disassembly and handling of ADAM mine projectiles were demonstrated. Adapt the robotics technology to the M77 grenade and demonstrate removal of MLRS M77 grenades from a warhead section. The technology for standoff monitoring of OB/OD events at DoD demilitarization sites was transitioned to a commercial partner. In the predictive materials aging and reliability area, measurements of the electrical response of dormant storage munitions electronic components commenced. Under the aging of propellants task, continued to participate in the service life predictive technology (SLPT) program. This consisted of improved characterization of critical chemical and physical aging processes in composite propellants, and formatting that information into constitutive models for into predictive 3-D reactive-diffusion codes. The particulate emissions identification project moved to actual large-scale open-air detonation events, where soil samples near the event have been characterized to provide a baseline signature.

(U) FY 2005 / FY 2006 / FY 2007 Plans:

(U) Complete real time particle size and composition analysis open air testing. Complete isothermal fatigue experiments for solder interconnect reliability studies. Transfer electronic corrosion predictive model to Service demilitarization efforts. Continue identification of critical DoD electronic components susceptible to corrosion failure. Complete studies aimed at determining propellant thermal decomposition kinetics. Continue analysis of DoD aged samples and participation in Predictive Service Life Technology program reviews as requested. Complete MEMS reliability monitor verification tests. Complete testing of stand-off sensor for rocket motor demilitarization. Complete explosive combustion studies for predicting toxic emissions in OB/OD events. Prototype, design, and fabricate M77 grenade handling and safing hardware. Continue identification and analysis of non-plastic encapsulated critical DoD weapon components. Measure age dependent weapon adhesive joint toughness at various temperature levels and high humidity. Apply interfacial fracture mechanics methodology to existing DoD/DOE weapon systems. Continue HX-874 propellant binder aging studies.

**C. Other Program Funding Summary:** N/A

**D. Acquisition Strategy:** N/A

**E. Major Performers:** The work is performed in-house at the three DOE National Laboratories responsible for nuclear weapons RDT&E: Lawrence Livermore, Los Alamos, and Sandia National Laboratories.

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Fiscal Year (FY) 2006 Budget Estimates Exhibit R-2, RDT&E Budget Item Justification						Date: February 2005		
Appropriation/Budget Activity Defense Wide RDT&E, BA3				R-1 ITEM NOMENCLATURE PE-0603400D8Z J-UCAS Advanced Technology Development and Risk Reduction				
COST (\$ in millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
J-UCAS PE-0603400D8Z	0.000	354.794	0.000	0.000	0.000	0.000	0.000	0.000

**A. Mission Description and Budget Item Justification:**

The Joint Unmanned Combat Air Systems (J-UCAS) program is a joint effort to develop and demonstrate unmanned combat capabilities for high-threat Suppression of Enemy of Air Defense (SEAD), Information Operations/ Electronic Attack, Persistent Surveillance/Reconnaissance, and related strike missions within the emerging global command and control architecture for the warfighting community. The J-UCAS program combines and expands the efforts that were previously conducted under the DARPA/Air Force Unmanned Combat Air Vehicle (UCAV) program and the DARPA/Navy Naval UCAV (UCAV-N) program. These efforts were targeted towards service-specific needs, however the Department recognized the potential for significant synergy by combining the programs. The accomplishments and ongoing efforts of the X-45A technology demonstrator, as well as the development of the X-47A demonstrator, are reducing the risk of the “operationalized” demonstration system being developed for a joint operational assessment (OA) planned for the FY 2007-2010 timeframe. The J-UCAS concept incorporates the next generation family of demonstrator air vehicles, together with common subsystems (e.g. sensors, payloads, communications) and a Common Operating System to achieve the system’s diverse mission functionality. These common system elements will maximize mission flexibility and operational versatility, while reducing overall costs and maintaining schedule toward a joint OA. The J-UCAS Office operates in close coordination with Service users and other operational components. The program is focused on demonstrating capabilities that support both Services and enable an operational system development decision by the end of the decade. PE 0603400D8Z is for Advanced Technology Development and Risk Reduction. These funds are used for the completion of demonstrations of the X-45A technology demonstrator, continued development of the Boeing and Northrop Grumman demonstrator programs, and the development of common systems technology elements.

UNCLASSIFIED

**B. Program Change Summary:**

	<u>FY 2004</u>	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>
Previous President's Budget:	0.000	284.617	77.785	0.000
Current FY2006 President's Budget Submission:	0.000	354.794	0.000	0.000
Adjustments to Appropriated Value:		+70.177		
Congressional Program Reductions:		-8.823		
Congressional Rescissions:				
Congressional Increases:		+79.000		
Reprogrammings:			-77.785	
SBIR/STTR Transfers:				
Other:				

**C. Other Program Funding Summary:**

	<u>FY 2004</u>	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>
PE 0604400D8Z, OSD	0.000	217.401	0.000	0.000	0.000	0.000	0.000
PE 0603114N, Navy	117.865	0.000	0.000	0.000	0.000	0.000	0.000
PE 0604731F, Air Force	160.551	0.000	0.000	0.000	0.000	0.000	0.000
PE 0207256F, Air Force	2.305	0.000	0.000	0.000	0.000	0.000	0.000
PE 0603285E, DARPA	41.385	0.000	0.000	0.000	0.000	0.000	0.000
PE 0603400F, Air Force	0.000	0.000	77.800	0.000	0.000	0.000	0.000
PE 0604400F, Air Force	0.000	0.000	272.300	400.100	554.100	780.500	955.200

**D. Acquisition Strategy:**

The J-UCAS program blends the advantages of both the Advanced Technology Demonstration (ATD) and the Advanced Concept Technology Demonstration (ACTD) concepts to facilitate rapid development and integration of advanced technologies in an experimental system that addresses operational needs. Using the next generation demonstrator air vehicle families, together with common subsystems and a Common Operating System, this nontraditional approach also incorporates key acquisition considerations (i.e., user requirements, comprehensive system lifecycle perspective, and rigorous risk mitigation processes) to provide the necessary insights, operational data and identified options for the services to make an informed decision for accelerated acquisition near the end

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of the decade. This effort is tightly coupled with PE 0604400D8Z (J-UCAS Advanced Component and Prototype Development), which complements the work under this program element to deliver systems for the joint operational assessment.

**E. Performance Metrics:**

2Q FY 2006 Delivery of 'Build 0', Basic Services Build of the Common Operating System (COS).

2Q FY 2007 Delivery of 'Build 1', Single Ship Build of the Common Operating System (COS).

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Fiscal Year (FY) 2006 Budget Estimates Exhibit R-2a, RDT&E Budget Item Justification						Date: February 2005		
APPROPRIATION/BUDGET ACTIVITY DEFENSE WIDE RDT&E BA 3				R-1 ITEM NOMENCLATURE PE-0603400D8Z J-UCAS Advanced Technology Development and Risk Reduction				
COST (\$ in millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
J-UCAS PE-0603400D8Z	0.000	354.794	0.000	0.000	0.000	0.000	0.000	0.000

**A. Mission Description and Budget Item Justification:**

The Joint Unmanned Combat Air Systems (J-UCAS) program is a joint effort to develop and demonstrate unmanned combat capabilities for high-threat Suppression of Enemy of Air Defense (SEAD), Information Operations/ Electronic Attack, Persistent Surveillance/Reconnaissance, and related strike missions within the emerging global command and control architecture for the warfighting community. The J-UCAS program combines and expands the efforts that were previously conducted under the DARPA/Air Force Unmanned Combat Air Vehicle (UCAV) program and the DARPA/Navy Naval UCAV (UCAV-N) program. These efforts were targeted towards service-specific needs, however the Department recognized the potential for significant synergy by combining the programs. The accomplishments and ongoing efforts of the X-45A technology demonstrator, as well as the development of the X-47A demonstrator, are reducing the risk of the “operationalized” demonstration system being developed for a joint operational assessment (OA) planned for the FY 2007-2010 timeframe. The J-UCAS concept incorporates the next generation family of demonstrator air vehicles, together with common subsystems (e.g. sensors, payloads, communications) and a Common Operating System to achieve the system’s diverse mission functionality. These common system elements will maximize mission flexibility and operational versatility, while reducing overall costs and maintaining schedule toward a joint OA. The J-UCAS Office operates in close coordination with Service users and other operational components. The program is focused on demonstrating capabilities that support both Services and enable an operational system development decision by the end of the decade. PE 0603400D8Z is for Advanced Technology Development and Risk Reduction. These funds are used for the completion of demonstrations of the X-45A technology demonstrator, continued development of the Boeing and Northrop Grumman demonstrator programs, and the development of common systems technology elements.

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**B. Accomplishments/Planned Program**

	FY 2004	FY 2005	FY 2006
Accomplishment/Effort/Subtotal Cost	0.000	354.794	0.000

FY 2005 and FY 2006 Planned Program:

- Continue development of J-UCAS systems, specifically the Boeing and Northrop Grumman demonstrator programs as well as the common operating system and sensors.
- Prepare for joint Operational Assessment (OA).

**C. Other Program Funding Summary:**

	<u>FY 2004</u>	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>
PE 0604400D8Z, OSD	0.000	217.401	0.000	0.000	0.000	0.000	0.000
PE 0603114N, Navy	117.865	0.000	0.000	0.000	0.000	0.000	0.000
PE 0604731F, Air Force	160.551	0.000	0.000	0.000	0.000	0.000	0.000
PE 0207256F, Air Force	2.305	0.000	0.000	0.000	0.000	0.000	0.000
PE 0603285E, DARPA	41.385	0.000	0.000	0.000	0.000	0.000	0.000
PE 0603400F, Air Force	0.000	0.000	77.800	0.000	0.000	0.000	0.000
PE 0604400F, Air Force	0.000	0.000	272.300	400.100	554.100	780.500	955.200

**D. Acquisition Strategy:**

The J-UCAS program blends the advantages of both the Advanced Technology Demonstration (ATD) and the Advanced Concept Technology Demonstration (ACTD) concepts to facilitate rapid development and integration of advanced technologies in an experimental system that addresses operational needs. Using the next generation demonstrator air vehicle families, together with common subsystems and a Common Operating System, this nontraditional approach also incorporates key acquisition considerations (i.e., user requirements, comprehensive system lifecycle perspective, and rigorous risk mitigation processes) to provide the necessary insights, operational data and identified options for the services to make an informed decision for accelerated acquisition near the end of the decade. This effort is tightly coupled with PE 0604400D8Z (J-UCAS Advanced Component and Prototype Development), which complements the work under this program element to deliver systems for the joint operational assessment.

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**E. Major Performers:**

The Boeing Company, St. Louis, MO

The Boeing Company, Seattle, WA

Northrop Grumman Corporation, El Segundo, CA

Northrop Grumman Corporation, Rancho Bernardo, CA

Northrop Grumman Corporation, Palmdale, CA

Lockheed Martin, Palmdale, CA

The Johns Hopkins University, Baltimore, MD

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Exhibit R-2, RDT&E Budget Item Justification						Date: February 2005			
Appropriation/Budget Activity RDT&E, Defense Wide/BA-3			R-1 Item Nomenclature Joint Capability Technology Demonstration (JCTD), PE 0603648D8Z						
Cost (\$ in Millions)		FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
JCTD		0.000	0.000	35.000	35.000	35.000	35.000	35.000	35.000

**A. Mission Description and Budget Item Justification**

BRIEF DESCRIPTION OF ELEMENT: Beginning in FY 2006, a new Advanced Concept Technology Demonstration (ACTD) business process will be initiated which will take the successful ACTD program and update it to meet the Department’s transformational goal of becoming capability vice threat based in its focus. The program will be referred to as the Joint Capability Technology Demonstration (JCTD) program. The JCTD program will include many of the positive aspects of the ACTD program, but will be revamped to meet the defense challenges of the 21<sup>st</sup> century. The new process will integrate the ACTD program with the new Joint Capabilities Integration and Development System (JCIDS) developed by the Joint Chiefs of Staff (JCS). Beginning in FY 2006, the Department estimates a three to five year transition period from the current ACTD process to the improved JCTD program. Eventually, JCTDs will replace ACTDs, providing an even faster process that focuses on joint and transformational technologies that are initiated in Science and Technology (S&T) and carried through the difficult transition stage, sometimes referred to as the “S&T valley of death.”

The new JCTD business model includes a Defense Acquisition Executive (DAE) pilot program which will take a limited number of “joint peculiar” JCTDs past milestone B, through engineering and manufacturing, and into procurement, followed by initial sustainment---a “cradle to grave” approach. The piloted program envisions using joint acquisition activities like the Joint Program Sustainment and Development (JPSD) program office, or even U.S. Special Operations Command (USSOCOM), to provide the necessary program management functions. The DAE pilot program will give overall programmatic oversight of JCTDs that are deemed uniquely joint (i.e., capability directly supports more than one Military Service) and/or transformational. The new JCTD demonstration model will specifically address congressional concerns and recommendations made by the General Accountability Office (GAO) regarding the ACTD program.

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The appropriation, Program Element (PE) and Budget Activity (BA) structure for the new JCTD process includes the following:

- JCTD PE 0603648D8Z (RDT&E/DW BA-3)
- JCTD PE 0604648D8Z (RDT&E/DW BA-4)
- Defense Acquisition Executive (DAE) PE 0605648D8Z (RDT&E/DW BA-5)
- JCTD Procurement (funded in Procurement Defense Wide, OSD Major Equipment: PE 0902198D8Z).

An initial allocation of resources (\$40M) from the ACTD PE has been shifted into these program elements starting in FY 2006, which explains the reduction in the ACTD FYDP line shown in this budget exhibit. During the transition period additional resources will be shifted into the various JCTD program elements until a fully resourced program is established which will support a minimum of ten new JCTDs each year. It is envisioned that the BA-3 JCTD PE will eventually replace the current ACTD BA-3 PE. However during the transition period the JCTD and ACTD program elements will use combined resources to ensure continuity of ongoing ACTDs and program flexibility for the new JCTDs. During this period the program will sometimes be referred to as the JCTD/ACTD program to show the blended and transitioning nature of the process. To establish resource visibility and accountability and to ensure a fully leveraged program, the Military Services and the Defense Advanced Research Projects Agency (DARPA) will also create new program elements in BA-3 and/or BA-4. These program elements will be established during the transition period and will be specifically titled and associated with the JCTD process.

JCTDs are initiated at the Budget Activity three (BA-3) level and are thereby pre-acquisition demonstrations, characterized by Technology Readiness Levels 4, 5 or 6. Although not fully developed for production, these newly initiated JCTDs can provide the path for transition of Science and Technology to acquisition and are low-to-moderate risk vehicles for pursuing those objectives. In seeking ways to speed transition and fielding of innovative joint capabilities, the JCTD Program will pioneer a transformational new model for Department of Defense acquisition with the addition of funding in BA4, BA5 and Procurement to provide a path for those capabilities that are so transformational that they require a purposeful transition to acquisition to avoid some of the delay issues which sometimes hamper the ACTD program. JCTDs will be aligned with the Joint Capabilities Interoperability Development System (JCIDS) seeking to enhance CoCom inputs into the JCIDS process. The Defense Wide RDT&E funding managed by the Deputy Under Secretary of Defense for Advanced Systems and Concepts (DUSD(AS&C)) will support demonstration of military utility and deployment of interim capability

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including an “extended user evaluation,” providing the Combatant Commanders, Services, Agencies, and operators with adequate time to address transition issues of supportability, maintainability and training identified by the JCTD/ACTD.

**B. Program Change Summary**

	FY 2004	FY 2005	FY 2006	FY 2007
Previous President’s Budget	0.000	0.000	0.000	0.000
Current President’s Budget	0.000	0.000	35.000	35.000
 Total Adjustments:	 0.000	 0.000	 -35.000	 -35.000
Congressional reductions				
Congressional Rescissions				
Congressional Increases				
Reprogrammings				
SBIR/STTR Transfer				
ACTD Transfer (0603750D8Z)			-35.000	-35.000

**C. Other Program Funding Summary:** The new JCTD Program provides a “cradle to grave” path for transformational joint capabilities. The initial funding lines are outlined in the table below. Refer to the specific Budget Exhibit for more details on each funding line.

ACTD and JCTD Program Funding Summary	APPN	BA	PE	LINE #	FY 2004	FY 2005	FY 2006	FY 2007
Advanced Concept Technology Development (ACTD)	RDT&E	3	0603750D8Z	44	212.570	212.915	163.649	163.744
Joint Capability Technology Demonstration (JCTD)	RDT&E	3	0603648D8Z	36	0.000	0.000	35.000	35.000
Joint Capability Technology Demonstration (JCTD)	RDT&E	4	0604648D8Z	83	0.000	0.000	3.000	3.000
Defense Acquisition Executive (JCTD Pilot Program)	RDT&E	5	0605648D8Z	99	0.000	0.000	1.000	1.000
Procurement (JCTD Pilot), Major Equipment-OSD Def Wide	Proc	1	0902198D8Z		0.000	0.000	1.000	1.000
Total:							40.000	40.000

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**D. Acquisition Strategy:** N/A

**E. Performance Metrics:** The JCTD/ACTD performance metrics are centered on how fast relevant joint and/or transformational technologies can be demonstrated and fielded 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 these metrics and helps compare/contrast the current ACTD program with the new JCTD business process model.

<b>Performance Metric</b>	<b>ACTD</b>	<b>JCTD</b>
<b>Project Selection Focus</b>	Threat Based: Shared Military Service and CoCom influence	Capability Based: Greater CoCom influence looking at nearer term needs..
<b>Spiral Technologies</b>	No Metric currently established	Spiral Technology available within one year of JCTD initiation.
<b>Final Demonstration Completed (Starting Point: Approved ID)</b>	3 to 4 years after initiation (Implementation Directive (ID) Signed)	50% completed by the end of the 2 <sup>nd</sup> year. All JCTDs completed by the end of the 3 <sup>rd</sup> year.
<b>Shared Funding and Visibility of resources</b>	OSD provides no more than 30% of the budgeted resources. Funding provided from many different program elements.	OSD provide significantly more funding (more than 50% depending on the cost of the JCTD), especially in the first two years.
<b>Military Utility Assessment (MUA) conducted by an independent activity</b>	MUA traditionally tied to a specific planned exercise for evaluation	JCTDs not necessarily tied to an exercise. Greater flexibility to establish military utility via operational “real-world” demonstration or specifically designed test/venue
<b>Transition of technology</b>	70% of ACTDs transition at least one product to sustainment	80% of JCTDs transition at least 50% of their products to sustainment

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Exhibit R-2a, RDT&E Project Justification						Date: February 2005		
Appropriation/Budget Activity RDT&E, Defense Wide/BA-3			R-1 Item Nomenclature Joint Capability Technology Demonstration (JCTD), PE 0603648D8Z					
Cost (\$ in Millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
JCTD	0.000	0.000	35.000	35.000	35.000	35.000	35.000	35.000

**A. Mission Description and Budget Item Justification**

BRIEF DESCRIPTION OF ELEMENT: Beginning in FY 2006, a new Advanced Concept Technology Demonstration (ACTD) business process will be initiated which will take the successful ACTD program and update it to meet the Department’s transformational goal of becoming capability vice threat based in its focus. The program will be referred to as the Joint Capability Technology Demonstration (JCTD) program. The JCTD program will include many of the positive aspects of the ACTD program, but will be revamped to meet the defense challenges of the 21<sup>st</sup> century. The new process will integrate the ACTD program with the new Joint Integration and Development System (JCIDS) developed by the Joint Chiefs of Staff (JCS). Beginning in FY 2006, the Department estimates a three to five year transition period from the current ACTD process to the improved JCTD program. Eventually, JCTDs will replace ACTDs, providing an even faster process that focuses on joint and transformational technologies that are initiated in Science and Technology (S&T) and carried through the difficult transition stage, sometimes referred to as the “S&T valley of death.”

JCTD Selection Process:

During the transition phase the JCTD Program will be combined and integrated with the selection process used for the ACTD program. However eventually the Department will use a deliberate process for drafting demonstration proposals based on the top priorities of the CoComs, versus evaluating pre-developed proposals that may not have been vetted with a CoCom. Military Services, Defense and Non-Defense Agencies, industry and coalition partners will still be invited to submit their technical concepts for consideration representing technological opportunities enabled by recently demonstrated mature technology, however a deliberate effort will be made to craft these concepts into JCTD proposals prior to the Breakfast Club briefings (the traditional ACTD kick-off for project review). CoComs and the JCIDS Functional Capability Boards will be consulted as technical approaches and employment

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concepts are developed. The aim will be to develop capability solutions that can be rapidly demonstrated, confirm military utility, and to accelerate fielding of the best joint and/or transformational solutions.

The proposed JCTD candidates will be briefed to the Joint Requirements Oversight Council (JROC). Similar to the ACTD process, the principal management tools for the JCTD are the Implementation Directive (ID), Management Plan (MP) and the Transition Plan (TP). Each approved JCTD will be described in these top-level documents which provide details of the demonstration/evaluation, the main objectives, approach, critical events, measures of success, transition options, participants, schedule, and funding. The development of JCTD proposals for initiation in FY 2006 will begin in February 2005. Final JCTD candidates will be included in the FY 2006 JCTD/ACTD Congressional Report submitted to the congressional defense committees. JCTD/ACTD BA-3 Program direct funding for new FY 2006 JCTD/ACTDs, including potential midyear starts, is approximately \$45 million (\$35 million from the JCTD PE and \$10 million from the ACTD PE).

The typical timeline of two years for the operational demonstration phase of a JCTD is compressed compared to normal acquisition timelines for fielding an operational capability. Executives and managers for JCTD projects will be encouraged to “spiral out” proven elements of JCTDs with interim Military Utility Assessments (MUAs) that permit rapid technology transition during the course of the demonstration rather than awaiting final demonstration completion to transition technologies to acquisition and sustainment programs of record. These shorter schedules are made possible because JCTDs will incorporate mature, or nearly mature, technology and, therefore, forgo time-consuming technology development and technical risk reduction activities. At the end of the JCTD, the user sponsor will be able to determine if the capability provided by the JCTD technology has sufficient utility to warrant procurement or sustainment. If there are significant shortcomings, their options are either to pursue an advanced technology demonstration to improve performance, return the technology to the research and development technology base for further maturation, or not to pursue the technology any further. In cases where the operational user is satisfied the prototype has significant military utility, the prototype can be retained as an interim capability. The Department then moves quickly to enter the formal acquisition process to acquire needed quantities or, if sufficient, to make fully operational those residual assets already produced as demonstration prototypes. The final demonstration concludes the operational demonstration phase and is the basis for the military utility assessment (MUA). In most cases, a residual support/pre-transition phase (sometimes used for extended user evaluation) follows. After the residual phase (if one is required), the JCTD will be defined as being complete and is now ready for consideration as a Budget Activity four (BA-4) JCTD (PE: 0604648D8Z).

**B. PROGRAM ACCOMPLISHMENTS AND PLANS – FY 2004 THROUGH FY 2007:**

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FY 2004 Program Accomplishments: Not applicable

FY 2005 Program Plans: Not applicable

FY 2006 and FY 2007 Program Plans:

DUSD (AS&C) will maintain oversight of the JCTD/ACTD program. The FY 2006 review and validation process will begin at the beginning of February 2005, with JROC validation expected during the third quarter of FY 2005. Congressional notification will follow with an anticipated start of approximately ten new JCTD/ACTDs on October 1, 2005---or as soon as appropriated dollars become available. The process will be repeated for FY 2007 JCTD/ACTDs.

**C. Other Program Funding Summary:** The new JCTD Program provides a “cradle to grave” path for transformational joint capabilities. The initial funding lines are outlined in the table below. Refer to the specific Budget Exhibit for more details on each funding line.

<b>ACTD and JCTD Program Funding Summary</b>	<b>APPN</b>	<b>BA</b>	<b>PE</b>	<b>LINE #</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>FY 2006</b>	<b>FY 2007</b>
Advanced Concept Technology Development (ACTD)	RDT&E	3	0603750D8Z	44	212.570	212.915	163.649	163.744
Joint Capability Technology Demonstration (JCTD)	RDT&E	3	0603648D8Z	36	0.000	0.000	35.000	35.000
Joint Capability Technology Demonstration (JCTD)	RDT&E	4	0604648D8Z	83	0.000	0.000	3.000	3.000
Defense Acquisition Executive (JCTD Pilot Program)	RDT&E	5	0605648D8Z	99	0.000	0.000	1.000	1.000
Procurement (JCTD Pilot), Major Equipment-OSD Def Wide	Proc	1	0902198D8Z		0.000	0.000	1.000	1.000
Total:							40.000	40.000

**D. Acquisition Strategy:** N/A

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Exhibit R-2, RDT&E Budget Item Justification						Date: February 2005		
Appropriation/Budget Activity RDT&E Defense-Wide, BA 3				R-1 Item Nomenclature: Special Technology Support PE 0603704D8Z				
Cost (\$ in millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Total PE Cost	13.434	0	0	0	0	0	0	0
<b>A. Mission Description and Budget Item Justification:</b>								
Special Technology Support to Intelligence and Light Forces is a classified program. See the Congressional Justification Book for program details.								
<b>B. Program Change Summary:</b> (Show total funding, schedule, and technical changes for the program element that have occurred since the previous President's Budget Submission)								
	<u>FY 2004</u>	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>				
Previous President's Budget	13.495	0	0	0				
Current President's Budget	13.434	0	0	0				
Total Adjustments	-0.061							
Congressional program reductions								
Congressional rescissions								
Congressional increases								
Other Adjustments	-0.061							
Change Summary Explanation:								
FY 2004: Miscellaneous reductions \$0.061								
FY 2005: Transferred to Budget Activity 6.								
<b>C. Other Program Funding Summary:</b> Not Applicable								
<b>D. Acquisition Strategy:</b> Not Applicable								
<b>E. Performance Metrics:</b> Classified								

Exhibit R-2a, RDT&E Project Justification							Date: February 2005	
Appropriation/Budget Activity RDT&E,DW BA 3				Project Name and Number: Special Technology Support				
Cost (\$ in millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Special Technology Support	13.434	0	0	0	0	0	0	0
RDT&E Articles Quantity	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>A. Mission Description and Budget Item Justification:</b>								
Special Technology Support to Intelligence and Light Forces is a classified program. See the Congressional Justification Book for program details.								
<b>B. Accomplishments/Planned Program</b>								
	FY 2004	FY 2005	FY 2006	FY 2007				
Accomplishment/ Effort/Subtotal Cost	13.434	0	0	0				
RDT&E Articles Quantity	N/A	N/A	N/A	N/A				
FY 2004 Accomplishments: <ul style="list-style-type: none"> <li>• Mission Support \$13.434</li> </ul> FY 2005 Accomplishments: N/A  FY 2006 Plans: N/A  FY 2007 Plans: N/A								

**C. Other Program Funding Summary:** Not applicable

**D. Acquisition Strategy:** Not Applicable

**E. Major Performers:** Classified

Exhibit R-2, RDT&E Budget Item Justification							Date: February 2005		
Appropriation/Budget Activity RDT&E. Defense-Wide BA3				R-1 Item Nomenclature: Strategic Environmental Research and Development Program (SERDP) PE 0603716D8Z					
Cost (\$ in millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	
Total PE 0603716D8Z Cost	49.002	56.597	64.101	66.104	69.799	69.864	71.191	72.722	
SERDP P470	49.002	56.597	64.101	66.104	69.799	69.864	71.191	72.722	
<b>A. Mission Description and Budget Item Justification:</b>									
<p>(U) 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 by providing new knowledge, cost-effective technologies, and demonstrations in the areas of environmental Cleanup, Unexploded Ordnance (UXO), Compliance, Conservation, and Pollution Prevention. SERDP does this by (1) addressing high priority, mission-relevant, defense environmental technology needs necessary to enhance military operations, improve military systems' effectiveness, enhance military training/readiness, sustain DoD's training and testing range infrastructure, and help ensure the safety and welfare of military personnel and their dependents; and (2) enhancing pollution prevention capabilities to reduce operational and life-cycle costs, as well as reducing the cost of necessary cleanup actions and compliance with 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 to these priority defense needs; the pursuit of universal, world-class technical excellence; emphasis on constant technology transfer to field use; and sound fiscal management. The apparent increase between FY 2004 and FY 2005 represents a return to historical levels in prior years' requests. The increase between FY 2005 and FY 2006 and similarly FY 2006 and FY 2007 represents an increased investment in technologies for the detection, discrimination and disposal of unexploded ordnance (UXO).</p>									
<b>B. Program Change Summary:</b>									
		<u>FY 2004</u>	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>				
Previous President's Budget		49.883	56.936	60.358	61.189				
Current FY 2006 President's Budget		49.002	56.597	64.101	66.104				
Adjustments to Appropriated Value:		-0.881	-0.339	+3.743	+4.915				
Congressional Program Reductions:									
Congressional Rescissions:									
Congressional Increases:		+3.550	+1.000						
Reprogrammings:		-3.849	-0.716						
SBIR/STTR Transfers:		-0.582	-0.623						
Program Increases						+3.743	+4.915		

**C. Other Program Funding Summary: NA**

**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 120 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.

Exhibit R-2a, RDT&E Project Justification							Date: February 2005	
Appropriation/Budget Activity RDT&E. Defense-wide BA 3				Strategic Environmental Research and Development Program (SERDP) PE 0603716D8Z				
Cost (\$ in millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
SERDP P470	49.002	56.597	64.101	66.104	69.799	69.864	71.191	72.722
<b>A. Mission Description and Budget Item Justification:</b>								
<p>(U) 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 by providing new knowledge, cost-effective technologies, and demonstrations in the areas of environmental Cleanup, Unexploded Ordnance (UXO), Compliance, Conservation, and Pollution Prevention. SERDP does this by (1) addressing high priority, mission-relevant, defense environmental technology needs necessary to enhance military operations, improve military systems' effectiveness, enhance military training/readiness, sustain DoD's training and testing range infrastructure, and help ensure the safety and welfare of military personnel and their dependents; and (2) enhancing pollution prevention capabilities to reduce operational and life-cycle costs, as well as reducing the cost of necessary cleanup actions and compliance with 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 to these priority defense needs; the pursuit of universal, world-class technical excellence; emphasis on constant technology transfer to field use; and sound fiscal management. The apparent increase between FY 2004 and FY 2005 represents a return to historical levels in prior years' requests. The increase between FY 2005 and FY 2006 represents an increased investment in technologies for the detection, discrimination and disposal of unexploded ordnance (UXO).</p>								
<b>B. Accomplishments/Planned Program</b>								
Unexploded Ordnance	FY 2004	FY 2005	FY 2006	FY 2007				
Accomplishment/ Effort/Subtotal Cost	10.826	12.651	17.345	17.887				
(U) FY 2004 Accomplishments: Unexploded Ordnance (UXO):								
<p>Investment in UXO yielded advanced technology to address the most difficult and persistent issues facing our military testing and training lands, ranging from advanced signal processing approaches for improved detection and discrimination to next generation sensors to UXO filler material identification methods to underwater characterization technologies. Investigators continued to use the two standardized test sites for the demonstration and evaluation of UXO technologies. New start projects concentrated on improved sensor designs and detection and discrimination methods.</p>								
(U) FY 2005 Plans: UXO: Continuing efforts in UXO detection and discrimination technologies, projects include developing navigation tools to support collection of geophysical data, characterizing underwater sites, and developing novel sensors and signal processing techniques.								

(U) FY 2006 Plans: UXO: New initiatives will continue to focus on wide area assessment technologies, advanced sensors, signal processing, supporting technologies and protocols. Continuing efforts include a project to develop model-based, robust methods for UXO discrimination from time and frequency domain Electromagnetic Induction.

(U) FY 2007 Plans: UXO: Research initiatives will focus on advancements in wide area assessment technologies, advanced sensors, signal processing, supporting technologies and protocols to reduce the costs associated with detecting UXO. New start initiatives will center on cost effective remediation technologies.

Cleanup	FY 2004	FY 2005	FY 2006	FY 2007
Accomplishment/ Effort/Subtotal Cost	9.686	11.319	12.066	12.443

(U) FY 2004 Accomplishments: Cleanup

In FY 2004 SERDP-funded research continued to address two major contaminants of concern at DoD facilities: munitions constituents (explosives, propellants and pyrotechnics) found on ranges; and chlorinated solvents (TCE, PCE) found at over half of DoD sites. Significant progress was made in the investigation of the genetic and biochemical processes involved in the breakdown of explosive contaminants by plants. Researchers continued to develop both biological and abiotic technologies to address the remediation of munitions constituents in soil and groundwater and development of technologies to remediate chlorinated solvent plumes with in-situ alternatives to decades-long “pump and treat” solutions. Other continuing projects researched source zone delineation and the sequestration of toxic heavy metals in soils, such as lead on small arms ranges. Work was initiated in FY 2004 to investigate the in-place remediation of contaminated sediments, identify remediation strategies for groundwater contaminated with heavy metals, and develop low cost methods of measuring hydraulic conductivity.

(U) FY 2005 Plans: Cleanup:

Efforts will continue in the munitions constituents on ranges and chlorinated solvents areas. Projects initiated in FY 2005 will: 1) investigate cost-effective remediation strategies for new emerging contaminants in soil and groundwater; 2) improve risk assessments at DoD sites with ecological soil screening levels and wildlife toxicity reference values; 3) develop technologies to perform screening level risk assessments of energetics contaminated soil and groundwater; 4) better understand the scientific principles behind the thermal treatment of contaminants.

(U) FY 2006 Plans: Cleanup:

SERDP will aim to improve scientific understanding and develop innovative cost effective methods for the bioremediation of munitions constituents, specifically energetics and nitroaromatic compounds. Work will also focus on the in-place management of contaminated sediments. Additional initiatives will continue work in the areas of source-zone treatment of dense non-aqueous phase liquids, and the phytoremediation of energetic contaminants.

**(U) FY 2007 Plans: Cleanup:**

New initiatives will focus on the remediation of energetics and other contaminants found on testing/training ranges, management of contaminated sediments, and the identification and characterization of new emerging contaminants.

Conservation	FY 2004	FY 2005	FY 2006	FY 2007
Accomplishment/ Effort/Subtotal Cost	9.117	10.654	11.312	11.665

**(U) FY 2004 Accomplishments: Conservation:**

Completed two initiatives under the SERDP Ecosystem Management Project (SEMP) – understanding ecosystem disturbance thresholds and ecosystem indicators of change. Continued to develop land management techniques for installations and ranges. Completed efforts to use hyperspectral imagery to rapidly and inexpensively map invasive plant species on military lands, and developed a strategy to control, monitor, and predict invasive species in Western states. Completed a sensor fusion approach to assess and characterize archaeological artifacts in DoD installations and ranges. Evaluated the impacts of training noise on the endangered Red Cockaded Woodpecker and on marine mammals. Commenced planning for an estuarine and coastal research land/resources management initiative at Camp LeJeune to address impacts of military training operations in these environments.

**(U) FY 2005 Plans: Conservation:**

Ecosystem management techniques for installations and ranges continue to dominate SERDP Conservation research. Sustaining use of military ranges requires SERDP to continue efforts on developing cost effective quantification of impact of military operations on Threatened and Endangered Species, prediction of marine mammal distribution, and cost effective control of invasive species on ranges. Continuing efforts to understand and manage invasive plant species that negatively affect training activities; predicting marine mammal population densities; characterizing military activities that contribute to the transport of non-indigenous species; monitoring migratory bird species on military lands; and developing remote sensing technologies to identify threatened/endangered species habitats to meet requirements of the Endangered Species Act and Migratory Bird Treaty Act. New initiatives will commence to determine the fundamental relationships that define migratory land bird habitat and routes; and to understand how these elements can lead to improved monitoring strategies; develop models for biogeochemical cycles that can assist land managers in determining appropriate land uses and land management approaches for ecosystems; and develop new remote sensing technologies to detect high priority threatened and endangered species (TES) and their habitat(s) on DoD lands. A research strategy and plan will be developed for the Defense Coastal and Estuarine Research Program at Camp LeJeune.

**(U) FY 2006 Plans: Conservation:** SERDP will continue and initiate new efforts to address persistent issues that severely impact installation readiness and their ability to support force training and testing. Research topics include an assessment of the stressors on military lands caused by future larger/centralized force structures; developing scientific, defensible threatened and endangered species population viability and recovery goals for installations and their surrounding areas; and the development of methods to evaluate land parcels around military installations that are candidates for acquisition to combat encroachment. Establish the Defense Coastal and Estuarine Research Program at Camp LeJeune.

(U) FY 2007 Plans: Conservation: SERDP will expand the long-term research efforts at the Defense Coastal and Estuarine Research Program at Camp LeJeune into full scale operation. Continue efforts to assess stressors on military lands caused by future force structures; developing scientific, defensible threatened and endangered species population goals for installations and surrounding areas; and develop tools to manage biodiversity fragmentation caused by encroachment around military installations.

Compliance	FY 2004	FY 2005	FY 2006	FY 2007
Accomplishment/ Effort/Subtotal Cost	8.547	9.988	10.558	10.888

(U) FY 2004 Accomplishments: Compliance:

Continued efforts to determine the levels of explosives contamination on training and testing ranges and continued studies that determine the fate and transport of these materials into the soil and groundwater at training ranges. Completed a study to assess the fate, transport and ecotoxicological issues of CL-20, considered a new energetic materials candidate. New technologies to measure and characterize fine particulate matter in the air from military systems were successfully concluded and will permit the Department to comply with emerging EPA regulations. Developed technologies for estimating the impact of DoD activities on marine estuaries and technologies to control invasive aquatic species in Navy ships. New projects were initiated to develop technologies to measure and predict noise impacts, and to develop dust emissions factors from military activities.

(U) FY 2005 Plans: Compliance:

Continue to develop technologies needed to support the sustainability of DoD's training and testing ranges with specific attention on fate and effect of munitions constituents from operational ranges. Characterize the source term of energetic compounds in aquatic environments. Continue to develop emissions factors for dust generated by unique military activities, air toxic emissions factors for military aircraft engines, and technologies for the measurement and control of air emissions from tactical vehicles. Continue to assess the impact of military noise sources and begin innovative monitoring systems for impulse noise. New initiatives identify and quantify naturally occurring sources of perchlorate and develop new, cost-effective methods for the treatment of perchlorate in drinking water.

(U) FY 2006 Plans: Compliance:

Future initiatives that will be funded to ensure the continued use and sustainability of our training ranges include exposure assessments of the fate and transport of energetic materials, and screening level and modeling tools. The knowledge of the potential sources, the movement of residual energetic materials and/or their breakdown products, and the assessment of environmental exposure will assist in total assessment of potential environmental impacts stemming from the use of test and training ranges. Solicit technologies to safely and effectively dispose of composite materials that come about as a result of manufacturing and repair processes at military depots.

(U) FY 2007 Plans: Compliance:

Research initiatives will continue to focus on the sustainability of our training ranges including screening level tools and detailed range management models that minimize impacts to the environment while maximizing training capabilities. Invest in technologies to

safely and effectively recycle or dispose of next generation materials produced by manufacturing and repair processes at military depots.

Pollution Prevention	FY 2004	FY 2005	FY 2006	FY 2007
Accomplishment/ Effort/Subtotal Cost	10.826	11.985	12.820	13.221

(U) FY 2004 Accomplishments: Pollution Prevention:

Continued development efforts in green munitions for medium caliber munitions and environmentally benign ammonium perchlorate replacements in pyrotechnics. Successfully identified options to eliminate or reduce the use and associated emissions of carcinogenic chromium - from novel polymers for corrosion protection to a chromate-free dry-coating technology. Identified options to further reduce particulate matter emissions in diesel and gas turbine engines. Completed projects to develop environmentally benign polymer matrix composites and cleaning solvents for precision and hand-wipe applications. Initiated projects to develop green alternatives to ammonium perchlorate for propulsion purposes and develop an environmentally green synthesis of TNT for the elimination of red water.

(U) FY 2005 Plans: Pollution Prevention:

New and continuing efforts will focus on eliminating hazardous "red water" from explosives (TNT) manufacturing, cadmium plating on high-strength steels, and solvents containing Class II ozone depleting substances. Alternatives to perchlorate in incendiary mixes and pyrotechnic formulations; Hazardous Air Pollutant (HAP)-free solvents, and environmentally benign "green" gun barrels for medium caliber weapons will continue.

(U) FY 2006 Plans: Pollution Prevention:

The P2 program will focus on development of "green" energetics, munitions and weapons systems components that have little impact on the environment. Other initiatives include a coating system for military aircraft and land based platforms that eliminates volatile organic compounds, chromium constituents, and associated hazardous air pollutants systems.

(U) FY 2007 Plans: Pollution Prevention:

The P2 program will continue 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. New initiatives to reduce or eliminate compounds on the Toxic Release Inventory top ten list.

**C. Other Program Funding Summary:** N/A

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Exhibit R-2, RDT&E BUDGET ITEM JUSTIFICATION							Date: February 2005	
APPROPRIATION0/BUDGET ACTIVITY RDT&E/Defense-Wide/BA 3						R-1 ITEM NOMENCLATURE Joint Warfighting, PE 0603727D8Z		
Cost (In Millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Total Program Element (PE) Cost	9.949	10.696	10.205	10.476	11.209	11.231	11.461	11.724
<b>A. Mission Description and Budget Item Justification</b>								
<p>In May 1998 the Secretary of Defense appointed U.S. Joint Forces Command (formerly the U.S. Atlantic Command), as the Defense Department's Executive Agent for Joint Experimentation. Subsequently, the Department realigned resources to support the Joint Forces Command's new role. In FY 1999 funds from this Joint warfighting Program Program Element (PE: 0603727D8Z) were redirected to support the initial stand-up of Joint Forces Command's Joint Experimentation Directorate. Funding for joint experiments was transferred to Joint Forces Command through the Navy and PE 0603727N in FY 2000 and was established to provide Joint Forces Command with its own funding source. Funding to support the Joint Advanced Warfighting Program (JAWP) concept development, the Information Technology Backplane (ITB), and Technology Feeder Support (TFS) for joint experimentation was retained in the JWP PE. The Defense Adaptive Red Team (DART) was initiated as a pilot project in FY 2002. DART has proven to be very successful by providing an independent team of experts to challenge emerging operational concepts from their origin through the experimentation process. DART is now included in the JWP program across the FYDP.</p> <p>The Joint Warfighting PE supports four related activities: the JAWP, the ITB, DART and TFS for Joint Experimentation. While these activities strongly support Joint Forces Command's joint experimentation efforts, a separate program element is necessary since the activities support other organizations in addition to Joint Forces Command. Additionally, because of the evaluation role a separate program element, with OSD oversight, provides a necessary degree of independence.</p> <p>The Joint Advanced Warfighting Program (JAWP) was established by the Office of the Secretary of Defense (OSD), with the support of the Vice Chairman of the Joint Chiefs, to serve as a catalyst for innovation and change. This program's focus is on</p>								

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assisting in the formulation and assessment of advanced concepts and capabilities, plus identifying enabling technologies and integration options for the Department. These concepts drive changes in the doctrine, organization, training, materiel, leadership, people, and facilities (DOTMLPF) of the Services. The JAWP serves an essential independent role in identifying, exploring and evaluating breakthrough war fighting capabilities. It helps capture and builds on lessons learned from joint contingency operations and earlier joint and Service experimentation. From that foundation, it identifies and helps formulate breakthrough joint concepts, explores their effectiveness by designing and conducting joint experiments, and helps streamline implementation processes. Its work compliments and supports the activities of Joint Forces Command, the Joint Staff, and the OSD by providing a uniquely informed independent source of advice. In identifying and elaborating innovative joint concepts and capabilities and associated enabling technologies, the JAWP helps integrate related Service efforts and those of Combatant Commanders and Defense agencies.

Through its influence in a wide range of DoD transformation efforts, the JAWP promotes integration, bringing greater coherence to efforts that would otherwise be tangential or disconnected. The JAWP is composed of both civilian and military members. Its military component is the JAWP Analytical Project Office (JAWP-APO), a jointly manned activity established by the Deputy Secretary of Defense, consisting of equal numbers of military personnel from all four Services. The active duty military members provide a current operational perspective to concepts under investigation and serve as a vital link to ongoing relevant activities in the Services. The Information Technology Backplane (ITB) provides an advanced network infrastructure that extends commercial capabilities to meet JV2020 needs. Information Superiority is a key JV2020 building block and the ITB provides the means to experiment with the digital transmission capabilities that are projected to be available within five years (from each funding year). The ITB is not a new physical network. It is a virtual network that capitalizes on existing physical networks such as the Defense Information Systems Network (DISN), the DISN Asynchronous Transfer Mode Service Network (DATMS), the Defense Research and Engineering Network (DREN), and the experimental Advanced Technology Demonstration Network (ATDnet). The ITB has many users from sites served by existing networks but the funding included in this PE is the incremental funding needed to support joint experimentation. For example, this PE provides the circuit costs to extend the ITB from the experimentation site to the nearest point on the backplane (where no other network exists), and only the “extra” backplane costs generated by the Joint Warfighting Experiments. Since joint experiments are very dependent on advanced distributed simulation, or on limited, live, command post exercises that are being driven by simulations, a robust high-

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performance network is needed to interconnect the various sites. These simulations press the state of the art in networking capability, including that of requiring high-bandwidth, low-latency Type-I encryption for protected communications. The ITB also supports new bandwidth-intensive applications such as video teleconferencing, high definition television and large file transfers.

The third effort supported by this PE is Technology Feeder Support (TFS) for joint experiments. There are many Technology Demonstrations (TDs), Advanced Technology Demonstrations (ATDs), and Advanced Concept Technology Demonstrations (ACTDs) that can provide advanced technologies to support joint experiments. For example, the Joint Staff has prepared 72 desired operational capabilities based on JV2020 concepts and 21st Century Challenges. For each Challenge, the Joint Staff has prepared roadmaps that provide opportunities to assess each Challenge. The roadmap for the battlefield awareness challenge shows 42 ACTDs that have the potential to demonstrate some aspect of a desired operational capability supporting battlefield awareness. This effort provides technology managers the resources to expand the scope of a test or demonstration to collect data for the joint staff or JFCOM, thereby leveraging the OSD and Service ACTD investment. The final effort supported by this Program Element is the Defense Adaptive Red Team (DART), which was established as a separate project starting with the FY 2003 budget. The DART's mission is to challenge JFCOM, JAWP, the Joint Staff and others in the DoD to develop more robust and resilient concepts for conducting joint operations in the future. It does so through four sets of activities:

(1) Involvement in the planning and implementation of JFCOM, JAWP and Joint Staff concept development and experimentation; (2) Support of other combatant commands; (3) Support of the ACTD and Foreign Comparative Test Programs; and (4) Development and refinement of red teaming best practices. The DART develops and implements wargames and other activities as appropriate, and provides independent reports relating to its activities. A senior advisory group meets annually to review the DART's activities and accomplishments, and to recommend appropriate changes in focus or operations.

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**B. Program Change Summary**

	<u>FY 2004</u>	<u>FY 2005</u>	<u>FY 2006</u>
Previous President's Budget:	10.284	9.936	10.268
Current FY 2006 President's Budget Submission:	9.949	10.696	10.205
Adjustments to Appropriated Value:	-0.335	+0.760	-0.063
Congressional Program Reductions:	-0.074	-0.240	
Congressional Rescissions:			
Congressional Increases:		+1.000	
Reprogrammings:			
SBIR/STTR Transfers:	-0.261		
Other:			-0.063

**C. Other Program Funding Summary: N/A**

**D. Acquisition Strategy: N/A**

**E. Performance Metrics:**

- By FY 2005 conduct Urban Resolve Experiment.
- By FY 2005 initiate on-going interactive experimentation plan.
- By FY 2005 provide assessment plan addressing lessons learned from GWOT.
- By FY 2006 identify implementation path for joint command and control.
- By FY 2006 provide Combatant Commands with experimentation/demonstration plans.
- By FY 2007 continue to provide operational concept support to COCOMS.

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<b>Exhibit R-2a RDT&amp;E Budget Item Justification</b>							Date: February 2005	
APPROPRIATION0/BUDGET ACTIVITY RDT&E/Defense-Wide/BA 3						R-1 ITEM NOMENCLATURE Joint Warfighting , PE 0603727D8Z		
<i>Cost (In Millions)</i>	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Total Program Element (PE) Cost	9.949	10.696	10.205	10..476	11.209	11.231	11.461	11.724

**A. Mission Description and Budget Item Justification**

The Joint Warfighting PE supports four related activities: the Joint Advanced Warfighting Program (JAWP), the Information Technology Backplane (ITB), the Technology Feeder Support (TFS) and the Defense Adaptive Red Team (DART). Each of these activities is associated with the Joint Experimentation role assigned to the U.S. Joint Forces Command (USJFCOM). While these activities strongly support Joint Forces Command’s joint experimentation efforts, a separate program element is necessary since the activities support other organizations in addition to Joint Forces Command (e.g., OSD, JCS, and other CoComs). Additionally, because of the evaluation role a separate program element, with OSD oversight, provides a necessary degree of independence.

**B. Program Accomplishments and Plans:**

	FY 2004	FY 2005	FY 2006	FY 2007
Joint Advanced Warfighting Program (JAWP)	4.600	4.800	5.000	5.150

- FY 2004 Accomplishments – The JAWP supported JFCOM’s Joint Center for Lessons Learned by identifying and collecting lessons from the Global War on Terrorism. The JAWP conducted the collection and analysis effort from OSD, the Joint Staff, the Intelligence community, and the departments of State and Justice. It also coordinated and help integrate the overall global lessons learned effort from a JAWP-led cell at headquarters SOCOM and a JAWP-led analysis cell at JFCOM. That effort continued throughout the FY and involved more than two thirds of the JAWP’s resources. JAWP also lead and helped man JFCOM’s Jont Urban Resolve Experiment. The experiment explored joint commands and control organization; integration of manned and unmanned capabilities for reconnaissance and combat applications; and innovative ways to overcome opponents protective measures in an urban environment. Vulnerability assessments

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and “Red Teaming” were conducted to improve the experiment’s validity and robustness. Complimentary efforts for DUSD (AS&C) and other DoD departments was used to identify opportunities to leverage and integrate Service, allied and other agency programs. The latter effort helped integrate the independent joint command and control initiatives of United States Pacific Command (USPACOM), USCENTCOM, JFCOM, and Service command and control structure worldwide. A component of the task is to help identify and exploit opportunities facilitating the early transition of new concepts and technologies to operational capabilities. JAWP concluded its support for JFCOM in its assumption of duties as DoD’s Executive Agent for Joint Urban Operations in 2004 and concurrently completed its support to OSD and the Joint Staff on the next Unified Command Plan. Finally, JAWP lead an effort supporting OSD and the Joint Staff on developing key concepts for capabilities based planning.

- FY 2005 Plans - JAWP will continue support of the Department’s transformation objectives through joint experimentation and joint concept development. Specifically, the JAWP will continue its Urban Resolve experiment and initiate a continuing experiment extending through FY 2006 to exploit insights gained from earlier experimentation. It will concurrently help identify an implementation path for a worldwide joint command and control structure emphasizing the creation of standing Joint Headquarters as the command and control foundation on which future joint operations will be based.
- FY 2006 Plans – JAWP will continue support of the Department’s transformation objectives through joint experimentation and joint concept development. Specifically, the JAWP will expand its support of the Combatant Commands by assisting them in the formulation of ACTDs, conducting experimentation that explores the comparative advantages of operational capability alternatives, and assisting them with the refinement of operational concepts supporting their contingency planning responsibilities.
- FY 2007 Plans – JAWP will continue to support the Department’s transformation objectives through joint experimentation concept development. JAWP will continue its support to the Combatant Commands in the refinement of operational concepts supporting their contingency planning responsibilities.

	FY 2004	FY 2005	FY 2006	FY 2007
Information Technology Backplane (ITB)	1.442	1.696	1.905	1.963

- FY 2004 Accomplishments - The ITB supported wide-area network connectivity for joint warfighting experimentation and continued transition of emerging technology from advanced research network test beds. Information assurance and other security technologies were tested and deployed. Fielded multicast and net-flow monitoring and analysis tools to determine and map traffic-flow prioritization to WAN

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Quality of Service (QoS). Supported JFCOM, FBE and ad-hoc experimentation including JFCOM’s Continuous Experiment Environment (CEE).

- FY 2005 Plans - The ITB will continue support for wide-area network connectivity for joint warfighting experimentation, as will the ongoing task of transitioning emerging technology from advanced research network test beds. ITB will make contribution to emerging technology from advanced research network test beds. ITB will make contributions to emerging Service Oriented Architecture Enterprise Services through the Evaluation Capabilities Modules efforts. ITB will continue to support net centric functional capabilities definition and exploration. Information assurance and other security technologies for ultra high bandwidth and networking technologies will continue to be developed, tested and deployed.
- FY 2006 Plans – The ITB will provide technology assessments, participate in industry and government consortia and continue to evolve Warfighter access to leading edge networking technologies. ITB will continue support for wide-area network connectivity for Joint Warfighting experimentation. ITB will contribute to emerging Service Oriented Architecture Enterprise Services through the Evaluation Capabilities exploration. Information assurance and other security technologies and concepts for ultrahigh bandwidth and networking technologies will continue to be developed, tested and deployed.
- FY 2007 Plans – The ITB will continue support for wide-area network connectivity for Joint Warfighting experimentation. Security technologies and concepts for ultrahigh bandwidth and networking technologies will continue to be developed, tested and deployed.

	FY 2004	FY 2005	FY 2006	FY 2007
Technology Feeder Support (TFS)	1.157	1.200	1.200	1.200

- FY 2004 Accomplishments - TFS project ensured that technology applications (ACTDs /ATDs) were injected into Pinnacle Vision 2004. It assisted with focusing the Standing Joint Force Headquarters and Theater Effects Based Operations so significant effort could be applied to ensure that appropriate technologies to support these operational concepts are available to enhance experimentation efforts with combatant commanders.
- FY 2005 Plans - The major effort planned for support by the TFS project will be to ensure that technology applications (ACTDs /ATDs) are injected into FY 2005 experiments conducted by JFCOM and other combatant commanders. It is anticipated that implementation of the Standing Joint Forces Headquarters and other Transformation efforts will continue to be the focus of experimentation efforts. Technology resources will be focused to support this effort. The support of combatant commander (other than JFCOM) experimentation will continue.

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- FY 2006 Plans – Continue to ensure that technology applications (ACTDs/ATDs) are injected into experiments conducted by JFCOM and other combatant commanders. The support of combatant commander (other than JFCOM) experimentation will continue.
- FY 2007 Plans – Continue to provide resources to USPACOM and USJFCOM for Joint Experimentation and oversight to new technologies and concepts.

	FY 2004	FY 2005	FY 2006	FY 2007
DoD Adaptive Red Team (DART)	2.000	2.000	2.100	2.163

- FY 2004 Accomplishments – In response to recommendations from a Senior Advisory Group, DART shifted its primary emphasis away from Joint Forces Command (JFCOM) to supporting Combat Command (COCOM) requirements. DART actively supported US Pacific Command’s (PACOM) Biological Weapons Countermeasures Initiative, US Southern Command’s (SOUTHCOM) work with the Columbian Military on defeating the FARC, US Northern Command’s (NORTHCOM) exercise program, and US Forces Korea’s (USFK) assessment of warning of possible North Korea attack. Ongoing, albeit reduced levels of participation with JFCOM included completion of a red team review of Joint Forces Command’s Operation Iraqi Freedom After-Action Report and red teaming of urban operations concepts. DART continued to directly support DOD with activities relating to Counter-Bomber 2 (CB2) and Active Denial System (ADS) ACTD programs. In addition, DART provided a red team assessment of alternative means to defeat hard and deeply buried targets. Finally, DART published several red teaming “best practices” documents, with particular focus on the global war on terrorism and counter-insurgency operations in Iraq.
- FY 2005 Plans- DART will continue to support PACOM, SOUTHCOM. Its support to NORTHCOM and USFK is expected to have concluded; however, it will begin red team support to STRATCOM on strategic deterrence and related areas. Urban Operations support to JFCOM is envisioned. ACTD support will continue, including both CB2 and ADS. Valuable technical, as well as employment and deployment considerations are invaluable in refining the residual products for DOD. Best practices and Senior Advisory Group activities will continue. Finally, it is expected that DART will examine the current and potential role of red teaming including competitive analysis in intelligence, looking critically at how certain products are produced.
- FY 2006 Plans – The DART will again support JFCOM, JAWP and Joint Staff concept development and experimentation efforts. The DART expects to complete its work with PACOM on countering biological weapons, and will extend this work by providing red teaming and wargaming that can bring lessons learned to other Combatant Commands. Efforts relating to combating terrorism, including continued work with SOUTHCOM, will continue. In addition, it is expected that work with STRATCOM will continue, and with NORTHCOM or another

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COCOM will be initiated. ACTD support will continue, as the DART expects to complete work on the CB2 and ADS ACTDs and initiate red teaming of several new starts (TBD). Once again, technical, employment and deployment considerations raised by the DART are expected to be invaluable in refining the residual products for DOD. Work on defining red teaming best practices will continue. A Senior Advisory Group will review the DART's activities and accomplishments, and recommend appropriate changes in its focus and operations.

- FY 2007 Plans – DART will continue to support JFCOM, JAWP and Joint Staff concept development and experimentation efforts, as well as several COCOMs. Technical employment and deployment considerations raised by the DART are expected to be invaluable in refining the residual products for DOD. Work will continue on defining red teaming best practices will continue. A Senior Advisory Group will review the DART's activities and accomplishments, and recommend appropriate changes in its focus and operations.

	FY 2004
(JFCOM Rapid Database Development) Congressional Plus Up	0.750

- FY 2004 Accomplishments – The Homeland Security and Defense (HLS&D) Modeling and Simulation R&D initiative accomplished several critical tasks. First and foremost was the development and down selection of models supporting training and planning for interagency operations at the Federal, State, Tribal, Regional and Local levels. Just as critical, the model emphasized crisis response and emergency management for first and early responders, as well as emergency management centers at all levels. The capability also expanded the ability to replicate the effects of all types of weapons of mass destruction and mass casualty consequence management, especially in an urban environment. The model will also stimulate both the Command and Control and Information Systems for all agencies involved. Finally, the project has resulted in the development of enhanced models of the military and civilian decision support processes and communications infrastructures employed at all levels during HLS&D events.

	FY 2005
Joint Navigational Warfare: Congressional Plus Up	1.000

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- FY 2005 – The Joint Navigational Warfare is a program that is run by the National Security Agency (NSA) with oversight by OASD (NII). These funds will be transferred to the appropriate program office as directed by OASD (NII) to support the NSA project, ensuring the Department uses the funds per the intent of Congress. These resources are aimed at supporting a “Navwar” jamming test in the Spring of 2005 to exercise the SIGINT communities ability to detect, geo-locate, and disseminate an evolving Global Positioning System (GPS) jamming threat.

**C. Other Program Funding Summary:** N/A

**D. Acquisition Strategy:** N/A

**E. Major Performers:** Institute for Defense Analyses (IDA), Alexandria, VA

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Exhibit R-2, RDT&E Budget Item Justification						Date: February 2005			
Appropriation/Budget Activity RDT&E, Defense Wide/BA-3			R-1 Item Nomenclature Advanced Concept Technology Demonstration (ACTD), PE 0603750D8Z						
Cost (\$ in Millions)		FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
ACTD/P523		212.570	212.915	163.649	163.744	174.549	174.788	179.239	184.216
* FY 2006-2011: \$40 million shifted to the new Joint Capability Technology Demonstration (JCTD) program outlined below.									
<b>A. Mission Description and Budget Item Justification</b>									
<p><u>BRIEF DESCRIPTION OF ELEMENT:</u> The Advanced Concept Technology Demonstration (ACTD) program began in 1995 with the purpose of demonstrating new, mature technologies in an operational environment and a goal of getting new technologies into the hands of the warfighter as quickly as possible. Early successes included the Predator and Global Hawk unmanned aerial vehicles (UAV). To date, 144 ACTDs have been initiated across the Department of Defense (DoD). In FY 2005 fifteen new ACTDs have been started, bringing the total number of active ACTDs to seventy-nine. The success of the ACTD program continues with forty nine contributing products which were, or are, employed in Operation Iraqi Freedom (OIF). Some of these ACTDs are completing their operational demonstrations in a wartime environment. Examples include the Language and Speech Exploitation Resources (LASER), Expendable Unmanned Aerial Vehicle (XUAV) and the Joint Explosive Ordnance Disposal (JEOD) ACTDs. The streamlined approach to ACTDs brings together scientists and military operators, who insert advanced technologies into live demonstrations, evaluating their military utility in the field while simultaneously tailoring concepts for operational employment.</p> <p>A key ingredient to the relevant and rapid insertion of technology is the ability for an ACTD to be initiated faster than the traditional two year DoD Planning, Programming, Budgeting, and Execution (PPBE) process. Each year this President’s Budget submission provides resources for the next slate of ACTDs which are just beginning their selection process. This allows a rapid/accelerated technology insertion process which helps maintain relevancy to the warfighters, compared to a “standard” PPBE process which requires a minimum of two years to initiate new technologies to begin development for a demonstration several years later. The goal is to speed up the acquisition process by operationally demonstrating capabilities, looking for an eighty percent solution so an acquisition decision can be made quicker---a “try before you buy” approach. ACTDs are selected by the Combatant Commanders (CoComs) and the Services. Oversight is provided by the Deputy Under Secretary of Defense for Advanced Systems and Concepts (AS&amp;C). Each year a new slate of</p>									

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ACTDs are forwarded to the Joint Requirements Oversight Council (JROC) for mission need validation and prioritization. Upon JROC validation, congressional notification occurs and the new ACTDs are initiated within a few weeks of selection. This selection and validation process can occur in as little as nine months. Each ACTD is included in the Joint Warfighting Science and Technology Plan (JWSTP) as a Defense Technology Objective (DTO) to help leverage the technology being demonstrated and avoid duplication within the Department.

Beginning in FY 2006, a new ACTD business process will be initiated which will take the successful ACTD program and update it to meet the Department's transformational goal of becoming capability vice threat based in its focus. The program will be referred to as the Joint Capability Technology Demonstration (JCTD) program. The JCTD program will include many of the positive aspects of the ACTD program, but will be revamped to meet the defense challenges of the 21<sup>st</sup> century. The new process will integrate the ACTD program with the new Joint Integration and Development System (JCIDS) developed by the Joint Chiefs of Staff (JCS). Beginning in FY 2006, the Department estimates a three to five year transition period from the current ACTD process to the improved JCTD program. Eventually, JCTDs will replace ACTDs, providing an even faster process that focuses on joint and transformational technologies that are initiated in Science and Technology (S&T) and carried through the difficult transition stage, sometimes referred to as the "S&T valley of death." The new JCTD business model includes a Defense Acquisition Executive (DAE) pilot program which will take a limited number of "joint peculiar" JCTDs past milestone B, through engineering and manufacturing, and into procurement, followed by initial sustainment---a "cradle to grave" approach. The piloted program envisions using joint acquisition activities like the Joint Program Sustainment and Development (JPSD) office, or even U.S. Special Operations Command (USSOCOM), to provide the necessary acquisition compliant and program management functions. The DAE pilot program will give overall programmatic oversight of JCTDs that are deemed uniquely joint/combined (i.e., capability directly supports more than one Military Service) and/or transformational. The new JCTD demonstration model will specifically address congressional concerns and recommendations made by the General Accountability Office (GAO) regarding the ACTD program.

The appropriation, Program Element (PE) and Budget Activity (BA) structure for the new JCTD process includes the following:

- JCTD PE 0603648D8Z (RDT&E/DW BA-3)
- JCTD PE 0604648D8Z (RDT&E/DW BA-4)
- Defense Acquisition Executive (DAE) PE 0605648D8Z (RDT&E/DW BA-5)
- JCTD Procurement (funded in Procurement Defense Wide, OSD Major Equipment: PE 0902198D8Z).

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An initial allocation of resources (\$40 million) from the ACTD PE has been shifted into these program elements starting in FY 2006, which explains the reduction in the ACTD FYDP line shown in this budget exhibit. During the transition period additional resources will be shifted into the various JCTD program elements until a fully resourced program is established which will support a minimum of ten new JCTDs each year. It is envisioned that the BA-3 JCTD PE will eventually replace the current ACTD BA-3 PE. However during the transition period the JCTD and ACTD program elements will use combined resources to ensure continuity of ongoing ACTDs and program flexibility for the new JCTDs. During this period the program will sometimes be referred to as the JCTD/ACTD program to show the blended and transitioning nature of the process. To establish resource visibility and accountability and to ensure a fully leveraged program, the Military Services and the Defense Advanced Research Projects Agency (DARPA) will be requested to create new program elements in BA-3 and/or BA-4. These program elements will be established during the transition period and will be specifically titled and associated with the JCTD process. DoD recognizes the unique role the ACTD program fills and aims to further improve its effectiveness and relevancy through the establishment of the JCTD program. The business process improvements will address DoD, congressional, and GAO recommendations for rapidly developing and transitioning CoCom relevant capabilities to the joint warfighter in a more cost effective, timely and efficient model.

**B. Program Change Summary**

	<u>FY 2004</u>	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>
Previous President's Budget	218.167	213.901	202.510	204.714
Current FY 2006 President's Budget	212.570	212.915	163.649	163.744
Total Adjustments:	-5.597	-0.986	-38.861	-40.970
Congressional program reductions	-	-		
Congressional Rescissions	-3.244	-5.036		
Congressional Increases	+10.150	+5.100		
Reprogrammings	-2.100	-1.050		
SBIR/STTR Transfer	-5.597			
JCTD Transfer			-40.000	-40.000
Other			+1.139	-0.970

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**C. Other Program Funding Summary (\$million):** The new JCTD Program provides a “cradle to grave” path for transformational joint capabilities. The initial funding lines are outlined in the table below. Refer to the specific Budget Exhibit for more details on each funding line.

<b>ACTD and JCTD Program Funding Summary</b>	<b>APPN</b>	<b>BA</b>	<b>PE</b>	<b>LINE #</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>FY 2006</b>	<b>FY 2007</b>
Advanced Concept Technology Development (ACTD)	RDT&E	3	0603750D8Z	44	212.570	212.915	163.649	163.744
Joint Capability Technology Demonstration (JCTD)	RDT&E	3	0603648D8Z	36	0	0	35.000	35.000
Joint Capability Technology Demonstration (JCTD)	RDT&E	4	0604648D8Z	83	0	0	3.000	3.000
Defense Acquisition Executive (JCTD Pilot Program)	RDT&E	5	0605648D8Z	99	0	0	1.000	1.000
Procurement (JCTD Pilot), Major Equipment-OSD Def Wide	Proc	1	0902198D8Z		0	0	1.000	1.000
<b>Total:</b>							40.000	40.000

**D. Acquisition Strategy:** N/A

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**E. Performance Metrics:** The JCTD/ACTD performance metrics are centered on how fast relevant joint and/or transformational technologies can be demonstrated and fielded 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 these metrics and helps compare/contrast the current ACTD program with the new JCTD business process model.

<b>Performance Metric</b>	<b>ACTD</b>	<b>JCTD</b>
<b>Project Selection Focus</b>	Threat Based: Shared Military Service and CoCom influence	Capability Based: Greater CoCom influence looking at nearer term needs..
<b>Spiral Technologies</b>	No Metric currently established	Spiral Technology available within one year of JCTD initiation.
<b>Final Demonstration Completed (Starting Point: Approved ID)</b>	3 to 4 years after initiation (Implementation Directive (ID) Signed)	50% completed by the end of the 2 <sup>nd</sup> year. All JCTDs completed by the end of the 3 <sup>rd</sup> year.
<b>Shared Funding and Visibility of resources</b>	OSD provides no more than 30% of the budgeted resources. Funding provided from many different program elements.	OSD provide significantly more funding (more than 50% depending on cost of JCTD), especially in the first two years.
<b>Military Utility Assessment (MUA) conducted by an independent activity</b>	MUA traditionally tied to a specific planned exercise for evaluation	JCTDs not necessarily tied to an exercise. Greater flexibility to establish military utility via operational “real-world” demonstration or specifically designed test/venue
<b>Transition of technology</b>	70% of ACTDs transition at least one product to sustainment	80% of JCTDs transition at least 50% of their products to sustainment

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Exhibit R-2a, RDT&E Project Justification						Date: February 2005		
Appropriation/Budget Activity RDT&E, Defense Wide/BA-3			R-1 Item Nomenclature Advanced Concept Technology Demonstration (ACTD): PE 0603750D8Z					
Cost (\$ in Millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
ACTD/P523	212.570	212.915	163.649	163.744	174.549	174.788	179.239	184.216

\* FY 2006-2011: \$40 million shifted to the new Joint Capability Technology Demonstration (JCTD) program outlined below.

**A. Mission Description and Budget Item Justification**

BRIEF DESCRIPTION OF ELEMENT: The Advanced Concept Technology Demonstration (ACTD) program began in 1995 with the purpose of demonstrating new, mature technologies in an operational environment and a goal of getting new technologies into the hands of the warfighter as quickly as possible. A key ingredient to the relevant and rapid insertion of technology is the ability for an ACTD to be initiated faster than the traditional two year DoD Planning, Programming, Budgeting, and Execution (PPBE) process. Each year this President’s Budget submission provides resources for the next slate of ACTDs which are just beginning their selection process. This allows a rapid/accelerated technology insertion process which helps maintain relevancy to the warfighters, compared to a “standard” PPBE process which requires a minimum of two years to initiate new technologies to begin development for a demonstration several years later. The goal is to speed up the acquisition process by operationally demonstrating capabilities, looking for an eighty percent solution so an acquisition decision can be made quicker---a “try before you buy” approach. ACTDs are selected by the Combatant Commanders (CoComs) and the Services. Oversight is provided by the Deputy Under Secretary of Defense for Advanced Systems and Concepts (AS&C). Each year a new slate of ACTDs are forwarded to the Joint Requirements Oversight Council (JROC) for mission need validation and prioritization. Upon JROC validation, congressional notification occurs and the new ACTDs are initiated within a few weeks of selection. This selection and validation process can occur in as little as nine months. Each ACTD is included in the Joint Warfighting Science and Technology Plan (JWSTP) as a Defense Technology Objective (DTO) to help leverage the technology being demonstrated and avoid duplication within the Department

Initiation of the Joint Capability Technology Demonstration (JCTD) program: Beginning in FY 2006, a new ACTD business process will be initiated which will take the successful ACTD program and update it to meet the Department’s transformational goal of becoming capability vice threat based in its focus. The program will be referred to as the Joint Capability Technology Demonstration

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(JCTD) program. The JCTD program will include many of the positive aspects of the ACTD program, but has been revamped to meet the defense challenges of the 21<sup>st</sup> century.

An initial allocation of resources (\$40 million) from the ACTD PE has been shifted into these program elements starting in FY 2006, which explains the reduction in the ACTD FYDP line shown in this budget exhibit. During the transition period additional resources will be shifted into the various JCTD program elements until a fully resourced program is established which will support a minimum of ten new JCTDs each year. It is envisioned that the BA-3 JCTD PE will eventually replace the current ACTD BA-3 PE. However during the transition period the JCTD and ACTD program elements will use combined resources to ensure continuity of ongoing ACTDs and program flexibility for the new JCTDs. During this period the program will sometimes be referred to as the JCTD/ACTD program to show the blended and transitioning nature of the process. To establish resource visibility and accountability and to ensure a fully leveraged program, the Military Services and the Defense Advanced Research Projects Agency (DARPA) will also create new program elements in BA-3 and/or BA-4. These program elements will be established during the transition period and will be specifically titled and associated with the JCTD process.

**B. PROGRAM ACCOMPLISHMENTS AND PLANS – FY 2004 THROUGH FY 2007:**

FY 2004 General Program Accomplishments

The Department of Defense strengthened ties for cooperative ACTD programs with countries closely supporting the United States in Operations ENDURING FREEDOM and IRAQI FREEDOM. Significantly, Australia and the United Kingdom expressed commitment to expanding integration of efforts with programs that closely parallel the ACTD model.

By virtue of the recognized success of the ACTD Program as a catalyst for transformation, DoD ACTD representatives have been invited to participate in a number of senior Defense Integrated Process Teams focusing on transformation. From consideration of acquisition models for joint capabilities to development of plans to transform the military to new levels of integration, the ACTD program office has been tapped to provide lessons learned for transformation of tactics, techniques, procedures and technologies. Experience with ACTDs also increasingly places ACTD Oversight Executives in a pivotal role for technology transition with a continuous portfolio of demonstrating programs feeding improved capabilities to the warfighter in the field.

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The close collaboration between the ACTD program and Combatant Commanders (CoComs) conferred a relevance to ACTD projects confirmed by asymmetric requirements emerging from the Global War on Terrorism (GWOT). In many cases, management teams formed to execute ACTDs were tapped to accelerate fielding of technologies to defeat emergent terrorist threats. These management teams and ACTD-based technologist networks played a leading role in feeding solutions to the Combating Terrorism Technology Task Force (CTTTF) led by Director, Defense Research and Engineering (DDR&E). A DUSD (AS&C) oversight executive for ACTDs was tapped to serve as the CTTTF Chairman reporting to DDR&E. ACTD management teams generating rapid-response technologies and TTPs included many ACTDs: Thermobarics, Counter-Bomb/Counter Bomber (CB/CB), Military Operations in Urban Terrain (MOUT), Joint Blue Force Situational Awareness (JBFSA), Adaptive Joint C4ISR Node (AJCN), Deployable Cargo Screening, Night Vision Cave & Urban Assault, Overwatch, Theater Support Vessel, Tunnel Target Defeat, Urban Recon, Active Denial System, Agent Defeat Warhead, Contamination Avoidance at Seaports of Debarkation, Expendable Unmanned Aerial Vehicle, Joint Explosive Ordnance Disposal, Language and Speech Exploitation Resources, Pathfinder, SPARTAN, Adaptive Battlespace Awareness, Area Cruise Missile Defense, Coalition Theater Logistics, and Joint Area Clearance.

Ten ACTDs were completed in Fiscal Year 2004. The Area Cruise Missile Defense ACTD developed an airspace collaboration and early detection capability called Joint Based Expeditionary Mobile Connectivity Command & Control (JBECC). The JBECC was employed to help protect Washington, DC airspace immediately following the September 2001 terror attacks and remains in this role as part of Operation Noble Eagle, less than one year after it was initiated as an ACTD. Numerous ACTD software products were integrated within operational systems, such as four Joint Theater Logistics software tools to the Global Combat Support System. Some ACTD products remained in theater as part of Kosovo peacekeeping operations. Almost 50 ACTDs participated in Operations Enduring Freedom and Iraqi Freedom, as well as Homeland Security/Homeland Defense operations. Thirteen new ACTDs were validated by the JROC and initiated in FY 2004 (see specific accomplishments below): Advanced Tactical Targeting Technology, Agile Rapid Global Combat Support, Coalition Reception Staging, and Onward Movement, Coalition Shared Intelligence Network Environment, Future Tactical Truck System, Joint Precision Airdrop System, Joint Unmanned System Common Control, Man Portable Threat Warning System, Multi-Sensor Aerospace/Ground Joint ISR Interoperability Coalition, MAGNUM, Protected Landing and Takeoff, Psychological Operations Global Reach and Theater Effects-Based Operations.

The data call for FY 2005 ACTDs began during the 1<sup>st</sup> Quarter of Fiscal Year 2004. Twenty-four ACTD candidates, of the ninety-five received from the Unified Combatant Commands, the Services, Defense agencies and industry, were considered for final

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selection. Candidates cover a broad range of technologies and needs, prominently including the GWOT, network-centric warfare, adaptive combat logistics support, force health information for joint theater commanders, coordination of coalition logistics, production of critical, time-sensitive infrared, MASINT imagery, unmanned aerial vehicles for special operations units, and unattended surveillance of maritime, littoral and harbor areas. These candidates were screened for technical maturity, operational relevance and transition potential by the “Breakfast Club” and prioritized by each of the Combatant Commands and Services. The JROC determined the final validation needs and prioritization, establishing the final list of fifteen FY 2005 new ACTD projects on December 2, 2004. Congressional notification was forwarded a few days later and resources became available in early January to begin funding the FY 2005 ACTDs.

FY 2005, FY 2006 and FY 2007 General Program Plans:

DUSD (AS&C) will continue the process of initiating and transitioning ACTDs. As noted in the introduction, a new business process is envisioned for the ACTD program as DoD shifts from a threat based to a capability based focus. The ACTD program will eventually be replaced by the Joint Capability Technology Demonstration (JCTD) program. The 3-5 year transition period from ACTDs to JCTDs will begin in FY 2006. Emphasis for the FY 2005/2006 JCTD/ACTD program will be placed on serving the unique requirements of joint Combatant Commanders, with coalition and transformational aspects highlighted as “value added” attributes of new and continuing demonstrations. As in FY 2004, a strong commitment to early and aggressive transition management will aim to sustain the capabilities successfully demonstrated in JCTD/ACTDs. Exploration of new coalition partnership agreements and integration of efforts with the Joint Staff JCIDS process will characterize JCTD/ACTD staff support efforts. As noted earlier, the final validation of the FY 2005 ACTD projects has been accomplished by the JROC. The fifteen FY 2005 prioritized and validated ACTDs are described below. Numerous demonstrations will be conducted in FY 2005 for those ACTDs initiated in previous years. Nominations of proposed FY 2006 JCTD/ACTDs were received in December 2004, and will be reviewed in January 2005 by the “Breakfast Club.” Continued staffing and refinement of the FY 2006 proposals will continue through March/April 2005. Many of the FY 2006 projects will be funded in the newly formed JCTD program designed to leverage the JCIDS process and enhance the program’s resource stability, and provide a better opportunity to transition into acquisition programs. Funding will continue in FY 2005 for active ACTDs initiated in Fiscal Years 1997 through 2004 that have not been completed or transitioned to acquisition programs. In FY 2005, congressional added \$5.1 million to ACTDs and joint enabling technologies that hold promise for breakthrough technologies. The congressional adds included: Low Cost Autonomous Attack System (\$1.0 million); Remote Unattended Sensing System (\$1.05 million), and the SecureD Hardware Encryption Device (\$2.0 million). The congressional add for the Maria Tactical Mapping System (\$1.05 million) was appropriately transferred to the Foreign Comparative Test (FCT) program (PE:

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0605130D8Z) to meet the intent of Congress. Funding for the new FY 2005 ACTDs, including potential midyear starts, is approximately \$40 million. (Total ACTD funding in FY 2005: \$212.915 million).

Funding will continue in FY 2006 and FY 2007 for active ACTDs initiated in Fiscal Years 2000 through 2005 that have not been completed or transitioned to acquisition programs. Numerous demonstrations will be conducted for those ACTDs initiated in previous years. Funding available for initiating new FY 2006 JCTD/ACTDs will be approximately \$45 million. These funds are available from the current ACTD program and the newly established program element for JCTDs (0603648D8Z). (Total ACTD funding in FY 2006: \$163.649 million). Funding available for initiating new FY 2007 JCTD/ACTDs will be approximately \$45 million. (Total ACTD funding in FY 2007: \$163.744 million). The Department estimates starting ten new JCTD/ACTDs in both FY 2006 and FY 2007.

ACTD Direct Program Support: The ACTD program contains four budget lines broken-out from the specific ACTDs projects. The direct funding line is used to provide support for the entire ACTD program (versus individual ACTDs). These four budget lines include (1) Unified Combatant Commander; (2) ACTD Pre-Transition Support; (3) Interagency Classified Projects, and (4) Joint enabling technologies that are either directed by the Congress or initiated by DUSD (AS&C).

- 1) Unified Combatant Commander (UCC) Direct Support: The UCC's play an essential role in the selection, validation, demonstration, and transition of ACTDs. Many ACTDs have funding allocated for the UCCs from within their specific program funding lines. Additionally, in previous years DUSD (AS&C) would attempt to provide direct ACTD support from OSD if resources became available. This direct support allows for a timely allocation of resources to the UCCs, based on the number of ACTD projects being sponsored and the intensity of effort required. The Department also envisions that the UCCs will play a greater role in the development, support and coordination of JCTD/ACTDs that are coalition oriented (within their specific AOR). UCC direct program funding is estimated between \$4.0 and \$5.0 million per year.
- 2) ACTD Pre-Transition Support: The ACTD 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 ACTDs to the warfighter, the SECDEF established the goal of increasing the number of ACTDs evolving into formal acquisition programs. In order to enhance this transition effort and to respond to GAO recommendations in earlier years, the ACTD program continues to support a pre-transition line in the ACTD budget submission. Funding for pre-transition initiatives will

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be in the approximately \$3.0 million per year.

3) Interagency Classified Support for ACTDs: ACTDs also support a limited number of classified efforts which are coordinated with other agencies and detailed in separate DoD budget exhibits. Funding for this direct program support is estimated between \$9.0 and \$10.0 million each year.

4) Joint Enabling Technologies: Over the past several years congressional committees have highlighted the potential of mature, joint technologies and provided resources to the ACTD program to investigate the military utility of these technologies. DUSD (AS&C) also becomes aware of promising technologies which may have transformational application to ACTDs. The need for these technologies may not be realized until an ACTD 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 ACTDs. Four enabling technologies are highlighted in this year's budget submission:

Joint Enabling Technology Title	FY 2004	FY 2005	FY 2006	FY 2007
Rosetta STONE	3.00	3.500	0.000	0.000

Rosetta STONE (Single integrated picture Topology-driven Optical Nonlinear Engine—SIP-STONE) is a promising joint enabling technology. The Department will develop this enabling technology capable of integrating multi-source sensor data/track inputs from all available sources, correlating the data and fusing it into a single integrated picture. The technology combines the Rosetta gateway technology from the LINK 16 ACTD (1999) that enables multi-datalink translation and forwarding of data with the STONE optical correlator to provide near real-time fusion, sensor registration and correlation of information sources. The overall objective is to reduce engagement decision time, improve target location estimates, and provide enhanced combat identification (CID) from disparate sensors. USJFCOM is the operational manager of the SIP-STONE enabling technology.

- FY 2004 - Further STONE algorithm development with increased number of sensor information sources. Participate and demonstrate expanded capability in JEFX 2004 at Nellis AFB NV.
- FY 2005 - Operational demonstration of Rosetta STONE full capability at demonstration.

Joint Enabling Technology Title	FY 2004	FY 2005	FY 2006	FY 2007
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Secure Hardware Data Encryption Device (Secured)	2.400	2.000	0.000	0.000
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Since 2003 Congress has provided additional resources for the Secure Hardware Data Encryption Device (Secured) project. The Department will develop an enabling capability to insert encryption methods to protect information at rest by interrupting the data bus to hard disk drive path within the computer, improving operational security in the event of lost or overrun computer assets.

- FY 2004 – Commenced the U.S. process for NIST and DoD Common Criteria certification for a desktop workstation (expected completion early FY 2005). Began miniaturization and transition to laptop computer form factor. Began identification of pilot sites/early implementer venues.
- FY 2005 – Will complete Common Criteria certification and conduct pilot sites evaluation and user familiarization. Transition to commercially available product for incorporation into DoD networks. Present the Secured product to potential DoD and other federal government agencies using reality based operational scenarios.

Joint Enabling Technology Title	FY 2004	FY 2005	FY 2006	FY 2007
Remote Unattended Sensing System (RUSS)	2.100	1.050	0.000	0.000

For the past two years Congress has provided additional resources for the Remote Unattended Sensing System (RUSS). Development, design and technology integration of RUSS into the Bio Ops Plan. RUSS will provide a modular platform for sensing biological warfare activity over long periods of time in a variety of sites, including remote or hostile/denied locations. RUSS will support force and area protection requirements for CoComs and civil authorities. RUSS will accept a wide variety of present and future sensors and communications devices.

- FY 2004 - Support the Pacific Area Bio Ops Project to develop Bio Defense Capabilities through the Chemical Biological Radiological Technology Alliance (CBRTA). Develop urban unattended ground sensors, in conjunction with CBRTA, to support the Night Vision Cave and Urban Assault ACTD.
- FY 2005 - Continue FY 2004 activities. Develop, test, and demonstrate hardware and software in conjunction with scheduled NVCUA ACTD exercises. Integrate results with existing tagging, tracking, and locating (TTL) initiatives.

Joint Enabling Technology Title	FY 2004	FY 2005	FY 2006	FY 2007
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JP-8 Pilot Program	2.000	0.000 (note1)	0.000	0.000
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Note 1: \* \$4.5 million funded in FY 2005 RDT&E , Army Appropriation, page 251, line 14 under Combat Vehicle and Automotive Technology

This project is to investigate the feasibility and merits of a capability to produce in-theatre, from local natural gas, a single synthetic fuel that is usable in ground vehicles, aircraft, and ships. The products of this effort will be test reports and evaluations, feasibility study reports, engineering design studies, and concept of operations. The three key areas of this effort will be: 1) definition of the necessary chemical formulation, optimize the hull design for the barge mounted plant, military usefulness of a modular size plant. Congress provided additional resources in FY 2002 (\$3.5 million) and again in FY 2004 for the syntroleum technology JP-8 Pilot Program in the ACTD program element, however the FY 2005 add was in the Army RDT&E Appropriation.

- FY 2004 - Optimized the hull design for the barge for reduced weight and cost of the hull while increasing storage capability. DoD and DoE labs assessed viability of the draft fuel specifications developed in FY 2003 by completing additional testing using a surrogate synthetic aromatic component and when available, fuel with the synthesized aromatic. Conducted a Military Utility Assessment for modular synthetic fuels plants having a capability of providing fuel, power and water to forward-based forces. Continued development of a formulation for synthetic JP-8 / JP-5, expressed as a draft specification, which ensures the fully synthetic fuel is freely interchangeable with conventional fuel in the legacy fleets.
- FY 2005 - Continue Military Utility Assessment for modular synthetic fuels plants having a capability of providing fuel, power and water to forward-based forces. Continue development of a formulation for synthetic JP-8 / JP-5.

Joint Enabling Technology Title	FY 2004	FY 2005	FY 2006	FY 2007
Platform Testbed for Advanced Sensors (PTAS)	0.000	1.000	3.000	3.000

The JCTD/ACTD program has a critical need for a medium-high altitude airborne platform testbed to support worldwide projects and demonstrations of various technologies ranging from scientific/experimental to operational/intelligence missions. NASA currently operates the sole remaining operational long-wing WB-57 aircraft. These aircraft have been determined useful to support the JCTD/ACTD program as a demonstration platform of new technologies. The JCTD/ACTD program will provide resources to NASA via the USAF using an Interagency Agreement. DUSD (AS&C) will help establish mission requirements & priorities, defining payload configurations, and the demonstration/testing schedule. NASA will provide maintenance support for the aircraft and engineering support for payload integration. The JCTD program estimates 200 flight hours will be required annually beginning in FY 2006. Support also includes use of hangar and office space for experiment planning/data processing.

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- FY 2005 - Program initiation, commence flight hour program for demonstrations and testing.
- FY 2006 - Approximately 200 planned flight hours for technology demonstrations and testing.
- FY 2007 – Approximately 200 planned flight hours for technology demonstrations and testing.

Joint Enabling Technology Title	FY 2004	FY 2005	FY 2006	FY 2007
Persistent Herk	5.400	0.000	0.000	0.000

The Persistent Herk (PH) Program will ensure the development of a timely, energetic, and cost effective means to improve the C-130 aircraft/equipment to meet the worldwide contingency operations of the Special Operations Forces. These funds are accomplishing system design, engineering, integration, manufacture, demonstration planning, and flight test of wing tip mounted fuel tanks on a C-130. The PH program is designed to add increased performance to the current US C-130 fleet. The prime objective of the modification is to help the heavily loaded C-130 aircraft operate more efficiently during the end of the takeoff run and initial climb phases of their flight. It is anticipated that the technology enabling capability may also benefit the Advanced Tactical Laser (ATL) and the Viper Strike ACTDs, both are expected to use the C-130 as a primary platform.

Operations of heavy weight C-130s from airports in hot ambient temperatures and higher altitude environments have resulted in aircraft losses due to current design features. An immediate objective of the PH program is to give the heavily loaded C-130s an increased margin of performance or safety factor through a wing tip tank and resultant aerodynamic modification during the initial phases of flight. These modifications are needed to give the C-130 aircrews a safety margin they currently do not have as they continue to operate in these marginal environments. A added benefit of the modification is an increase in overall flight efficiency.

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**FY 2004 - FY 2007 ACTD Individual Project Accomplishments and Plans (by ACTD year group).** The following list of accomplishments, plans and estimated resources is provided for each ACTD starting in FY 1997. Only active ACTDs are broken-out in the follow sections. Section F of this exhibit provides a resource summary of the all ACTDs beginning with 1997.

<b>FY 1997 ACTDs</b>
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ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Joint Advanced Health and Usage Monitoring System (JAHUMS)	0.800	0.000	0.000	0.000

Provide a means to monitor the health and usage of individual aircraft utilizing onboard sensors and diagnostics. Demonstrate an open architecture so that modules from multiple vendors can be inserted in baseline systems. The user sponsor is the Joint Staff (J4).

- FY 2004 – Joint Advanced Health and Usage Monitoring System (JAHUMS) In-flight Reporting System demonstrated extended, round-the-clock, real-time monitoring of aircraft location, operational states and diagnostic parameters during a cross-country flight from NAS, Patuxent River, MD to NAS, North Island, CA. The JAHUMS Post-Flight Animated Debrief system was implemented at the Navy HSL-41 squadron and the JAHUMS Engine Diagnostic Expert System was implemented at HSL-41. These systems are the first of their kind being demonstrated on DOD helicopters. Conducted system training and operational fielding of JAHUMS technologies to units at the HSL-41 squadron and at the Army 101<sup>st</sup> Airborne Division, Ft. Campbell, Kentucky. JAHUMS Engine Diagnostic Expert System was integrated into thirty UH-60L helicopters as part of the Army Fleet Management demonstration program. The Military User Assessment (MUA) was started and maintenance and operations data for the MUA are being collected and analyzed.
- FY 2005 – Complete the Military User Assessment and conduct extended user evaluations at HSL-41 and at the 101<sup>st</sup> Airborne to refine CONOPS and system software. Support interim capability and conduct necessary modifications, testing and analysis to support transition to the Navy Military Flight Operation Quality Assurance (MFOQA) program, Navy H-60R/S production line with the Integrated Mechanical Diagnostic System (IMDS), and to the Army UH-60M. Complete the final MUA report.
- FY 2006 – Support residual capabilities and transition to the H-60R/S and UH-60M aircraft. Complete the ACTD.

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**FY 2000 ACTDs**

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
CINC 21	1.500	0.400	0.000	0.000

Develop, demonstrate, assess and transition the concept of operations, hardware and software necessary to provide a theater Combatant Commanders with a command and control (C2) environment that addresses improved situational awareness and decision making tools across multiple simultaneous crisis operations and theater engagement activities. The User Sponsor is PACOM.

- FY 2004 - Completed Extended User Evaluation at Pacific Command (PACOM) and Strategic Command (STRATCOM). Installed and supported CINC 21 capability in European Command (EUCOM). Completed computer-based training, CONOPS, and TTPs. Conducted transition preparation. Ensured software refresh and functionality. Transitioning capability to next-generation GCCS(JC2) via the Net-Centric Capability Pilot (NCC-Pilot) to stand up and demo in October 2004. CINC21 capability being incorporated into STRATCOM program called D-Side to support National and Strategic Planning for Global Strike. Completed the ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Coalition Aerial Surveillance and Reconnaissance	2.900	0.600	0.000	0.000

Provide near-real-time, exploited ground surveillance data to multiple echelons of command between critical NATO allies. Develop a concept of operations and tactics, techniques and procedures for coalition employment of ground moving target indicators (GMTI) and synthetic aperture radar capability. U.S. Training and Doctrine Command System Manager / Joint STARS is the operational sponsor.

- FY 2004 – Demonstrated interoperability during an integrated simulation exercise. Assisted in development of Standard NATO Agreement (STANAG) 4607 for GMTI interoperability. Continued transition of CAESAR products to the participating nations, NATO and SHAPE. Products include tools (e.g. trackers and coalition test bed); Operational Concepts for interoperability (TTPs, measures of effectiveness (MOEs), measures of performance (MOPs)); and architecture and design (interfaces, interface control diagrams (ICDs) and Standard NATO Agreements (STANAGs)). Forwarded CAESAR products to Joint Forces Command (USJFCOM) for combatant commander distribution, and to Multi-sensor Aerospace/ground Joint Intelligence, Surveillance and Reconnaissance (ISR) Interoperability Coalition (MAJIIC) ACTD operations manager.

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- FY 2005 - Conduct final integrated simulation exercise and utility assessment at the NATO Communications, Command and Control Agency, to test implementation of STANAG 4607 by the seven CAESAR participating nations (Canada, France, Germany, Italy, Norway, the United Kingdom, and the United States). Publish final military utility assessment report. Transition products to NATO STANAGs and U.S. concepts of operation, and tactics, techniques, and procedures, as overseen by the Air Force Command and Control, Intelligence, Surveillance, and Reconnaissance Center. Conclude interim capability support phase to complete the ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Communication/Navigation Outage Forecasting System (C/NOFS)	1.000	0.000	0.000	0.000

Predict the satellite space environment and alert control operators to place satellites in protective mode when disturbed, ionospheric conditions are likely. A prototype operational demonstration of forecasting capability is planned during the first years of space operations, with planned transition in Fiscal Year 2006 to the DoD Space Test program of record and Air Force Research Laboratories. Air Force Space Command is the operational sponsor. The C/NOFS technology has been deployed to six operational sites.

- FY 2004 – Continued conducting payload test, spacecraft integration and launch vehicle integration. Continued Scintillation Network Decision Aid (SCINDA) assessments and user evaluation. Conducted a limited military utility assessment and demonstration of the data center at Hanscom AFB, MA.
- FY 2005 - Launch spacecraft aboard a Pegasus XL rocket from Ronald Reagan Ballistic Missile Defense Test Site, Kwajalein Atoll, Republic of the Marshall Islands, into a low-inclination, equatorial orbit. Conduct on-orbit checkout, enter survey and forecasting modes with limited operational use. Continue survey and forecasting modes. Perform extended user evaluation.
- FY 2006 – Continue extended user evaluation and prototype operational demonstration of forecasting capability. Conclude interim capability support phase to complete the ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Computerized Operational MASINT Weather (ComWX)	0.000	0.000	0.000	0.000

Provide near real-time environmental intelligence products for high-value targeting support, using existing national assets with a foundation to exploit future systems. The user sponsor is U.S. Central Command.

- FY 2004 – Completed state-of-the-art dissemination architecture for rapid dissemination of environmental intelligence data to theater. COMWX capabilities folding into future sensor. CENTCOM requested a two-year extension of effort due to new

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capabilities surfaced under support to OEF and OIF. Extension granted due to new operational needs and strong implications for support to Homeland Defense. Otherwise, utilize the demonstration for the Final MUA Report. Building module to DODIIS Certified Workbench under other Congressional funds as spin-off from COMWX to ensure leave-behind processing capability.

- FY 2005 – Continue support to OEF and OIF, as well as the Global War on Terror, as tasked. Improve product lines for Environmental Intelligence Production. Fold environmental capabilities developed into other capability production lines to help in data reduction improvements. Adapt algorithms into future sensor capabilities and fold into DODISS certified workbench. Engage with intelligence and weather communities to ensure future sensor requirements learned from COMWX are included in the requirements architecture.
- FY 2006 – Complete final MUA report. End the ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Content-Based Information Security (CBIS)	0.000	0.000	0.000	0.000

Demonstrate a multi-level security solution that can support joint, coalition, and interagency operations. The user sponsor is U.S. Joint Forces Command.

- FY 2004 – Completed contracted activity for module specification development needed for incremental delivery of certified Type 1 multi-security enclave encryption device for joint, interagency and coalition application. Delivered first prototype to Joint Forces Command for CONOPS development and preliminary operator feedback. Began planning military utility assessment in conjunction with US Northern Command for FY05. Negotiated transition activity into programs of record with primary multi-level security solutions need.
- FY 2005 – Continue preparation for User Assessment in 2005 currently scheduled for December 2005. Complete contract activity to produce a prototype certifiable high assurance multi-level security device for delivery to Navy for production/implementation on DoD and Coalition networks. Complete the final military utility demonstration and the ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Global Monitoring of ISR Space Systems (GMSIS)	0.200	0.000	0.000	0.000

Demonstrate the value of providing near-real-time information on potential threats to theater operations posed by commercial space systems. The user sponsor is U.S. Strategic Command.

- FY 2004 - Completed the final demonstration of the military utility of the system and continued support of real world operations.

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Transitioned to sustainment by US Strategic Command and the Defense Intelligence Agency. Completed the ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Joint Intelligence, Surveillance and Reconnaissance (JISR)	0.000	0.000	0.000	0.000

Provide the Joint Force and Early Entry Force commanders the ability to integrate tactical reconnaissance and tactical operational sensors to improve situational awareness. The user sponsor is U.S. Central Command.

- FY 2004 – Fielded JISR to US V Corps for OIF I. Supported JISR deployment as V Corps transitioned to become JTF-7 and was relieved by US III Corps. Completed final assessment of military utility, operational effectiveness, suitability, and interoperability. Transition Memoranda of Agreement executed with program executive officers (PEOs) with responsibilities for programs of record.
- FY 2005 – Deliver JISR prototype capabilities to CENTCOM CENTRIXS coalition networks. Complete JISR product sustainment support to respective Service and joint and US-led coalition C4ISR users/Warfighters. Complete the ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Restoration of Operations (RestOps)	1.700	0.000	0.000	0.000

Demonstrate the tools required to prepare for and immediately react to the consequences of a chemical or biological (CB) weapon attack against a combatant commander-identified, forward-deployed airfield or logistics facility, with minimum disruption to and degradation of throughput. Integrate concepts of operation (CONOPS) and Combatant Commander planning tools to identify the improvements needed in current policy for restoration of operations. U.S. Pacific Command is the operational sponsor.

- FY 2004 – Published final report. Transitioned technology and lessons learned via the Joint Requirements Office for Chemical, Biological, Radiological and Nuclear Defense. Conducted residual training and support. Transitioned RestOps Information Management System (ROIMS) to the Theater Battle Management Core Systems Unit Level (TBMCS-UL) in more than 40 locations worldwide. Provided changes in non-materiel tactics, techniques and procedures for five major CB operational areas. Influenced US Air Force CB warfare CONOPS development.
- FY 2005 - Conclude interim capability support phase to complete the ACTD.

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**FY 2001 ACTDs**

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Active Network Intrusion Defense (ANID)	1.700	1.200	0.000	0.000

Improve DoD's ability to protect, monitor, analyze, detect, and respond to unauthorized activity within DoD information systems and computer networks. ANID will improve response time and provide autonomic response capabilities to network intrusions, as well as improving collaboration between agencies to demonstrate a capability for responding in real-time to network intrusions by making changes to network devices like routers, firewalls, intrusion sensors, etc. The user sponsor is U.S. Strategic Command.

- FY 2004 - Concluded the development of ANID and began transition efforts. Deployed ANID prototype to JFCOM, STRATCOM, ARSTRAT, and JIOC. Continued CONOPS, Tactics, Techniques and Procedures development and documentation.
- FY 2005 - Complete implementation at CoCom demonstration sites, Naval Postgraduate School, and Joint Warrior Interoperability Demonstration (JWID) sites for final MUA, Extended User Evaluation and transition to DISA NETOPS and Computer Emergency Response Teams (CERTs). Complete the ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Adaptive Battlespace Awareness (ABA)	1.700	1.100	0.000	0.000

Demonstrate the potential of the Global Command and Control System (GCCS) Common Operating Picture (COP) to provide relevant information to support Combatant Commanders. ABA enhancements to the COP are configuring information and COP views to meet specific, time-sensitive mission requirements. The user sponsor is U.S. European Command.

- FY 2004 - Integrated spiral releases of ABA systems into Common Operating Environment, GCCS-I3 versions as user evaluations of residuals are evaluated with training plans and concept of operations. Assessed the final spiral 6 performance at all demonstration sites in EUCOM. Began implementation of transition plan. Reviewed ABA adoption by other combatant commanders, with priority on CENTCOM demonstration and assessment. Completed the final demonstration and preparation of the military utility assessment report. ABA capabilities were employed in support of the Olympics, Homeland Defense COP and OIF (Operation Iraqi Freedom).

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- FY 2005 – Demonstration and assessment of an additional logistics-based common operational picture spiral for EUCOM and CENTCOM, as well as incorporating extended user evaluations of residuals. Additional spiral will provide COP display of logistics in-transit visibility in support of OIF. Finalize concept of operations. Execute plan for transitioning ABA into GCCS-I3. Complete the ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Advanced Tactical Laser (ATL)	5.600	3.600	1.200	0.000

Integrate a moderate power laser, uncoiled optics, and existing fire-control systems onboard a C-130 aircraft. The user sponsor is U.S. Special Operations Command.

- FY 2004 - Completed the design and began the build-up of the ATL ACTD system. Accomplished the subsystem and system Critical Design Reviews (CDRs) and the final reviews of the system component designs before assembly and check out. Procured long-lead components and began acquisition and delivery of ATL ACTD system hardware and software. Began the Military Utility Assessment (MUA) using ATL simulations and component hardware testing in conjunction with planned military exercises. Began modification of the integration and test facilities at Kirtland AFB, NM
- FY 2005 – Began testing the ATL ACTD subsystems and continue the MUA. Begin component integration (i.e. optics module, laser generation module), component testing, and subsystem integration and testing. Complete modification of the ATL ACTD host aircraft. Complete ground test of the surveillance and beam control systems and begin integrating them onto the C-130 aircraft. Begin ground assembly, integration and test of the high-power flight test laser module. Complete modifications of the integration and test facilities.
- FY 2006- Begin flight test of the ATL ACTD system and continue the MUA. Complete build-up, integration and ground test of the high-power flight test laser module and integrate the entire ATL ACTD system on the C-130 host aircraft. Complete ground verification tests of the entire integrated ATL system. Commence integrated system flight testing.
- FY 2007 - Complete MUA and commence interim capability support.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Advanced Technology Ordnance Surveillance (ATOS)	0.700	0.700	0.000	0.000

Demonstrate a system that will provide ordnance managers (and therefore the warfighter) near real-time total asset visibility (i.e. war reserve storage, battlefield distribution, and the environmental piece of in-transit) of their ordnance stockpile while also providing data

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for predictions of future condition and performance. The user sponsor is U.S. European Command.

- FY 2004 - Conducted full system field demonstration at NAVSEA Indian Head. Completed Military Utility Assessments (MUAs) at retail (Army Depot Miesau, Germany), wholesale (Army Depot, Crane, Indiana) and shipboard (U.S.S. Ponce and U.S.S. Truman) sites. Commenced communication with Ammunition Inventory System (AIS) Managers from each Service to begin discussions on ATOS integration into their systems. Completed transition plan. Incorporated design improvements when identified during MUA and as MUA schedule permitted. Revitalized Transition IPT to ensure the main requirements from each service are addressed in final product for transition.
- FY 2005 – Integrate ATOS into service AISs. Implement recommended changes from MUA. Continue installation planning. Install ATOS system at select sites as determined by resource sponsor. Complete the ATOS ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Coalition Combat Identification (CCID)	5.700	3.000	1.800	0.000

Demonstrates and transitions CID solutions that significantly reduce fratricide and enhance combat effectiveness of allied and coalition forces operating in both traditional and ad-hoc coalitions. Joint Forces Command (JFCOM), in conjunction with Allied Transformation Command, is working with the coalition partners to conduct the final ACTD demonstration in the United Kingdom, September 2005. JFCOM is the User Sponsor.

- FY 2004 - Completed Radio Based Combat Identification (RBCI) improvements and technically tested ground based RBCI to insure specification compliance, deployability and interoperability with fielded systems. Operationally demonstrated RBCI. Completed feasibility study of integrating RBCI into UK BOWMAN radio VHF voice mode. Continued Battlefield Target Identification Device(BTID) technical interoperability testing with UK, and France. Conducted operational demonstration of the BTID during CJFTEX-04 exercise. Completed a study in support of Fixed Wing Close Air Support (CAS) friendly forces identification issues resulting in selection of Radio Frequency (RF) Tags for future technical and operational demonstration.
- FY 2005 – Technically test the RBCI Air SINCGARS (ASIP) Improved Radio and Digital Knee-Board interface integrated on to an Apache Aircraft and RBCI ASIP on to UAV. Technically demonstrate RBCI interface with Fixed Wing CAS aircraft. Technically test different analogue and digital RF Tags in preparation for 2005 Operational Demonstration. Continue development of CONOPS, TTPs and training package. Conduct the final ACTD operational demonstration and Joint Military Utility Assessment of the NATO BTID, RBCI, RF Tags and Dismounted Soldier Identification Device (DSID). Continue implementation of transition strategy through initiation of Extended User Evaluation and delivery of products to programs of

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record pending successful JMUA.

- FY2006 – Continue execution of the transition plan including Extended User Evaluation. Finalize CONOPs, TTPs and training package. Complete CCID ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Coalition Theater Logistics (CTL)	2.200	0.000	0.000	0.000

Integrate logistics information and combat support tools among coalition forces. The user sponsor is U.S. Pacific Command.

- FY 2004 – Integrated capabilities to support combatant commands within the architecture framework. Completed all technical testing and integration. Conducted a successful final demonstration and Military Utility Assessment during Multi-National Experiment 03 and COBRA GOLD 04. Drafted transition plan. Began transition and plan to field residual capabilities and to migrate logistics tools to CENTRIXS Network.
- FY 2005 – Complete migration of logistics tool sets to CENTRIXS Network and conduct operational testing with Australian Defense Force, USPACOM, and USTRANSCOM.
- FY 2006 – Complete transition of CTL applications on CENTRIXS Network and complete the ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Hunter Standoff Killer Team (HSKT)	6.200	4.200	1.400	0.000

Integrate and demonstrate joint precision targeting of time sensitive targets at standoff ranges and reduced sensor-to-shooter timelines using manned/unmanned aircraft teams and cognitive decision-aiding technologies, and transition into Programs of Record (POR). The User Sponsor of HSKT ACTD is PACOM. The ACTD’s top level metrics include increased identification range for manned rotorcraft systems and standoff range for weapons engagement, reductions in mission planning, mission execution times and battle damage assessment timelines, and increased lethality and survivability.

- FY 2004 - Completed software builds for Mobile Commander's Associate (MCA) and Warfighter Associate (WA), providing capability for AH-64 Longbow Apache helicopter and Army Airborne Command and Control System (A2C2S) Blackhawk helicopter to control UAV with Multi-mission Optronic Stabilized Payloads (MOSP) 280 sensor. Continued development of CONOPs, TTPs and training package. Completed TCDL / MOSP 280 sensor ground and flight testing. Completed Army / Navy LINK-16 simulated message transfer. Completed integration of Hunter UAV precision targeting 3S MOSP sensor with laser

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designation capability. Completed integration of A2C2S MCA with LINK-16 and TCDL. Conducted coordination for operational exercises and demonstrations scheduled to begin during 4Q, FY 2005.

- FY 2005 – Complete final software builds for MCA and WA, providing capability for AH-64 A2C2S helicopters to control UAV with 3 sensor MOSP. Complete ground and flight testing of Hunter UAV with TCDL and 3 Sensor MOSP. Complete all hardware in the loop integration, ground and flight tests of the MCA A2C2S and WA Longbow Apache systems. Complete A2C2S Link-16 / F/A-18 OFP communications demonstration. Complete system flight demonstration and evaluations involving UAV, AH-64D WA, A2C2S MCA and F/A-18, and install hardware and software into production AH-64D Longbow Apache aircraft for use during operational demonstrations and Extended User Evaluation (EUE). Complete manned / unmanned teaming simulation and warfighter training and conduct operational demos. Continue development of CONOPs / TTPs, training package and execute Transition Plan.
- FY 2006 – Complete EUE of residual package. Complete Operational Demonstrations and Joint Military Utility Assessment (JMUA). Continue coordination with joint and service organizations to refine / complete the Transformation Change Package focusing on DOTMLP-f recommendations. Finalize CONOPS / TTPs and Training package. Complete HSKT ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Joint Area Clearance (JAC)	1.100	0.000	0.000	0.000

Demonstrate de-mining and explosive ordnance disposal equipment for area clearance of airfields, fuel/ammunition distribution points, main supply routes and other rear-area activities. The user sponsor is U.S. Joint Forces Command.

- FY 2004 - Concluded the MUA demonstration process with MUA III at Camp Lejeune, North Carolina. US Joint Forces Command (USJFCOM) prepared the final Military Utility Assessment (MUA) report. Matured efforts to deploy the Change Detection technology to real world operations in support of route clearance missions. Three initial Change Detection systems have been fabricated for the Marine Corps for use with their UH-1N helicopter to help find indicators of road-side threats and landmines buried on a route. Two additional systems were fabricated and all five are integrated with the USMC F-18D Advance Tactical Air Reconnaissance Systems (ATARS) and will remain with the Marine Corps as residuals for possible deployment. Other transition efforts: completed new draft doctrine updates for area and route clearance missions; staffed new requirements for new JAC ACTD area and route clearance capabilities through TRADOC; Air Force and USMC EOD acquisition of the Telepresent Rapid Aiming Platform (TRAP) and development of draft Doctrine and TTP. Transitioned JAC ACTD Change

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Detection Work Station technology into a new Science and Technology Objective (STO).

- FY 2005 - Provide residual transition support and complete the JAC ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Loitering Electronic Warfare Killer (LEWK)	0.100	0.000	0.000	0.000

Planned to demonstrate a low-cost unmanned combat aerial vehicle weighing 60 pounds and capable of carrying a combined 200 pound lethal and non-lethal payload, with eight hours of endurance. USEUCOM is the operational sponsor.

- FY 2004 – Due to issues of technological maturity, this project was placed on hold in mid-2003 pending an Oversight Review Group (ORG) meeting. Accepting the CoComs assessment, the ORG recommended the ACTD be terminated and the technology returned to the technical base for further development. Minimum close-out costs were incurred as this ACTD was terminated in early FY 2004.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Network-Centric Collaborative Targeting (NCCT)	5.600	1.800	0.600	0.000

Network operational intelligence, surveillance, and reconnaissance sensors to significantly improve the capability to detect, identify, and geo-locate time-critical targets. The user sponsor is U.S. Central Command.

- FY 2004 – Successfully completed Interim Military Utility Assessment (IMUA) at JEFX04 resulting in favorable transition recommendation from USCENTCOM. Began work to identify interim network communications equipment for transition.
- FY 2005 – Resolve action items from the IMUA. Live-Fly Demonstration to include US Navy participation and UK NIMROD aircraft using interim (transition) network communications system. Update Interim MUA to final. Provide initial support to USAF for capability transition.
- FY 2006 - Conclude interim capability support phase and complete the ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Personnel Recovery Extraction Survivability Aided by Smart Sensors (PRESS)	6.200	0.000	0.000	0.000

Demonstrate and transition near real-time, automated, precision evader location and tracking systems, enhanced survivability and situational awareness technologies. Develop Concept of Operations (CONOPs) and Joint Tactics, Techniques and Procedures (JTTPs). Joint Forces Command JFCOM is the User Sponsor.

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- FY 2004 – Fielded multiple Global Personnel Recovery System (GPRS) devices with the 301st Rescue Squadron to support Operation Iraqi Freedom which reduced rescue response time by 90 minutes. Continued miniature GPRS design, fabrication and testing. Developed prototype space relay capability and tested in high-altitude / tactical applications. Conducted technical and operational demonstrations and Interim Joint Military Utility Assessment of integrated PRESS systems, including survivability, C4ISR, and survivor / evader technologies. Continued development of CONOPs, JTTPs and training package. Continued transition planning activities for follow-on acquisition of PRESS technologies.
- FY 2005 – Continue evaluation of PRESS technologies during Extended User Evaluation. Integrate and assess prototype space relay capability into high-altitude/tactical applications. Continue transition activities and initiate acquisition of PRESS ACTD technologies for follow-on development, procurement and fielding pending successful JMUA. Finalize CONOPs, TTPs, training package and Doctrine, Organization, Training, Materiel, Leadership, Personnel and Facilities (DOTMLPF) recommendations.
- FY 2006 – Complete EUE of PRESS ACTD technologies and transition to Program of Record. Complete the PRESS ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Tactical Missile System - Penetrator (TACMS-P)	0.600	0.000	0.000	0.000

Demonstrate integration of the Army Tactical Missile System booster with a Navy reentry vehicle to provide a high-availability, all-weather, survivable, and short-response-time means to destroy hard and deeply buried targets. The user sponsor is U.S. Pacific Command.

- FY 2004 – Successfully completed first flight test. Second flight test completed Nov 2004. Third flight and residual deployment delayed until FY 2005.
- FY 2005 - Complete and evaluate flight testing and the final demonstration. Deploy residual weapons. Continue evaluation for consideration of a transition to programs of record. Complete the ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Theater Integrated Planning Subsystem (TIPS)	0.700	0.300	0.300	0.000

Automate and network the current manual processes to produce decision documents to assist in weapons of mass destruction targeting for the theater Combatant Commanders. The user sponsor is U.S. Strategic Command.

- FY 2004 - Migrated nuclear and conventional planning tools to the Theater Planning Response Cells (TPRC) to support a deployable configuration. Initiated crisis action and immediate planning capability. Refined communications links to combat theatres. Conducted MUA demonstrations (including final demonstration) and exercises.

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- FY 2005 – Complete final report. Commence interim capability support and extended user evaluation phase
- FY 2006 - Complete interim capability support phase. Complete the ACTD.

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**FY 2002 ACTDs**

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Active Denial System (ADS)	8.600	3.600	3.600	0.000

Demonstrates a breakthrough, non-lethal technology that uses millimeter wave electronic energy to stop, deter, and turn back an advancing adversary from a relatively long range. The user sponsor is U.S. Joint Forces Command.

- FY 2004 - Concept of operations and assessment plan finalized. Human effects testing continuing. System integration and field technical testing completed.
- FY 2005 – Complete human effects testing. Complete military utility assessment (MUA). Optimization of system/operator interfaces, tactics, techniques and procedures accomplished. Residual delivered to transition manager for extended user evaluation.
- FY 2006 - Conclude interim capability support phase. Complete extended user evaluation and assessment. Complete the ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Agent Defeat Warhead (ADW)	0.800	4.200	0.000	0.000

Demonstrate a high temperature, thermal radiation, incendiary, kinetic energy penetrator warhead to destroy biological and chemical manufacturing and storage facilities. Provide a robust means to neutralize chemical/biological agents while minimizing collateral damage. Efforts are on-going to secure DTRA and service support to develop a robust agent defeat capability for DoD. Lack of counter-WMD mission assignment to a force provider is impeding progress and collaboration on this ACTD. Secured assistance of ATSN/CBRNE in achieving this important capability. The user sponsor is U.S. Central Command.

- FY 2004 – Completed the initial lethality kill rate experiments in order to determine the increase of kill/neutralization of CHEM/BIO agents provided by a unique ACTD fill.
- FY 2005 – Conduct and complete full scale lethality testing with the Defense Threat Reduction Agency (DTRA) and the Air Force Operational Test & Evaluation Center (AFOTEC). Results to be briefed at summer 2005 Oversight Review Group to decide way ahead for the ACTD and pursue full partnership with DTRA and the military services to develop a weaponized agent defeat capability.
- FY 2006 – Develop prototype weapons for operational assessment and demonstration. Conduct flight testing against biological .

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and chemical targets with stimulant agent. Complete fabrication of the residual round and commence interim capability support phase. Conduct demonstrations. Complete the ACTD and transition to SD&D phase by a force provider assigned the mission of supplying this capability to the warfighting combatant commands.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Agile Transportation (AT21)	7.000	1.000	0.000	0.000

Demonstrate capability to optimize and schedule all transportation requirements (personnel and equipment) against available lift assets for movement to, from, and within the various theaters of operation; afford continuous visibility into asset management processes; flexibility to address changing and partially defined requirements. Improves quality of service for Joint force and component customers and enables US Transportation Command (USTRANSCOM) to efficiently and effectively manage the assets, infrastructure and resources to support the warfighting commander in a parallel and continuous battlespace. The user sponsor is U.S. Transportation Command.

- FY 2004 – Successfully conducted operator test in USTRANSCOM’s Deployment Distribution Operations Center (DDOC) of strategic-level mode determination, business process workflow, shared visualization, and scheduling capabilities using live TPFDD OEF/OIF data for the USCENTCOM Area of Responsibility. Demonstrated shared visualization environment and scheduling/optimization tools as interoperable capability. Demonstrated metrics reporting in support of strategic-level planning and scheduling. DUSD (AS&C) provided additional resources to accelerate and enhance the ACTD due to CoCom requests and potential for greater efficiency in OIF/OEF rotations.
- FY 2005 – Conduct final demonstration and Military Utility Assessment (MUA). MUA participants included USTRANSCOM, U.S. Central Command (USCENTCOM) in Tampa, and USCENTCOM DDOC (CDDOC) in Kuwait. Install and field a residual capability and transition to program of record. Update Transition Plan.
- FY 2006 – Provide interim capability and residual transition support. Potential to complete the ACTD in FY 2006 due to acceleration decision in FY 2004.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Boundary Step (BS)	0.600	0.600	0.000	0.000

Demonstrate tools and techniques for destruction of certain weapons of mass destruction production facilities. The user sponsor is U.S. Special Operations Command.

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ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Contamination Avoidance at Seaports of Debarkation (CASPOD)	3.400	1.200	1.200	0.000

Demonstrate contamination avoidance at seaports of debarkation. The user sponsor is U.S. Central Command.

- FY 2004 – Conducted Information Technology/Detector limited utility assessment (LUA) at Dugway Proving Grounds, Utah. Developed SPOD CONOPs. Down-selected technology for the Final Demonstration scheduled.
- FY 2005 - Transition technology and lessons learned. Conduct residual training and support.
- FY 2006 – Conclude the interim capability support phase.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Coalition Information Assurance Common Operational Picture (CIA COP)	3.600	3.700	1.800	1.200

Demonstrate detailed information assurance and situational awareness picture of the information system security status of all mission critical systems on a near- or real-time basis in support of Combatant Command and coalition missions. Permits the commander and staff to rapidly assess mission related impacts caused by Information Technology (IT) infrastructure degradation or attack.

- FY 2004 - Developed prototype for Mission Definition, Coalition IT Performance Monitoring, and Incident Management. Demonstrated system with Coalition stakeholders during Joint Warrior Interoperability Demonstration (JWID) 04. Implemented preliminary Threat and Vulnerability portions of IT Risk Monitoring; multi-layered geographical display of units, connectivity, attacks, performance, and impacts; Implement initial coalition collaboration capabilities. Began assessment of commercially available tools for possible technology insertion in lieu of further technology development.
- FY 2005 – Terminate technology development and pursue requirements satisfaction through commercial tools. Refine Coalition IT Performance Monitoring requirements, IT Risk Monitoring, Geographical Display and Coalition Collaboration. Refine CONOPS and TTPs. Plan and support the Military Utility Assessment preparations.
- FY 2006 – Conduct final Military Utility Assessment. Execute Transition Plan to DISA NETOPS, or emerging multinational Information Sharing initiative. Complete the ACTD.

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ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Expendable Unmanned Aerial Vehicle (XUAV)	0.900	0.500	0.000	0.000

Demonstrate covert delivery of off-board sensors, tactical surveillance, battle damage assessments and weapons of mass destruction monitoring without risking personnel. The user sponsor is U.S. Special Operations Command.

- FY 2004 – Continued work on parasail (ALERT) and completed the Military Utility Assessment (MUA). Delivered residual MAKO and TERN UAV systems. Began transition and interim capability support phase. MAKO UAVs developed on this project deployed in support of Operation Iraqi Freedom.
- FY 2005 – Resolve MUA after-action items to assist in rapid transition to operations. Complete the ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Homeland Security Command and Control (HLS C2)	6.100	3.600	2.400	0.000

Refine and transition technologies and operational concepts that support the Homeland Security and Homeland Defense missions assigned to the Department of Defense. The user sponsor is U.S. Northern Command.

- FY 2004 - Continued development of Homeland Security On Line Services (HOLS) tools, Area Security Operations Command and Control (ASOCC) functionality and expansion of capability to both DoD and civil organizations. Conducted Military Utility Assessment (MUA) in conjunction with Joint Warrior Interoperability Demonstration (JWID) 2004. Employed HOLs and ASOCC for coordination of military security forces under the command of US Northern Command Joint Task Force National Capital Region in the funeral of President Ronald Reagan, dedication of the World War II Memorial., presidential election nomination conventions and G-8 Summit.
- FY 2005 - Continue development of concept of operations in conjunction with US Northern Command in order to optimize currently fielded HOLs and ASOCC capabilities. Expand functionality to participating civil agencies and municipalities including the Department of Homeland Security, US Marshal Service, and Bureau of Alcohol, Tobacco and Firearms. Demonstrate utility and develop concepts of operations to employ current capabilities in conjunction with first responder command and control tools to protect military related critical infrastructure facilities within the continental United States.
- FY2006 – Continue initial operations support to NORTHCOM, PACOM, other COCOMS and selected non-DoD users. Update CONOPS and training based on user feedback, Develop and implement detailed transition plans to programs of record including Net-Centric Enterprise Services, GCCS, and JC2 for AT/FP activities not covered by these programs, work with JROC process to establish requirements and out-year resources.

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- FY 2007 – Complete transition activities, conclude interim capability support phase and end the ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Hyperspectral Collection and Analysis (HYCAS)	1.600	0.200	0.400	0.000

Demonstrates the utility of a deployable hyperspectral system allowing the end user to utilize intelligence derived from spectral data in a tactical environment while providing the Warfighter with an end-to-end hyperspectral capability. Demonstrates the ability of hyperspectral (HSI) to address critical needs via a calibrated HSI sensor. The user sponsor is U.S. Central Command.

- FY 2004 - Successfully supported the deployment of the Army-COMPASS hyperspectral sensor supporting OIF. Enhanced processing and exploitation algorithms. Began integration of the AF-COMPASS sensor onboard the MQ-1 Predator.
- FY 2005 – Complete integration of the AF-COMPASS sensor onboard MQ-1 Predator. Integrate processing, exploitation and dissemination system in Predator Ground Control Station. Perform the final Joint Military Utility Assessment with AF-COMPASS integrated onto Predator, utilizing a high-altitude hyperspectral sensor on a Proteus aircraft (SPIRITT ATD). Transition tactical hyperspectral sensor system to Aeronautical Systems Center.
- FY 2006 – Continue transition of tactical hyperspectral sensor system to Aeronautical Systems Center. Complete the ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Joint Distance Support and Response (JDSR)	3.600	2.800	2.400	0.000

Demonstrates and transitions joint, common, interoperable, tele-maintenance environment using a collaborative knowledge center and tool suite, with reach-back capability. JDSR ACTD focuses on timely employment of information, both automated and live, to the different service maintainers. Some of the top level metrics include common collaborative environment, access to multiple subject matter experts, technical information at point of maintenance, interoperable tool suites and auto report generation. Planned transition will be to Distance Support (DS), Joint Aviation Technical Data Integration (JATDI), Integrated Maintenance Data System (IMDS), Third Echelon Test Set (TETS) and Technical Data Distribution (TEDD) programs. The User Sponsor is JFCOM.

- FY 2004 – Completed technical demonstration with low bandwidth collaboration, SME distance training, large file update, help desk support and advanced search capability. Performed operational demonstrations with Marine Corps, Navy, Army and Air Force. Partially deployed JDSR ACTD system tools with the Army Fire Finder Program, Operation Iraqi Freedom (OIF). Supported Army Stryker Program and the Marine Corps I MEF at OIF with JDSR ACTD lessons learned. Conducted

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interoperability excursion demonstration between JDSR ACTD and Joint Explosive Ordnance Disposal (JEOD) ACTD. Conducted excursion cross-service demonstration. Initiated Extended User Evaluation of residual packages. Continued development of CONOPs / TTPs, training package and DOTMLPF recommendations. Continued efforts in support of Transition Plan.

- FY 2005 – Continue implementation of the transition strategy including conduct of EUE of residual package and follow-on development, acquisition and fielding. Complete the integration of JDSR ACTD with JEOD ACTD. Continue EUE of residual packages including JDSR / JEOD ACTDs interoperability. Continue development of CONOPs, TTPs, training package and DOTML-PF recommendations. Upgrade common business process with modeling and simulation as needed for establishing joint common maintenance processes based on preliminary EUE results. Continue transition of JDSR products to Program of Records. Initiate fielding of JDSR products.
- FY 2006 – Complete EUE. Finalize CONOPs, TTPs, training package and DOTML-PF recommendations. Continue transition of JDSR products to the POR. Complete JDSR ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Joint Explosive Ordnance Disposal (JEOD)	7.100	0.600	0.600	0.000

Demonstrate a new integrated capability for joint and coalition explosive ordnance disposal forces to meet the evolving, asymmetrical, and sophisticated chemical, biological, radiological, nuclear, and high yield explosive terrorist threats. The user sponsor is U.S. Pacific Command. Metrics include existence of new CONOPS; degree to which in-theater operatives can achieve operational reach-back connectivity to a JEOD MSC ; extent to which connectivity can be achieved to Subject Matter Experts (SME) and web sites; and operational feasibility of CONOPS, TTP, and integrated equipment.

- FY 2004 - Completed Technical Support Center development and transition to Navy support. Continued development of Decision Support System. Completed Technical Evaluation. Conducted operational demonstration and limited military utility assessment for transition of initial operational capability. ACTD used in OIF during operational demonstration and collection data. Completed transition plan integration into Capabilities Development Document for formal acquisition decision.
- FY 2005 – Configure Decision Support System capabilities to operationally and technically integrate JEODNET into the Horizontal Fusion portfolio of systems and users. Conduct final ACTD Operational Demonstration and Military Utility Assessment. Complete Capabilities Production Document to reach LRIP. Final MUA scheduled. Field initial operational capability.
- FY 2006 - Commence interim capability support phase. Transition tools into EOD basic training. Complete final ACTD reports.

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- FY 2007 - Complete interim capability support phase and complete the ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Language and Speech Exploitation Resources (LASER)	2.000	0.000	0.000	0.000

Demonstrate technologies, concepts, and architecture paths providing language translation capabilities with improved interoperability, accuracy, deployability and timeliness of translation for speech and document exploitation. Assessments include users within the sponsoring Pacific Command, as well as warfighters in other combatant commands and INSCOM with immediate and critical language translation needs in the Global War On Terrorism. Products from LASER have been deployed for operational use in OIF. The user sponsor is U.S. Pacific Command.

- FY 2004 – Developed interim assessment of military utility for technologies and concept of operations assigned to each Integrated Process Team. Planned and conducted demonstrations in USPACOM’s area of responsibility and in other areas of operations. Provided interim language translation tools for assessment in current military operations in Iraq for speech and text communication with Iraqi civil and governmental personnel, as well as interrogation of terrorist forces and exploitation of intercepted documents. Document exploitation tools have already proven useful for intelligence operations involving enemy combatants and hidden weapons caches. Developed transition plan for LASER products found to have utility for military coalition and intelligence users. Facilitated establishment of a machine language translation program and centralized management office.
- FY 2005 - Conduct demonstrations and military utility assessments. Assess opportunities for machine language translation tool residuals in combatant command areas other than the sponsor’s area of operations. Complete utility assessments for selected tools and continue demonstration and assessment of other tools for which the user community determines a benefit to additional assessment. Continue fielding interim products for demonstration and extended user evaluations in coalition and intelligence operations. Finalize concepts of operations and tactics, techniques and procedures for user adoption. Conduct capstone demonstrations and final military utility assessment report. Begin implementation of transition plan and joint transition program.
- FY 2006 – Conduct extended user evaluations during the residual phase. Continue modification to CONOPs and procedures for those language translation tools found to have utility. Complete LASER ACTD product transitions, interim capability support phase and end the ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Micro Air Vehicle (MAV)	3.400	3.000	1.200	0.000

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Provide small, ground combat units with situational awareness of enemy activity using an affordable, responsive, easy-to-operate, backpackable reconnaissance and surveillance system as an organic asset at the platoon level. The final demonstration is planned for Fiscal Year 2006. The Micro Air Vehicle (MAV) will be transitioned in Fiscal Year 2007 by the Program Manager for Tactical Unmanned Air Vehicles. DARPA is the executing agency. U.S. Pacific Command is the user sponsor.

- FY 2004 – Conducted Phase 1: system requirements analysis, as well as the design and build of the air vehicle with a COTS engine. Designed and developed a small, heavy fuel engine. Developed system tactics, techniques and procedures. Conducted critical design review
- FY 2005 – Conduct field evaluations of the Phase 1 development. Complete development and production of a small, heavy fuel engine. Integrate heavy fuel engine and feedback from Phase 1 field evaluations into the Phase 2 MAV system development and production.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Pathfinder	1.000	0.800	0.800	0.000

Pathfinder is integrating a modular system consisting of unmanned sensors and unmanned aerial and ground platforms, display components, and high-bandwidth wireless networks to provide system connectivity to provide real-time reconnaissance and surveillance data for early entry SOF operations. The user sponsor is U.S. Special Operations Command. Metrics include the degree to which small reconnaissance teams can be assisted in emplacement of sensors and deployment of unmanned platforms for collecting information and relaying to inbound assault forces. Effectiveness of ad hoc networking, offset surveillance, fire support coordination, UAV-directed close air support will be assessed.

- FY 2004 – Finalized and integrated COTS and GOTS technology selections. Completed enhancements to the Pathfinder Raven unmanned aerial vehicle (UAV) to include: airframe and avionics refinements; air vehicle miniaturization and weight reduction; improved system performance and survivability; improved battery charging capability; and integration of an optional FalconView (aviator’s navigation software) capable laptop. Funded and completed technology enhancements to the Rajant BreadCrumb, a wireless network node, resulting in the SuperCrumb which gives enhanced range, performance, and soldier packaging over the COTS 802.11b system. Developed with BAE a wireless network of acoustic, seismic, and IR sensors. These sensors communicate via low probability of intercept and detection (LPI/LPD) waveforms, and have been packaged for easy deployment by the Soldier. Initiated development of the system user interface with Tactical Geographics. Developed and received first prototype of GCU/2, a half-sized ground control unit for the Pointer and Pathfinder Raven UAVs. Completed three Technical Working Group Assessments of technologies, one Limited Objective Experiment, and the initial Military Utility Assessment

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(MUA). Conducted numerous Pathfinder Raven new equipment training sessions (both CONUS and OCONUS) for USSOCOM and US Army troops, including train-the-trainer sessions for the US Army to equip them with ability to conduct their own Army training program. Planned transition of Pathfinder Raven UAV to US Army PM-UAVS (Unmanned Aerial Vehicle Small) via a Wartime Urgent Need Statement and to USSOCOM via a Combat Mission Need Statement. Executed a 250M indefinite quantity, indefinite contract for a small UAV to facilitate quick procurement of systems for users in theater. Planned transition of the SuperCrumb to 3<sup>rd</sup> Infantry Division via the Rapid Equipping Force, managed by CECOM. Transitioned Raven to both the Army and SOCOM.

- FY 2005 – Complete system integration efforts. Conduct LOEs in preparation for the final MUA. Conduct final MUA. Complete documentation of the initial three years of the program, to include the MUA. Move into residual period and conduct extended user evaluations (EUE).
- FY 2006 – Continue to provide support for the EUE. Complete transition activities and end the ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Signals Intelligence (SIGINT) Processing	0.600	0.000	0.600	0.000

Provide a SIGINT processing mode to more precisely identify signals of interest and determine its military utility. The user sponsor is U.S. Pacific Command.

- Classified content only.
- FY 2004 – Performed initial testing.
- FY 2005 – Conduct demonstrations and interim MUA.
- FY 2006 – Complete MUA and final demonstration.
- FY 2007 – Complete the ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Space-Based Moving Target Indicator (SBMTI)	6.200	0.600	0.600	0.000

Demonstrate space-based moving target indicator capabilities using existing platform assets. The user sponsor is U.S. Strategic Command.

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- FY 2004 – Conducted hardware assessment and testing. Conducted field evaluation of software/hardware for determining effectiveness of technology.
- FY 2005 – Conduct initial demonstrations and interim MUA.
- FY 2006 – Complete MUA and final demonstration. Complete the ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
SPARTAN	3.900	2.400	3.600	4.800

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, noncombatants, and other national and strategic assets. The user sponsor is U.S. Pacific Command. SPARTAN has three basic operational capabilities objectives: 1. Conduct critical missions (MIW, ISR/FP, PS/ASuW): 2. Prepare the waterspace for Amphibious and Sealift Ops: 3. Provide port-protection when launched/operated from shore. The SPARTAN Critical Operational Issue (COI) is “To what extent do SPARTAN warfighting modules demonstrate a capability as a force leveler and force multiplier against surface and subsurface threats?” SPARTAN has three overarching MOEs: (1) Does the system work; provide capabilities/functionality needed to address the requirements? Does it do what it is supposed to do in each of the warfare areas? (2) Does the system demonstrate a capability as a force leveler and force multiplier against surface and subsurface threats? (3) Can the system be effectively integrated within the force structure? Is it supportable? Is it affordable?

- FY 2004 – SPARTAN deployed to the Arabian Gulf on the USS Gettysburg as part of the Enterprise CSG to support OIF. Spartan demonstrated its abilities as a Force Protection asset. Deployment achieved two years before scheduled. The development team completed development of Spiral 2 ISR/FP and planned Spiral 1 MIW modules for testing and demonstration.
- FY 2005 – Complete development of the Precision Engagement (PE) module, as well as integration and systems testing. Complete the final demonstration and military utility assessment. Conduct demonstration in Singapore. Conduct final MUA. Begin interim capability support phase.
- FY 2006 – Begin Residual and Transition Phase. Support Extended User Evaluations (EUEs). Support Navy program offices in the transition of SPARTAN to a Program of Record (POR) within the Littoral Combat Ship (LCS) Program and for backfit to existing surface ships.
- FY 2007 – Complete transition activities and the interim capability support phase. End the ACTD.

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ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Thermobarics (TB)	2.200	4.800	2.400	0.000

Demonstrate an energetic, thermobaric, penetrator payload to defeat enemy tunnel facilities and weapons with two-to-three times the lethality of conventional high explosive payloads. The user sponsor is U.S. Pacific Command.

- FY 2004 – Completed operational demonstrations of weapon and planning tool capability. Determined effectiveness of thermobaric fills in field testing scenarios. Produced residual weapons for further testing in SD&D phase or for use in contingencies. Develop weaponized tunnel target defeat fill with increased capability for defeat of these tunnel targets over conventional high explosives.
- FY 2005 – Conduct final demonstration. Deliver 10-20 residual warheads. Conduct user training. Support transition to SD&D phase by providing data to lead service.
- FY 2006 – Conclude transition actions and complete the ACTD.

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**FY 2003 ACTDs**

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Adaptive Joint C4ISR Node (AJCN)	6.200	5.900	0.800	0.800

Develops, integrates, demonstrates and transitions a multi-mission radio frequency system that provides seamless interoperable communications, simultaneously with signal intelligence (SIGINT), electronic warfare (EW), and information operations (IO) capabilities. Some of the top level metrics include number of simultaneous missions and reconfigurable levels of security, mission reconfigurable timelines, and number of scalable architectures and compliant radio transmissions. JFCOM is the User Sponsor.

- FY 2004 Accomplishments – Developed and demonstrated prototype payload functionality in laboratory. Conducted a flight demonstration of prototype payload on an Army C-23 aircraft and performed an Initial Joint Military Utility Assessment (IJMUA). This payload addressed top-level metrics by performing an initial capability in four functional areas (Communications, SIGINT, EW, and IO). Continued coordination of the two-prong approach transition strategy including Extended User Evaluation (EUE) of residual packages, FY06 - 07 and Follow-On Development, Production, Fielding and Sustainment, FY06 and beyond to twelve targeted payload and aircraft programs of record / programs. Continued CONOPS and TTP development. Initiated integration of the payloads final design that will support JMUA and Extended User Evaluation (EUE).
- FY 2005 – Complete integration and testing of payloads and demonstrate functionalities in the laboratory. Install payloads and antennas on the Paul Revere aircraft and two Hunter unmanned aerial vehicle aircraft. Conduct flight tests to verify operation of AJCN ACTD payload and network using CONOPS / TTPs. Conduct a final operational demonstration and perform JMUA. Refine CONOPS / TTPs based on JMUA results. Initiate transition strategy and prepare for EUE.
- FY 2006 – Conduct a EUE exercise. Initiate finalization of CONOPS / TTPs, training package and recommendations for Doctrine, Organization, Training, Materiel, Leadership, Personnel and Facilities (DOTMLPF). Transition AJCN ACTD products to programs of record / programs.
- FY 2007 – Complete EUE of AJCN residual package. Finalize CONOPS / TTPs, training package and recommendations for Doctrine, Organization, Training, Materiel, Leadership, Personnel and Facilities (DOTMLPF). Transition AJCN ACTD products to programs of record / programs. Complete AJCN ACTD.

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ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Counter Bomb/ Counter Bomber (CB2)	4.500	6.000	6.000	2.400

Provides technologies to detect either suicide bombers or command initiated terrorist conventional and non-conventional explosive devices. Objectives include improving force protection of deployed and CONUS-based forces. CB2 was a late FY 2003 new start in reaction to lessons learned during Operation Iraqi Freedom (OIF). The user sponsors are U.S. European Command and U.S. Southern Command. All technology assessments and demonstration results are coordinated and shared with the Joint Improvised Explosive Device Integrated Product Team (Joint IED IPT).

- FY 2004. - Continued technology development and evaluation in conjunction with participating operational sponsors. Conducted initial military demonstration in support of U.S. Southern Command. Completed coordination with U.S. European Command for an FY 2005 demonstration within at a forward deployed operational base. Coordinated with deployed operational forces within Iraq to identify, evaluate and deploy specific counter bomb/counter bomber technologies including improvised explosive device jammers and technologies to identify human carried explosives.
- FY 2005 – Continue to assess and integrate counter bomb/bomber detection tools including intelligence analytical capabilities in support of demonstrations at forward deployed bases within both European Command and Southern Command. Continue technology search and transitions of new capabilities to operationally deployed forces in coordination with other, designated DoD organizations and task forces. These include intelligence tools, wide area explosive detection sensors and portal sensors for monitoring of individuals entering either buildings or compounds.
- FY 2006 - Conduct demonstrations at expeditionary forward operating locations. Prepare MUA reports. Continue transition activities for expeditionary systems.
- FY 2007 - Complete the Extended User Evaluations for specific capabilities identified for transition during the EUCCOM and SOUTHCOM operational demonstrations. Transition activities will continue for systems to be deployed at the fixed bases and forward operating locations. Initial systems will be acquired and deployed. Installation and operator training will be provided. Maintenance activities will be established. Tactics, techniques, and procedures will be finalized based on local threat conditions and deployment scenarios.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
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Deployable Cargo Screening (DCS)	1.100	0.400	1.000	0.000
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Provide a deployable capability to detect explosive threats in pallet loads of cargo moving in the defense transportation system. The operational sponsor is U.S. Transportation Command. The Air Mobility Command provides operational manager and acts as customer representative. Transition will be managed through Warner-Robins Air Logistics Center.

- FY 2004 – Developed the demonstration plan. Prepared and assessed concept of operations. Conducted initial testing of proposed system. Initial assessment by customer determined need for an alternative technical approach. Oversight Group met and approved demonstration and assessment of an alternative technology and operational concept. Oversight Group approved extension of demonstration phase to accommodate alternative approach.
- FY 2005 - Perform military utility assessments of the pilot systems and spiral upgrades of sensor systems. Accelerate fielding of interim system for assessment and current operational imperatives. Complete the final demonstration and military utility assessment. Transition lessons learned during extended user evaluation of demonstration systems to objective cargo screening system procurements and fielding. Concepts of Operations, tactics, techniques and procedures also transitioned to Air Mobility Command trans-shipment operations. Perform baseline survey to determine presence of any existing persistent residue of explosives in the trans-shipment environment.
- FY 2006 – Complete the extended user evaluation and the ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Foliage Penetration Synthetic Aperture Radar (FOPEN)(FOPEN/SAR)	0.000	1.200	1.100	0.000

Planned to provide real-time detection and cueing of stationary targets obscured by foliage and under camouflage using tactical and national sensors. The user sponsor is U.S. Southern Command.

- FY 2004 – Targeted technologies were returned to the technology base after initiation. Alternate technologies are under examination to meet operational requirements. FY 2003-2004 tests in theater produced promising results.
- FY 2005 – After alternate technologies are identified, reinitiate the ACTD with submission of the Implementation Directive. Begin initial demonstrations.
- FY 2006 – To be determined as part of Implementation Directive development.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
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Gridlock	4.400	3.900	0.000	0.000
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Provide Unified and Joint Task Force Commanders the capability to quickly and automatically tie the time-sensitive advantage of tactical sensors to geospatial coordinate in support of time-sensitive targeting of precision guided munitions. The user sponsor is U.S. Central Command.

- FY 2004 - Achieved accuracy and timeliness goals in Predator and Global Hawk UAVs testing during JEFX 2004 at Nellis AFB. Initiated transition to operations for Predator imagery and Global Hawk Synthetic Aperture Radar (SAR) imagery upon successful achievement of goals.
- FY 2005 - Achieve accuracy and timeliness goals in Global Hawk and U-2 field exercises. Complete transition to support Predator and Global Hawk operations. Continue development of Gridlock capabilities for a host of sensors according to a planned schedule. Provide interim capability to Coalition Air Operations Center (CAOC) and Joint Operations Centers (JOC) at selected Combatant Commander sites. Complete the final demonstration and the ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
High Altitude Airship (HAA)	4.500	4.800	4.800	2.400

Provide a prototype, solar powered airship that can fly untethered at 65,000 feet altitude with 4,000 pounds of communication and surveillance payload. The user sponsor is North American Aerospace Defense Command.

- FY 2004 - Completed airship vehicle design. Integrated several subsystems. Performed several subsystem ground tests. Completed payload interface design.
- FY 2005 – Perform a risk reduction phase to improve the skin material, thermal management and power subsystems.
- FY 2006 – Integrate flight vehicle and initiate ground testing. Complete risk assessments. Initiate Military Utility Assessment (MUA).
- FY 2007 - Complete construction of ACTD aircraft. Initiate integrated airship flight-testing with demonstration payload. Perform initial demonstration and MUA.
- FY 2008 – Commence the interim capability support phase.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
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Joint Blue Force Situational Awareness (JBFSA)	2.800	0.900	0.500	0.000
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Develops, demonstrates, and transitions seamless integration of joint blue force situational awareness tracking device information for display on the Global Command and Control (GCCS) family of supported systems. Some of the top level capabilities / metrics supporting the Joint Military Utility Assessment (JMUA) include common operational picture track correlation, dissemination, filtering and manipulation, and interoperability with multiple devices and multiple displays. STRATCOM is the User Sponsor.

- FY 2004 – Conducted a successful operational demonstration and Joint Military Utility Assessment (JMUA) Quicklook by integrating data from ~175 Blue Force Tracking (BFT) devices of 8 different BFT device types into both a US and Coalition Common Operational Picture during Foal Eagle 04 (FE04). Conducted an operational demonstration in Joint Warrior Interoperability Demonstration 04 (JWID04). Leveraged Joint Expeditionary Force Experiment 04 (JEFX04) to gather additional input for the JMUA. Initiated transition of Mission Management Center Testbed(MMCT) capabilities to the Operational MMC located at Army Space and Missile Defense Command Colorado Springs. Continued development of CONOPs, TTPs, and training package based on FE04, JWID04 and JEFX04. Initiated planning to operationalize the solution with JFCOM sponsorship.
- FY 2005 - Initiate execution of transition through Extended User Evaluation(EUE) of residual package in the U.S. Forces Korea(USFK) theater. Operationalize the architecture in cooperation with JFCOM and PEO C4I and Space (Navy). Complete transition of MMCT capabilities to the operational Mission Management Center(MMC). Initiate transition of JBFSA products to targeted programs of record / programs for follow-on development, acquisition and fielding. Continue development and refinement of Concept of Operations(CONOPs), Tactic, Techniques and procedures(TTPs) and training package based on EUE.
- FY 2006 – Complete EUE. Finalize CONOPs, TTPs and training package based on EUE. Continue to operationalize the architecture with the support of JFCOM. Complete JBFSA ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Midnight Stand	2.800	1.200	0.000	0.000

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ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Night Vision Cave and Urban Assault (NVCUA)	6.300	6.300	1.700	0.800

Provides suite of lightweight, soldier-borne sensor technologies to enable decisive overmatch for dismounted assault in subterranean and urban environments. Products consist of Approach Sensors for long-range surveillance and identification; Cave Assault Kit and Urban Assault Kit for maneuver and target detection; and new Concepts of Operation (CONOPs) / Tactics, Techniques and

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Procedures (TTPs) to exploit sensor capabilities. Key Metrics: Target Identification at ranges equal to Detection ranges (Approach Sensors); Human Target Detection at Range of 250m (Cave/Urban Assault). The user sponsor is U.S. Special Operations Command (USSOCOM). ACTD residuals transition to U.S. Army Special Operations Command (USASOC). Products demonstrating military utility will transition to USSOCOM Acquisition Programs of Record. Final Demo occurs FY 2005. ACTD complete FY 2008.

- FY 2004 – Completed technology development of Approach Sensors and Cave Assault Kit. Developed initial CONOPS, TTPs and training packages. Conducted Operational Demonstration I (Cave) with Approach Sensors and Cave Assault Kit. Performed initial MUA. Initiated technology development for the Enhanced Cave Assault Kit and the Urban Assault Kit. Continued transition planning activities.
- FY 2005 - Complete development of Enhanced Cave Assault Kit and Urban Assault Kit. Prepare exercise and evaluation plans for Operational Demonstration II. Refine CONOPS, TTPs and training packages for Demo II based on lessons learned from Demo I. Conduct Operational Demonstration II (Urban). Perform Military Utility Assessment and Measures of Performance (MOPs) and Measures of Effectiveness analysis. Continue preparations for transition to designated acquisition programs.
- FY 2006 - Procure additional residual systems. Field residual systems to USASOC operational units to provide interim capability. Provide residual support. Begin transition to acquisition programs of records.
- FY 2007 – Continue interim capability/ residual support. Complete transition to programs of record.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
OVERWATCH	2.800	4.500	1.200	0.000

Provides an operational sensor and targeting system capable of detecting, classifying and accurately locating direct fire weapons in real-time. This capability for ground forces allows immediate direct precision fire support for infantry operations in land and urban warfare, peacekeeping and peace enforcement missions. The user sponsor is U.S. Pacific Command. Metrics include: percent of firing signatures detected; percent of firing signatures located; overall percent of successful detections resulting in accurate messages; and false target rate and percent of messages garbled or not received.

- FY 2004 – Installed and integrated Overwatch system on HMMWV. Performed Full Scale Test 1 - a limited user test (LUT) to benchmark system performance. Developed/updated classification software based on theater specific target set. Continued CONOPS development using Full Scale Test. Successfully fielded prototype with INSCOM in-theater for operational use. Provided sensor enabling the Gunslinger project of integrating the sensor with a weapon, successful operational evaluation conducted.

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- FY 2005 – Perform Major System Demonstration 1 with HMMWV based system. This demonstration will focus on ground forces executing military operations, to include convoy protection, securing designated sectors, and area surveillance. Achieve on-the-move capability for the sensor. Field integrated Gunslinger system with Marines Low Altitude Air Defense unit scheduled for deployment to support OIF.
- FY 2006 - Develop and acquire hardware for UGV-based Overwatch system. Update system software for unattended ground vehicle (UGV) operation. Perform Full Scale Test 2 - a LUT with a Unmanned Ground Vehicle-based system. Conduct final MUA. Transition of the OVERWATCH capability will move to the Night Vision/Reconnaissance, Surveillance, and Target Acquisition program manager.
- FY 2007 – Conduct Extended User Evaluations (EUE) during residual phase. Provide residual system support and maintenance of leave behind systems and perform modifications based on user feedback. Prepare for transition to production. Complete the ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Tactical Interferometric Synthetic Aperture Radar (IFSAR) Mapping (TIM)	5.700	1.200	1.200	1.200

Provide theater-wide, three-dimensional, fine resolution terrain data and synthetic aperture radar imagery for mission planning and rehearsal data acquisition in joint operations. The Military Utility Assessment will begin in FY 2006, with the residual period running through FY 2008. The user sponsor is U.S. Southern Command. The IFSAR Mapping ACTD will be evaluated based on the following parameters: 1) Demonstrate an ability to collect and disseminate fine resolution HRTI and imagery for country-sized areas in weeks; 2) Demonstration of integration of IFSAR sensor control and data handling hardware/software into the existing MQ-9 Predator-B GCS; 3) Demonstration of data transmission via the RPA SATCOM link; 4) Rapid Dissemination of data within theater of interest and delivery into the NSG; and 5) Tailoring of high-resolution data products to meet user specified requirements.

- FY 2004 - Completed sensor system design. Initiated laboratory testing and validation experiments. Initiated sensor control and data downlink software within ground control station. Identified and refined initial airframe modifications needed for the sensor and supporting ground-based testing. Initiated design of data and process flow.
- FY 2005 - Complete sensor laboratory integration and functional testing; initiate sensor integration into the Remotely Piloted Aircraft (RPA); continue to coordinate development effort with USAF and SOUTHCOM; test and refine sensor control and data downlink software within ground control station; finalize design of data and process flow.
- FY 2006 – Take delivery of RPA; complete sensor integration into the RPA; initiate and complete developmental flight operations. Conduct Military Utility Assessment (MUA).

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- FY 2007 – Conduct EUE and continue operational flight testing.
- FY 2008 - Continue EUE and flight testing operations. Conclude the ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Theater Support Vessel (TSV)	5.600	9.100	0.000	0.000

Provide theater commanders a high-speed, intra-theater sealift capability to support all theater engagement requirements within his area of responsibility including operational movement, repositioning and sustainment of combat forces. The user sponsor is U.S. Central Command.

- FY 2004 - Integrated the Enroute Mission Planning and Rehearsal System (EMPRS) capability into both the HSV-X1 and TSV-1X and increased other C4 capabilities of both vessels. Installed Cargo Handling System (CHS I) to include roller floor system and 20T crane and T-Foil (Ride Stabilizer) on TSV-1X; conducted interim assessment. TSV-1X returned to CENTCOM AOR after modifications and assessments completed to participate in OEF. HSV-X1 proceeded to USARPAC; participated in technical and operational exercises/demonstrations. HSV-X1 participated in USFK's RSOI/FE; was tested and proved to extend the Army's ability to employ TSVs in support of Joint operations. Researched CHS II, a potential cargo handling/lift system modification for HSV-X1, which was terminated as not feasible on the current vessel due to associated costs.
- FY 2005 - Demonstrate Radio Frequency (RF)/Infrared (IR)/Laser Warning Receiver (LWR) self-protection capabilities linked to an active deployment system (e.g. the Multi-spectral Softkill System (MASS)). Investigating ability to provide an organic integrated system of systems to detect, classify, and deter/engage asymmetric threats, using both lethal and non-lethal defenses (Spotlights, Acoustic Hailing Device (AHD), Elector-Optic/Infra-Red (EO/IR) Sensor System, and Remotely Operated Small Arms Mount (ROSUM). Upgrade the C4I suite of the TSV-1X, using Thin Client Technology. Pursuing participation in a Cooperative Development of tactical Electronic Warfare (EW) Situational Awareness to provide full dimension protection, precision targeting, and combat identification with the Australian DoD in conjunction with the U.S.-Australian Joint Exercise, Talisman Sabre. Continue with military exercises (RSOI/Foal Eagle, Cobra Gold, Talisman Sabre, Bright Star 05) and operational and technical assessment. Complete the final demonstration and military utility assessment. Transition lessons learned to Navy for acquisition of objective vessel. Also, transition concepts of operations, tactics, techniques and procedures.
- FY 2006 - Transition to acquisition and end the ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
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Tunnel Target Defeat (TTD)	0.000	0.000	0.000	0.000
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Provides the means to defeat underground facilities and the threatening assets they protect. The user sponsor is U.S. Strategic Command.

- FY 2004 - Conducted verification and validation program to numerically verify tunnel response and ground shock, high-fidelity codes against known solutions and to validate the codes against laboratory and field tested data. Finish laboratory tunnel experiments to provide test cases for high-fidelity codes to model tunnel response in jointed limestone media. Performed semi-precision, in-situ field test to provide scaled tunnel response test data on an actual jointed limestone site. Designed nuclear ground shock simulator for full-scale ACTD target facility event to demonstrate tunnel defeat capability.
- FY 2005 - Deliver validated analysis and planning tools for use in pre-shot prediction of the main field demonstration; construct and conduct full-scale ACTD event, a high-explosive simulation test on full-size tunnels in representative geology at the Nevada Test Site. Finish assessment of the end-to-end use of nuclear planning tools to characterize and weaponize the full-scale ACTD event. Provide residual capabilities to USSTRATCOM. Complete the final demonstration.
- FY 2006 – Complete transition of tools and capabilities to USSTRATCOM and other combatant commands. Complete the ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Urban Recon (UR)	1.600	1.500	0.300	0.300

Provide advanced airborne and terrestrial 3-D reconnaissance capability to SOCOM (Operational Manager) using LIDAR sensor with rapid processing software and decision aid software. The user sponsor is U.S. Special Operations Command. Metrics include: Extent to which the Urban Recon ACTD sensors and software provide the high-resolution, 3-D data needed to support urban warfare operations; extent to which the equipment and software provided are easy to use and supportable by military personnel; and extent to which the Urban Recon TTPs can be effectively executed in meeting urban reconnaissance objectives.

- FY 2004- Refined prototype designs and completed development of baseline laser sensor hardware and software configurations for vehicle-mounted, soldier-borne, and UAV-mounted configurations. Integrated GPS/IMU (positioning/orientation system) into sensor system configuration. Integrated laser into gimbals for UAV-mounting. Developed UAV control interface to support off-nadir collections. Began the development of remote sensor operation software for UAV. Completed auto-mosaic data fusion software. Completed baseline 3-D Visualization software. Conducted Limited Operational Experiment (LOE) CJTFEX04-2 of surrogate airborne sensor data, vehicle-mounted sensor and 3-D Visualization software package using baseline CONOPS and TTPs. Continued the development of CONOPS, TTPs and training package for warfighter evaluation.

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- FY 2005- Upgrade laser to maximum performance based upon commercially available technology. Complete objective laser systems development, supporting vehicle-deployed, soldier-deployed, and UAV-deployed configurations. Complete CONOPS for each objective system configuration. Conduct operational demonstration (JRX05) of vehicle-mounted, soldier-borne, and UAV-mounted laser sensors using established CONOPS and TTPs. Conduct Military Utility Assessment (MUA) of each integrated sensor configuration. Complete development of CONOPS, TTPs and training packages. Conclude transition strategy supporting follow-on development, acquisition and fielding based on successful MUA. Consider using Urban Recon as a JCTD pilot program for transition.
- FY 2006- Provide operational support for residual systems. Complete documentation and provide system training.
- FY 2007 – Conclude interim capability support phase and end the ACTD.

<b>FY 2004 ACTDs</b>
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ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Advanced Tactical Targeting Technology (AT3)	5.000	6.000	4.800	0.000

Develops, integrates, demonstrates and transitions the ability to rapidly identify and geolocate short-time-transmit threat emitters by fighter aircraft equipped with digital upgrades to Radar Warning Receivers (RWR) onboard. Will provide accurate target coordinates for immediate targeting by Suppression of Enemy Air Defense (SEAD) combat aircraft. The user sponsors are U.S. Central, Pacific and European Commands.

- FY 2004 – Conducted initial Software Integration Lab (SIL) testing. Delivered initial ALR-69 with digital upgrades with AT3 insertion. Conducted F-16/RWR interface testing for RF compatibility.
- FY 2005 – Begin initial tower testing with RWR sets to demonstrate Time-Difference-of-Arrival (TDOA) computation rapidly and netted. Conduct first two initial flight demonstrations and interim MUA.
- FY 2006 – Complete demonstration in JEFX 06 and begin integration with NCCT airborne, SIGINT platforms for a fully-developed net-centric battlefield capability against short on-time emitters and double-digit Surface-to-Air Missile (SAM) threats. Complete MUA.
- FY 2007 – Complete final demonstration. Commence interim capability support phase.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007

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Agile Rapid Global Combat Support (ARGCS)	3.000	4.800	4.800	1.900
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Demonstrates Integrated Combat Support System technology that will establish a common, interoperable, scalable and morphable capability for electronics weapon systems support. The user sponsor is U.S. Pacific Command.

- FY 2004 – Finalized system requirements. Conducted system integrator competition and awarded contract. Finalized and received approval of Implementation Directive and initiated approval of Management Plan. Worked with U.K. MoD and Spanish MoD as Coalition partners. Initiated industry-led standards activities to formalize ARGCS technologies involving Common Test Interface (CTI), Advanced Test Markup Language (ATML) and Synthetic Instrument (SI) interfaces.
- FY 2005 - Complete fabrication of systems hardware/software. Complete Integrated Assessment Plan.
- FY 2006 – Conduct technical evaluation before deployment on final system hardware and software. Deploy systems and begin Joint Military Utility Assessment (JMUA).
- FY 2007 – Complete JMUA. Begin transition of products. Conduct extended user evaluation.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Coalition Reception Staging & Onward Movement (CORSOM)	0.300	0.300	0.100	0.100

Demonstrates a set of technologies, provides modeling and simulation support, and establishes procedures to provide Joint Force Commanders with an enhanced Reception, Staging and Onward-Movement (RSOM) Planning and Execution Monitoring capability for coalition deployment operations. Four-year project under sponsorship of NATO Strategic Commands and Supreme Headquarters Allied Powers, Europe, with completion of development and demonstration by end of CY 2005, transition to NATO and U.S. logistics systems by FY 2007.

The primary metrics to be demonstrated in the ACTD Military Utility Assessment are (1) percent decrease in delays of convoy movements caused by congestion, and as a result decreases in number of units that do not meet Required Delivery Dates, (2) percent decrease in numbers of movement control personnel needed to manage RSOI efficiently, (3) average time to offload strategic movement assets, move assets through marshalling areas, and on to staging areas, (4) comparison of total cost of RSOI when using CORSOM deliverables compared to current costs, (5) identification of reductions in logistics response times, i.e., reduced sustainability requirements, and reductions in losses in supply chain.

- FY 2004 – Determined essential data requirements, and extended RSOM databases where needed to provide a framework for future planning and execution functionality. Completed requirements capture and initial implementation of prototypes for RSOM data exchange and software extensions to NATO and national systems. Installed hardware and software to conduct NATO Radio Frequency Identification (RFID) proof-of-concept trial for tracking NATO consignments on flights into Afghanistan, and

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developed links to NATO Movement and Transportation (M&T) systems to enhance in-transit visibility (ITV) in NATO. Conducted laboratory testing and prepared for first validation experiment.

- FY 2005 – Finalization of prototypes and Coalition RSOM Tactics, Techniques and Procedures (TTPs). Provide ITV concept and technology assessment during International Security Assistance Force (ISAF) operations using RFID. Use modeling and simulation to analyze new concepts and doctrines currently under discussion in various NATO M&T forums. Initial military Utility Assessment scheduled for April 05 will demonstrate planning functionality of software. Provide final operational demonstration of CORSOM Tool for RSOM planning and execution monitoring to users in a major coalition exercise. Final ACTD Demonstration date is November 2005.
- FY 2006 – Begin transition to inclusion of CORSOM in the NATO Logistics Functional Area Services of the Bi-Strategic Command Automated Information System, as well as integration in the U.S. GCSS.
- FY 2007 – Complete transition to NATO Logistics Functional Area Services and integration into GCSS and demonstrate capability. CORSOM ACTD scheduled completion date is December 2007.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Coalition Shared Intelligence Network Environment (COSINE)	0.200	0.300	0.200	0.200

Implement a flexible secure coalition command, control and intelligence system for sharing and collaboration information to support counter terrorist and combined/joint task force operations. COSINE is sponsored by North Atlantic Treaty Organization Allied Command Operations and Supreme Headquarters Allied Powers, Europe.

- FY 2004 – Developed plan for addressing multi-level security and releasability policy issues. Developed interface with accredited secure network architecture for heterogeneous coalition systems. Developed interface with existing initiative to establish dynamic content-based security system adaptable to changing user security attributes. Conducted preliminary demonstration of Coalition Shared Intelligence Network Environment capabilities using metadata-based publication, dissemination and retrieval rules. Demonstrate COSINE capabilities in the DoD Horizontal Fusion program and Quantum Leap II demonstration.
- FY 2005 – Conduct laboratory trials of interim capability and operational concepts. Test and assess concept of operations and the tactics, techniques and procedures in a broad multinational user environment. Prepare interim military utility assessment of spiral fielded capabilities. Prepare transition plan and Defense Intelligence Agency role in transitioning COSINE ACTD capabilities.

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- FY 2006 – Conduct capstone demonstration and military utility assessment. Finalize CONOPS for DoD and coalition operations. Finalize policy modifications and execute transition plan.
- FY 2007 – Oversee extended user evaluation period for the residual capability and concept of operations during the residual period. Modify technologies and procedures as evidenced in extended user evaluation period. Oversee implementation of interconnections of NATO and member nation systems using the COSINE capabilities. Complete the ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Future Tactical Truck System (FTTS)	4.500	7.200	1.200	0.600

Demonstrates the operational potential, technical feasibility and maturity of advanced vehicle technologies through integrated demonstrations of subsystems, systems, and system of systems. The user sponsor is U.S. Pacific Command.

- FY 2004 - Implementation Directive developed and approved. Draft solicitation for the Modeling & Simulation (M&S) Phase released to industry. Developed and released the Research Announcement (RA) and required attachments for the M&S Phase. RA included specifications for both the Maneuver Sustainment Variant (MSV) and the Utility Variant (UV). M&S Phase Source Selection Evaluation Plan developed and approved. Announcement released for the Tactical Wheeled Vehicle (TWV) Fleet Modernization Technology Rodeo as part of the Expedited Modernization Initiative Procedure. Initiated development of Concept of Operations (CONOPS) and Tactics, Techniques & Procedures (TTPs). Initiated development of the Military Utility Assessment Plan (MUAP). Finalize the Management Plan and completed staffing for approval. Awarded M&S Phase contracts.
- FY 2005 – Continue development of the CONOPS and TTPs. Conduct Technology Rodeo. Conduct an In-Process Review, a Preliminary Design Review (PDR) and a Critical Design Review (CDR) during the M&S Phase. Award contracts (minimum of one each contract for the MSV and the UV) for the Hardware Build Phase. Continue development of the MUAP.
- FY 2006 – Finalize the CONOPS, TTPs and MUAP. Complete build of MSV and UV vehicles. Conduct Safety Assessment for the MSV and UV vehicles. Conduct the Military Utility Assessment (MUA). Conduct the TWV Rodeo in parallel with the MUA. Initiate transition strategy and prepare for extended user evaluation.
- FY 2007 – Begin transition to truck acquisition programs. Complete the ACTD.

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ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Joint Precision Airdrop System (JPADS)	0.500	2.800	4.300	1.300

Develops, demonstrates a fast, flexible, direct projection-based distribution system to sustain rapidly deployed forces at any global destination - strategically, operationally, and tactically. The user sponsor is U.S. Joint Forces Command.

- FY 2004 – Refined tactics, techniques and procedures (TTP)/Concept of Operations (CONOPS). Performed prototype design and fabrication. Initiated system integration (Air Force Precision Airdrop System (PADS) with Army Joint Precision Airdrop System (formally PEGASYS)). Successfully demonstrated autonomous flight of two 10Klb decelerator system concepts during technical testing.
- FY 2005 – Complete user prioritization decision on decelerator systems. Complete system integration and continue technical testing. Conduct early user training and evaluation and prepare for Military Utility Assessments (MUA) Scenario #1. Demonstrate a high altitude (25,000 ft. Mean Sea Level), autonomous offset airdrop capability (goal 10-20 miles offset) with the option to deliver separate and distinct payloads (up to 10,000 lbs total, full rigged weight) to multiple locations.
- FY 2006 – Conduct Military Utility Assessments (MUA) #1. Prepare for MUA scenario #2 & #3 and execute. Transition JPADS ACTD technologies to Army and Air Force Transition Managers (PM Force Sustainment Systems (PM FSS) and Air Mobility Command (AMC)) for System Development and Demonstration (SDD).
- FY 2007 – Distribute Military Utility Assessments (MUA) final reports and residual JPADS systems to MUA users. Execute the residual support contracts to support systems. Continue to support and monitor residual system performance and user feedback. Continue to have JPADS Transition Managers (PM Force Sustainment Systems (PM FSS) and Air Mobility Command (AMC)) execute planned System Development and Demonstration (SDD) programs. Complete the JPADS ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Joint Unmanned Systems Common Control (JUSC2)	3.500	4.200	0.600	0.600

Provides a reconfigurable and scaleable common control architecture that provides capability to concurrently manage large numbers of unmanned systems of all types, and applies joint interoperability interfaces for joint service and coalition interoperability of unmanned systems. The user sponsor is U.S. Joint Forces Command. Metrics include: Does the JUSC2 technology enhance the capability of the Joint Task Force to execute its mission; does the use of the JUSC2 technology allow CJTF to make better use of low density- high demand unmanned systems within the JOA; does the JUSC2 technology enhance the JTF Commander's warfighting capabilities; does the JUSC2 technology help the JTF commander maintain better situational

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awareness and provide for dynamic re-tasking of assets in support of maneuver elements; and what difference does the technology make; does the JUSC2 system support the interoperability of the Services and the integration of their functions; are the JUSC2 ACTD technologies suitable for employment with the JTF; given the JTF's resources, is the system trainable, deployable and maintainable; can we afford to deploy and use it?

- FY 2004 – Developed joint requirements and preliminary CONOPS, an integrated assessment plan, and a plan for integration of legacy technologies. Completed initial integration of air, undersea, and surface unmanned systems and initiated application of joint interoperability standards to unmanned aerial vehicles.
- FY 2005 – Conduct technical experiments of the common control architecture with a strong focus on UAV interoperability between Army, Air Force, and Navy UAV systems. Conduct user training and preparation for operational demonstrations. Complete integration of unmanned systems of interest.
- FY 2006 - Conduct operational demonstration focused on joint interoperability of unmanned systems. Conduct initial military utility assessment. Complete system integration and testing in preparation for final operational demonstration and assessment.
- FY 2007 – Transition open architecture design and common unmanned vehicle management software to Navy, Army and Air Force.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
MAGNUM	2.500	2.400	1.800	0.000

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ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Man-Portable Threat Warning System (MANPACK)	4.500	6.000	4.200	0.000

Develops an individual, network-capable, situational threat warning ensemble using an open, plug-and-play architecture, which is user configurable. MANPACK will provide a small, mobile, lightweight intelligence warning package which requires minimal power.

The user sponsor is U.S. Special Operations Command.

- FY 2004 – Conducted technology search of existing off-the-shelf capabilities and performed limited integration leading to a baseline MANPACK ensemble. Developed CONOPS and finalized MOEs/MOPs. Developed initial TTPs and took delivery of the Demo I systems. Began user training.
- FY 2005 – Complete first demonstration. Identify early transition opportunities. Take delivery of Demo II systems and continue

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user training.

- FY 2006 - Continue final demonstration. Complete joint military utility assessment (JMUA).
- FY 2007 – Complete the ACTD. Commence interim capability support phase.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Multi-Sensor Aerospace/Ground Joint ISR Interoperability Coalition (MAJIIC)	2.500	2.100	2.000	2.000

Develop, test and transition a set of standards, eXtensible Markup Language (XML) formats, and information services to promote intelligence, surveillance and reconnaissance (ISR) interoperability between U.S. and Coalition ground stations and systems. Demonstrate near-real-time interoperability of data from electro-optical, infrared, motion video, moving target indicators, synthetic aperture radar, and other sensors. Enhance collaborative targeting operations, improve ISR data accessibility and sense making to support U.S. Joint ISR operations. Transition is planned for FY 2008 by the U.S. Army Training and Doctrine Command (TRADOC) System Manager to the Service Distributed Command Ground Station (DCGS) programs, to satisfy their requirements for coalition ISR interoperability and Network Centric Enterprise Services compatibility. U.S. Joint Forces Command is the operational sponsor and the USAF, AFC2ISRC Langley AFB is lead service.

- FY 2004 - Completed contractor selection and initiate ISR Information Service (ISRIS) design and development. Demonstrated initial ISRIS capability during the Horizontal Fusion Quantum Leap exercise. Developed initial MAJIIC Concept of Operations (CONOPS). Amended the Coalition Surveillance and Reconnaissance (CSR) Memorandum of Understanding (MOU) to include the Netherlands and Spain. Pursued participation in MAJIIC by Australia, Belgium and Turkey. Developed project arrangement and technical arrangement to define participation by the MAJIIC coalition nations: Canada, France, Germany, Italy, the Netherlands, Norway, Spain, the United Kingdom and the United States, and the NATO Consultation, Command and Control Agency (NC3A).
- FY 2005 - Participate in the Horizontal Fusion operational transition/deployment in support of 18th Airborne Corps with servers at DGS-X Langley AFB, VA. Conduct ISRIS laboratory testing and CONOPS validation experimentation to include Coalition nations. Initiate the MAJIIC Project multinational working groups. Expand ISRIS support to additional platform and sensors. Support Coalition test and integration testing with connectivity from DGS-X and NATO C3 Agency.

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- FY 2006 - Demonstrate ISRIS capability in U.S. and Coalition environments. Conduct interim Military Utility Assessment (MUA). Expand ISRIS support to additional platform and sensors. Continue MAJIIC Project multinational working group participation. Participate in first coalition live-fly exercise to demonstrate and test interoperability standards.
- FY 2007 - Participate in the annual MAJIIC coalition exercise with possible NATO Allied Command transformation with NATO Air Group IV ISR capability. Validate CONOPs and conduct MUA. Transition capability into the DCGS Integration Backbone spiral baseline.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Protected Landing and Takeoff (PLATO)	0.000	0.000	0.600	0.600

Assist in the development of an affordable Man-Portable Air Defense (MANPAD) countermeasures system that evaluates the use of a ground-based sensor grid in the vicinity of airports. PLATO continues to be delayed pending interagency agreement between the Department of Defense and the Department of Homeland Security on a coordinated strategy of investment for countermeasures to the MANPADS terrorist threat. The user sponsor is U.S. Transportation Command.

- FY 2004 - Prior to the current delay, conducted extensive measurements of infrared (IR) signatures of civil aircraft at a U.S. airport. Data collection will be employed to develop computer generated models of specific type/model and series of commercial aircraft commonly operated by U.S. airlines and also employed by the Department of Defense. Coordinated and shared collected data with the Department of Homeland Security.
- FY 2005 – Pending final approval, conduct hardware in-the-loop missile engagement model development, ground-based sensor development test and evaluation, evaluation of reactive pyrophorics and development of an prototype system to support defense of commercial derivative aircraft employed by the Department of Defense.
- FY 2006 – Perform ground-based sensor grid operational evaluation and leave-behind deployment. Continue sensor fusion flight evaluation/leave-behind deployment. Develop reactive pyrophorics leave-behind assets.
- FY 2007 – Commence interim capability support.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Psychological Operations (PSYOP) Global Reach	2.900	8.000	4.700	2.400

Provide extended range over which the PSYOP message can be delivered. Develop capabilities to disseminate products multi-

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dimensionally across extended ranges into denied areas, including over-the-air and new internet based methods. Advance the capabilities of automated planning processes through collaborative technologies, integrated into special operations forces (SOF) planning systems. The operational sponsor is U.S. Special Operations Command.

- FY 2004 - Initiated development/integration of satellite radio, television, and broadcast systems, Unmanned Aerial Vehicle (UAV) based broadcast/relay payloads and the PSYOP mission planning system. Solicited and received proposals for scatterable media products.
- FY 2005 – Perform initial military utility assessment (IMUA) for UAV payloads. Perform IMUA for version 1 of the mission planning system. Begin development/integration of advanced broadcast/relay platforms and scatterable dissemination media. Perform IMUA for first spiral of scatterable media products. Perform demonstration of satellite TV systems. Begin transition of satellite TV capability to warfighter.
- FY 2006 – Perform final MUA for UAV payloads. Perform IMUA for version 2 of the mission planning system. Perform IMUA on spiral 2 of scatterable media products. Demonstrate UAV payloads on the high altitude airship or other similar high altitude platform.
- FY 2007 – Demonstrate scatterable media, advanced broadcast/rebroadcast platforms. Transition initial release of the planning system.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Theater Effects-Based Operations (TEBO)	4.000	5.300	4.800	4.800

The TEBO ACTD will provide Combatant Commanders with enhanced capabilities to 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 Integrated Mission Architectures. The user sponsor is U.S. Pacific Command.

- FY 2004 - Established EBO baseline for U.S. Forces Korea (USFK). Demonstrated dual language prototype applications and tools for EBO and Operational Net Assessment (ONA) based on U.S. Joint Forces Command (JFCOM) developments. Initiated CONOPS development. Participated in USFK (Ulchi Focus Lens 2004) exercises.
- FY 2005 – Initiate development of EBO action planning tools and visualization tools. Conduct soldier-in-the-loop testing. Conduct initial military utility assessment. Continue CONOPS development. Participate in USFK and JFCOM exercises. Leave second spiral EBO tools with operational USFK planners.

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- FY 2006 – Initiate third spiral developments of TEBO tools and CONOPS. Conduct interim military utility assessments. Continue CONOPS development. Participate in USFK and JFCOM exercises. Leave third spiral EBO tools with operational USFK planners.
- FY 2007 – Enhance and integrate course of action planning capabilities and EBO execution enabling capabilities into Combined Forces Center (CFC) architectures (SRL 5). Enhance and transition ONA capabilities into program(s) of record. Enhance and integrate dynamic assessment capabilities into CFC architectures (SRL 6).

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**FY 2005 ACTDs**

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
ACTIONABLE SITUATIONAL AWARENESS PULL (ASAP)	0.000	3.000	1.800	0.600

Develop, integrate, demonstrate and transition software that provides a “Smart Pull” capability to the tactical, operational and / or strategic user on the Global Information Grid (GIG) for accessing critical situation awareness information resident on distributed databases. Utilizing the Net-Centric Enterprise Services (NCES) architecture a “Smart Pull” service will be operationally demonstrated and transitioned into NCES and other Programs of Record (POR). The ACTD’s top level metrics include increased percentage of useable data available to the user, increased performance through decreased latency of data, percentage of increase in data obtained via “pull” vice “push” procedures, and increased interoperability with coalition forces by use of XML Common Message Format Standards. The User Sponsor of ASAP ACTD is PACOM.

- FY 2005 - Generate Concept of Operations (CONOPS), tactics, techniques and procedures (TTPs) to implement a “Smart Pull” capability by the warfighter. Model and develop the capability and verify through technical and operational demonstrations. Define software specifications and integrate newly developed software into the NCES architecture. Develop a training package and train operational users of the ASAP ACTD software and TTPs in support of operational demonstrations and Interim Joint Military Utility Assessment (IJMUA).
- FY 2006 – Continue development and demonstration software builds around the “Smart pull” capability incorporating feedback from the IJMUA. Add intelligent software agent technology to software builds to help tailor the “Smart pull” capability and an interface to the Command and Control Information Exchange Data Model (C2IEDM) database used by coalition forces. Continue training of operational users prior to conducting operational demonstration and JMUA. Initiate transition of ASAP ACTD products to NCES architecture, User Defined Operational Picture (UDOP), and Integrated Broadcast Service (IBS) programs. Continue development of CONOPs and TTPs.
- FY 2007 – Conduct Extended User Evaluation of ASAP ACTD residual package. Initiate finalization of CONOPs / TTPs, training package and recommendations for Doctrine, Organization, Training, Materiel, Leadership, Personnel and Facilities (DOTMLPF). Transition ASAP ACTD products to programs of record / programs.

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ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Coalition Secure Management and Operations System (COSMOS)	0.000	2.250	2.400	2.400

The COSMOS ACTD will do a pilot implementation of the Multilateral Interoperability Programme (MIP) specifications (specifically the Command and Control Information Exchange Data Model (C2IEDM) and the Information Exchange Mechanism (IEM)) in the Combined Enterprise Regional Information Exchange System (CENTRIXS) coalition network environment. The goal is rapid, secure release and protection of critical C2 information to and among coalition partners on a single and secure integrated coalition network to reduce confusion, uncertainty and delay in combat and crisis operations. The net result will be the bridging of Coalition sourced information with US Global Information Grid (GIG) Network Centric Enterprise Services (NCES) for two-way information exchange.

- FY 2005 – The objectives of the first year are to integrate software products implementing and leveraging the MIP specifications in a testbed environment to initiate investigation, modification and testing of planned COSMOS enhancements. Appropriate demonstration venues, *e.g.*, USPACOM Pacific SimCenter '05 and USEUCOM Combined Endeavor (CE) '05, will be selected to show initial capability as well as allow coalition partners to interface their MIP-compliant implementations.
- FY 2006 - The second year will incorporate application exemplars and Community of Interest (COI) interfaces, with further development of COSMOS related capabilities, *e.g.*, cross domain security solutions. Demonstration venues will leverage already planned MIP system level and operational level test events as well as USEUCOM Combined Endeavor '06, Coalition Warrior Interoperability Demonstration '06, Net Centric Capabilities Pilots, USPACOM Pacific Endeavor'06 and other activities.
- FY 2007 – The third year will focus on incorporation of final application exemplars and Communities of Interest (COI) interfaces, complete development of COSMOS related capabilities leading to a Military Utility Assessment (MUA).

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
CBRN Unmanned Ground Reconnaissance (CUGR)	0.000	3.600	3.500	1.700

Demonstrates and transitions a Joint Contaminated Surface Detector (JCSD) into existing mounted CBRN reconnaissance capabilities and demonstrates the military utility of small, CBRN unmanned ground vehicles (CUGV). These enhancements will provide the Joint and Combined Force commanders' continuous and critical CBRN situational awareness while mitigating the risk to maneuver and supporting forces. U.S. Army Pacific Command (PACOM), in conjunction with the Joint Science and Technology Office for CBD, Joint Program Executive Office for CBD, and Edgewood Chemical and Biological Center will conduct final demonstrations in FY 2006 and FY 2007. PACOM is the CoCom/User Sponsor.

- FY 2005 - Initiate development of Concepts of Operations (CONOPS), Tactics, Techniques, and Procedures (TTPs) and Training Support Packages (TSP). Initiate JCSD prototyping, systems engineering, technical testing and integration. Initiate

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CUGV systems engineering and technical testing. Initiate modifications to JSLNBCRS shelter design, fabricate and integrate on HMMWVs. Complete platform modeling and human factors evaluation, and integrate JCSD with CBRN sensors onto CBRN Reconnaissance platform. Develop ACTD Management, Transition and Test Plans. Conduct Market Survey and selection of CBRN detectors and UGV platforms. Identify and obtain CBRN detection suite components. Purchase CBRN sensors and UGV platforms. Develop communication specifications for the CUGV.

- FY 2006 – Continue CONOPS, TTPs, TSPs, and Test Plans development. Complete JCSD test technology and methodology development. Conduct JCSD early user assessment. Complete technical manual and user training prior to the start of the JCSD demonstration. Conduct JCSD demonstration. Conduct early user assessment on dismounted CUGV and initiate system design and integration of modular capability packages. Complete CUGV engineering design tests and system design, test technology and methodology development, and technical manual and user training prior to the start of demonstration. Conduct dismounted CUGV demonstration. Complete dismounted CUGV Test Plan. Complete dismounted CUGV CONOPS development and continue mounted CONOPS development
- FY 2007 – Provide two JCSD equipped CBRN Reconnaissance platforms and JCSD residual support to the 95<sup>th</sup> Chemical Company (CMLCO) and initiate Extended User Assessment. Conduct robotic platform integration on the third JCSD. Provide two dismounted CUGV residuals to the 95<sup>th</sup> CMLCO along with residual support and initiate CUGV Extended User Assessment. Complete mounted CUGV system design and integration. Conduct mounted CUGV early user assessment. Complete CUGV test technology and methodology development as well as the technical manual and user training prior to the start of the mounted CUGV demonstration. Conduct mounted CUGV demonstration.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Gunship Standoff Precision Munition (Danger Close CAS – Viper Strike)	0.000	0.000	6.000	6.000

Provides precise (<1meter), simultaneous, multiple target effects with minimal collateral damage over a large (3000km<sup>2</sup>) area controlled with a digitized battle management system significantly increasing target effects and aircraft survivability.

- FY 2005 Develop prototype launcher system, modify Viper Strike munition with GPS and develop battle management system interfaces. Conduct laboratory simulations and inert munition safe aircraft separation.
- FY 2006 Launch munition from a C-130/surrogate aircraft in a short range engagement and from an AC-130 in a long range engagement against stationary targets. Modify Viper Strike munition with datalink capability and extended life battery.
- FY 2007 Launch munition from an AC-130 in a long range engagement against a moving target then multiple targets. Conduct Military utility assessment and assess and refine CONOPs and TTPs. Conduct extended user evaluation with

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residual launchers(2), battle management systems (2) and munitions (20).

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Epidemic Outbreak Surveillance (EOS)	0.000	6.000	7.200	7.200

Epidemic Outbreak Surveillance (EOS) ACTD is a FY05 ACTD that demonstrates and transitions solutions that are transformational dual use for biodefense and operational medicine. EOS is designed to rapidly detect and identify a wide range of pathogens. It is intended to overcome two diagnostic challenges: 1) discrimination between diverse pathogens that present similar (i.e. flu-like) symptoms; and 2) screening rapidly, accurately and simultaneously across multiple (100+) candidate pathogens (including dark horses and zebras). EOS exploits sophisticated micro array-based technology, advanced molecular biology procedures, bio-informatics, and connectivity to provide commanders at all levels the information needed to make time-critical decisions. Ultimately this situational awareness provides a high likelihood that correct diagnostic decisions will be made, even prior to the onset of symptoms. In detect-to-warn and detect-to-treat applications, EOS supports sustainment of warfighter capabilities in biologically hostile domains by promoting earlier and targeted interventions, minimizing casualty losses, and reducing mission degradation. The microbial forensic capability of EOS provides detect-to-act support for commanders as they make decisions related to threat source attribution, for tracking and retribution. DUSD/AS&C, USJFCOM, AF/SGEN and JPEO/CBD are the principals for Development, Assessment/CONOPS and Transition of the required system.

- FY 2005 - Begin planning and hardware procurement. Initiate monitoring of basic military trainees at Lackland AFB, TX for outbreaks of candidate pathogens using level 5 research platforms. Conduct user training. Begin development of CONOPS and TTPS. Plan and conduct technical demonstrations. Introduce protocol optimization and process automation to develop prototype platform for small clinic venues (level III).
- FY 2006 – Continue monitoring military trainees for outbreaks. Refine protocols and collect data for certification of EOS as a diagnostic tool. Continue refinement of CONOPS and TTPs.
- FY 2007 - Continue previous activities and expand demonstrations to Joint arenas to include Carrier Battle Groups, Metro DC (NCR) Metro. Conduct Joint Military Utility Demonstrations.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Joint Enhanced Explosive Resistant Coating (JEERC)	0.000	1.500	1.800	1.500

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Explosive Resistant Coating (ERC) is a poly urea material demonstrated to have significant capability to mitigate and reduce damage from explosive blasts. The Joint Enhanced Explosive Resistant Coating (JEERC) ACTD will evaluate the utility of ERC in a wide range of Force Protection scenarios. The ACTD will seek to understand ERC's blast mitigation phenomenology to facilitate better utilization of ERC on a wider range of applications. Areas to be examined are the employment of ERC on vehicles, aircraft, buildings and ships. Central Command is the sponsor and Navy the technical managers. DHS has briefed and been invited to participate coordinating with reps from the UK and Australia for potential coalition partnering.

- FY 2005 - Examine the utility of ERC to provide blast resistance and protection for a wide range of military vehicles. Efforts will include determination of proper formula, application techniques and required performance characteristics against explosive blasts. The primary emphasis in FY-05 will be on vehicle applications with initial evaluation of application of ERC on structures and ships.
- FY 2006 - Continue development of application techniques for vehicles with a greater emphasis on structures and ships.
- FY 2007 - Focus on application of ERC on ships to include new construction vessels (Littoral Combat Ship and High Speed Vessel).

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Joint Coordinated Real-Time Engagement (JCRE)	0.000	2.500	2.700	2.400

The JCRE ACTD will develop the CONOPS and the GIG-enabled software that enables Joint Real-Time Operations and Engagement across multi-Combatant Command (COCOM) Theaters and Echelons. The JCRE ACTD will support Joint and Combined Operations by providing Net-Centric Command and Control Tools that greatly enhance the Planning and Execution across multi-Combatant Commands. These tools will be provided as web services, so they can easily be extended to supporting 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; Multi-COCOM Course of Action (COA) Development Tools; Joint Force Engagement Packages; and Joint Force Synchronization Tools. These JCRE technology components will be implemented using a Service Oriented Architecture (SOA) and distributed orchestration of services. 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.

- FY 2005 - The JCRE will conduct one major demonstration in each year through 2007. These demonstrations will begin with a laboratory demonstration in 2005 and progress to a field exercise in 2007. Demonstration #1. (Fall 2005) Demonstration of Joint

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Force Global Situational Awareness Tools and Multi-COCOM COA Development Tools in a laboratory demonstration environment.

- FY 2006 - Demonstration #2. (Fall 2006) Demonstration of Joint Force Global Situational Awareness Tools, Multi-COCOM COA Development Tools, and Joint Force Engagement Packages in a Command Post exercise.
- FY 2007 - Demonstration #3. (Fall 2007) Demonstration of Joint Force Global Situational Awareness Tools, Multi-COCOM COA Development Tools, Joint Force Engagement Packages, and Joint Force Synchronization Tools in a field exercise. A Joint MUA will be performed in conjunction with the final demonstration. Demonstration goals may be changed based on Operational Manager's direction.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Joint Force Projection (JFP)	0.000	0.000	4.500	3.700

Provides the joint warfighter with a suite of functional tools and applications to support joint deployment planning and execution to rapidly provide required force capabilities. Provides a timely, coherent and comprehensive capability to plan, model, analyze, and execute the joint deployment process from an end-to-end perspective.

- FY 2005 - Develop, test, and demonstrate a semantic-language based workflow portal to link together Force Projection activities from initial planning and requirements for capabilities generation, through sourcing, movement, and delivery to the Joint Force Commander. Gain access to authoritative data sources, develop data structures to link capabilities to forces and forces to capabilities, and then provide tracking throughout the deployment process. Focus on integration of existing tools through application of advanced web-technologies. Develop initial concept of operations (CONOPS). Primary metric: 100% Net-centric access to core deployment planning and execution systems.
- FY 2006 – Develop, test, and demonstrate model-based decision support tools to give the Joint Force Commander the ability to be able to conduct rapid, dynamic course of action analysis and predictive assessment of the deployment flow on current operations. Develop, test, and demonstrate a common, joint toolset for Joint Reception, Staging, Onward Movement, and Integration activities to coordinate the flow of forces and sustainment into a theater during execution. Primary metric: Ability to create, manage, and track capability-based force packages and link them to an operational plan (100%).
- FY 2007 – Finalize demonstration activities and delivery of capability into programs of record, primarily Global Combat Control System (GCCS). Primary metric: Crisis Action Planning and Execution (after release of deployment order) Support development and maintenance cycle for Operations Order (OPORD) and associated products. Cycle time reduction from 2 weeks to < 96 hours. Complete JFP ACTD.

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ACTD Title	FY 2004	FY2005	FY 2006	FY 2007
Medical Situational Awareness in Theater (MSAT)	0.000	4.000	3.600	1.200

Provide combatant Commanders and Joint Task Force (JTF) commanders timely, complete, actionable health information for operational decision-making. This capability provided by a fusion of medical data, personnel location information and health threat intelligence for situational awareness in theater. The improved timeliness and actionable nature of the medical situational awareness information allows theater commanders to reduce both disease and non-battle injuries, as well as combat casualties, while improving combat effectiveness and responsiveness to emergencies. MSAT user sponsor is the U.S. Pacific Command with the Executive Agent being the Office of the Secretary of Defense, Health Affairs, Director of Deployment Health Support.

- FY 2005 – Refine architecture and identify new and sufficiently mature technologies for possible insertion or integration into the MSAT initial spiral. Develop a spiral model to incrementally grow the architecture while eliminating non-viable alternatives and decreasing risk. Prepare Functional Requirements Document identifying user needs to be addressed by the selected technological capabilities. Final preparation for initial field trial.
- FY 2006 – Conduct field trials of interim spiral capabilities and operational concepts. Demonstrate and assess concept of operations and the tactics, techniques and procedures in a joint exercise.
- FY 2007 – Conduct field trails and integration of spiral upgrades with a full assessment of capabilities, operational concepts and procedures in a capstone demonstration during a joint exercise.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Rapid Airborne Reporting & Exploitation (RARE)	0.000	0.900	1.200	0.400

Permits the production of critical, time sensitive Thermal IR MASINT from the SYERS-2 airborne sensor to meet theater commanders needs for certain types of target detection, identification and characterization.

- FY 2005 – Began coordination of Implementation Directive, of Beta capability for OIF and OEF ahead of ACTD planned timeline, and near real time processing of the full collection capability instead of the 10% in the ACTD.
- FY 2006 – Conduct initial flight demonstrations and interim MUA. Complete MUA and final demonstration.
- FY 2007 – Commence transition of capability support into DODISS certified workbench.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
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Sea Eagle	0.000	1.000	2.000	1.000
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Demonstrates and transitions technologies to provide persistent, clandestine, unattended monitoring of maritime, littoral and harbor areas in a Special Operations Forces (SOF) deliverable "system of systems" These funds will be used to support technical downselect, systems integration, and demonstration for the first spiral of the Sea Eagle ACTD and for ongoing technical assessments of sensor and communication technologies for future spirals. The funds will support Johns Hopkins University Applied Physics Lab (the technical integrator for Sea Eagle), Operational Managers support and demonstration costs, and procurement and integration of components for the demonstrations. Systems will be demonstrated when a new capability can be demonstrated to allow an incremental transition strategy. USSOCOM is the CoCom/User Sponsor.

- FY 2005 - Demonstrate an end to end systems solution. Demonstrate a land based electro-optic and infra-red sensor suite, triggered by land based triggers and from a clandestine maritime gateway device. Link land-based equipment together via a close access network. Send the output of the sensors through air via a gateway communications device to a Sea Eagle information handling server at the Mission Support Center (MSC) in Coronado, CA. Link the Sea Eagle server at the MSC to the Global Command and Control System - Maritime (GCCS-M). From the sea, demonstrate a clandestine device, perhaps a buoy, to be used as a multi-media gateway to breach the sea-air interface to communicate a trigger signal to the land based sensors. Additionally, use the gateway to trigger national technical means. Continue technical evaluation of underwater communications technologies. Transition capabilities with military utility.
- FY 2006 – Demonstrate an underwater communications and close access networking capability, and communicate through the clandestine maritime device to land-based systems and/or to the MSC. Demonstrate additional communications alternatives from underwater and from land based sensors to the MSC. Develop CONOPS and TTPS. Transition capabilities with military utility. Evaluate underwater sensors for detecting maritime vessels. Evaluate alternatives for other sensor technologies such as chemical, biological, nuclear, and radiological sensors. Transition capabilities with military utility.
- FY 2007 - For already demonstrated capabilities, iterate and demonstrate a second spiral with enhanced capability. Demonstrate improved networking capability. Demonstrate underwater acoustic sensors to detect and classify maritime vessels, and communicate via underwater close access network through clandestine maritime device with land based sensors and the MSC. Refine CONOPS and TTPs.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Sea Talon	0.000	4.000	2.400	1.200

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Is a new concept for using over-the-horizon offboard systems to detect and manage submarine threats in the littorals and for conducting persistent situational awareness in denied littoral approaches to land-based operational areas. Improves the Under Sea Warfare (USW) effectiveness in littoral areas by combining sonar technologies with unmanned undersea vehicles. Will improve the survivability of host platforms by operating at large standoff distances. Metrics include: evaluation of the system against a relevant threat in an environment characterized by water depth, sound velocity profile, clutter and interfering traffic, and sea state; operations demonstrated in passive, active monostatic, bistatic and multistatic acoustic modes; over-the-horizon operations will be demonstrated through the use of unmanned airborne data link relays; effective hand-off to weapons delivery platforms; measurement of parameters such as: Probability of detection (Pd), Probability of false alarm (Pfa), Area Search Rate (ASR), Stand-off range, Persistence, Time to detect, Time to classify, Time to Deploy (T<sub>d</sub>), Time to recover (T<sub>r</sub>), Situational awareness of countermeasures or spoofing, System vulnerability, Ability to navigate in obstructed waters. Manning requirements or savings will also be evaluated.

- FY 2005 – Will conduct systems engineering design and execute a proof-of-concept demonstration. Continue engineering design based on results. Initiate long lead acquisition for platform components and sensors.
- FY 2006 – Initiate concept of operations planning, continue engineering design and test.
- FY 2007 – Complete engineering design and testing. Conduct Military Utility Assessment (MUA).
- FY 2008 – Transition ACTD platforms to LCS program for EUE.
- FY 2009 – Continue EUE. Conclude ACTD.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
SOF Long Endurance Demonstrator (SLED)	0.000	3.000	6.000	4.800

Demonstrates an unmanned vertical take off and landing vehicle (the A160 Hummingbird VTOL UAV) capable of flying long range (2000+NM/40+ hours) and employing a wide variety of adaptable payloads, supporting combating terrorism (CT), counter proliferation (CP), special reconnaissance (SR), direct action (DA), psychological operations (PSYOP), and other mission areas.

- FY 2005 - Integration of LIDAR and PSYOP payloads. Development of SIL (Simulated Integration Lab) to speed integration process of other payloads. Begin Hellfire missile system integration. Log resupply payload development.
- FY 2006 - Demonstration of LIDAR payload. Demonstration of PSYOP broadcast payload. Complete Hellfire payload integration and demonstrate the capability. Log resupply payload integration and demonstration.
- FY 2007 – Complete CONOPs development. Develop slide on/slide off payload capability. Perform final MUA. Begin Extended

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User Evaluation (EUE).

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Tactical Satellite (TacSat)-2 (Road-Runner)	0.000	2.000	2.800	0.000

Demonstrates use of responsive, flexible and affordable tactical satellites to retain a space capabilities advantage in high threat environments and the concepts for dynamic theater tasking, high-rate theater downlinks and horizontal integration of space derived information via SIPRNET.

- FY 2005 – Build, integrate, launch, and perform on orbit check out and begin operations.
- FY 2006 – Complete MUA and final demonstration.
- FY 2007 – Transition capability to operating command (Air Force Space Command) in support of US STRATCOM.

ACTD Title	FY 2004	FY 2005	FY 2006	FY 2007
Weapon Data Link Network (WDLN)	0.000	5.000	4.800	0.000

The Military Services and Combatant Commanders have numerous standoff weapons programs entering SD&D Phase. Requirements are being identified for a weapon data link capability to enable inflight dynamic re-tasking of the weapons to improve time sensitive targeting and provide a counter-moving target capability. The joint warfighter lacks a currently defined weapons grid with specified standards for information exchange requirements and message sets to facilitate joint interoperability. The WDLN ACTD will define the requirement standards for future weapon data links to enable a fully integrated joint weapons grid where the combatant commanders can fully exploit the capabilities of inherent weapon data links. The residuals of this ACTD will be a defined standard that weapons programs will build to enable the combatant commander to take advantage of a fully integrated weapons grid.

- FY 2005 - Develop network architecture and select a Mil-Std message format that will capitalize on existing joint network standards to provide the earliest benefit to the warfighter, but will not preclude usage of other waveforms or growth to future waveforms. The communication equipment suite would emulate the characteristics of the weapon communicating commands to the weapon control systems and reporting weapon system status and position data to a C2 node after weapon release to insure the weapon can connect successfully to the network and perform its mission.
- FY 2006 - Demonstration of the viability and usability of the network architecture developed during the ACTD effort. The planned approach for the demonstration of the network architecture is to construct a communication equipment suite that will accommodate network enabling hardware and ACTD architecture. Fly a King Air-class aircraft platform carrying a

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communication suite for the demonstration. The communication equipment suite will be flown and exercised in a simulated vehicle within Line Of Sight (LOS) and Beyond Line Of Sight (BLOS) network configurations that include a surrogate Combined Air Operations Center (CAOC) and other C2 platforms (possibly a surrogate Forward Air Controller (FAC) using Tactical Air Control Party (TACP) hardware). Conduct the final ACTD operational demonstration and Joint Military Utility Assessment of the Weapon Data Link Network (WDLN) ACTD. Begin implementation of transition strategy.

- FY 2007 – Continue execution of the transition plan. Finalize CONOPs, TTPs and training package. The architecture products, standards established, and lessons learned will flow into current and future networking requirements for weapon programs including JASSM, SDB Increment 2, WCMD-ER, JSOW-C, and EW programs such as MALD-J. Complete the WDLN ACTD.

**C. Other Program Funding Summary (\$ million):** The new JCTD Program provides a “cradle to grave” path for transformational joint capabilities. The initial funding lines are outlined in the table below. Refer to the specific Budget Exhibit for more details on each funding line.

<b>ACTD and JCTD Program Funding Summary</b>	<b>APPN</b>	<b>BA</b>	<b>PE</b>	<b>LINE #</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>FY 2006</b>	<b>FY 2007</b>
Advanced Concept Technology Development (ACTD)	RDT&E	3	0603750D8Z	44	212.570	212.915	163.649	163.744
Joint Capability Technology Demonstration (JCTD)	RDT&E	3	0603648D8Z	36	0	0	35.000	35.000
Joint Capability Technology Demonstration (JCTD)	RDT&E	4	0604648D8Z	83	0	0	3.000	3.000
Defense Acquisition Executive (JCTD Pilot Program)	RDT&E	5	0605648D8Z	99	0	0	1.000	1.000
Procurement (JCTD Pilot), Major Equipment-OSD Def Wide	Proc	1	0902198D8Z		0	0	1.000	1.000
Total:							40.000	40.000

**D. Acquisition Strategy:** N/A

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**E. Specific funding for each ACTD by fiscal year started (*Dollars in Millions*).**

<b>FY 1997 ACTDs</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>FY 2006</b>	<b>FY 2007</b>
Chemical Add-On to Biological Detection*	0.000	0.000	0.000	0.000
Consequence Management*	0.000	0.000	0.000	0.000
Counterproliferation II*	0.000	0.000	0.000	0.000
Extending the Littoral Battlespace & JTF Warnet*	0.000	0.000	0.000	0.000
Information Operations Planning Tool*	0.000	0.000	0.000	0.000
Integrated Collection Management*	0.000	0.000	0.000	0.000
Joint Advanced Health and Usage Monitoring System**	0.800	0.000	0.000	0.000
Military Operations in Urban Terrain*	0.000	0.000	0.000	0.000
Rapid Terrain Visualization*	0.000	0.000	0.000	0.000

\* Completed

\*\* Completed the demonstration phase of the ACTD.

<b>FY 2000 ACTDs</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>FY 2006</b>	<b>FY 2007</b>
CINC 21*	1.500	0.400	0.000	0.000
Coalition Aerial Surveillance and Reconnaissance	2.900	0.600	0.000	0.000
Communication/Navigation Outage Forecasting System	1.000	0.000	0.000	0.000
Computerized Operational MASINT Weather	0.000	0.000	0.000	0.000
Content-Based Information Security	0.000	0.000	0.000	0.000
Global Monitoring of ISR Space Systems *	.200	0.000	0.000	0.000
Ground-To-Air Passive Surveillance *	0.000	0.000	0.000	0.000
Joint Intelligence, Surveillance and Reconnaissance	0.000	0.000	0.000	0.000
Multiple Link Antenna System *	0.000	0.000	0.000	0.000
Quick Bolt*	0.000	0.000	0.000	0.000
Restoration of Operations*	1.700	0.000	0.000	0.000
Tri-Band Antenna Signal Combiner*	0.000	0.000	0.000	0.000

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<b>FY 2001 ACTDs</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>FY 2006</b>	<b>FY 2007</b>
Active Network Intrusion Defense	1.700	1.200	0.000	0.000
Adaptive Battlespace Awareness **	1.700	1.100	0.000	0.000
Advanced Tactical Laser	5.600	3.600	1.200	0.000
Advanced Technology Ordnance Surveillance **	0.700	0.700	0.000	0.000
Area Cruise Missile Defense**	0.000	0.000	0.000	0.000
Coalition Combat Identification	5.700	3.000	1.800	0.000
Coalition Theater Logistics **	2.200	0.000	0.000	0.000
Coastal Area Protection System*	0.000	0.000	0.000	0.000
Hunter Standoff Killer Team	6.200	4.200	1.400	0.000
Joint Area Clearance **	1.100	0.000	0.000	0.000
Loitering Electronic Warfare Killer***	0.100	0.000	0.000	0.000
Network-Centric Collaborative Targeting **	5.600	1.800	0.600	0.000
Personnel Recovery Extraction Survivability Aided by Smart Sensors	6.200	0.000	0.000	0.000
Tactical Missile System - Penetrator **	0.600	0.000	0.000	0.000
Theater Integrated Planning Subsystem **	0.700	0.300	0.300	0.000

\* Completed

\*\* Completed the demonstration phase of the ACTD

\*\*\* This ACTD was concluded in early FY 2004 and returned to the technical base due to technical maturity issues.

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<b>FY 2002 ACTDs</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>FY 2006</b>	<b>FY 2007</b>
Active Denial System	8.600	3.600	3.600	0.000
Agent Defeat Warhead	0.800	4.200	0.000	0.000
Agile Transportation for the 21 <sup>st</sup> Century (AT21)	7.000	1.000	0.000	0.000
Boundary Step	0.600	0.600	0.000	0.000
Coalition Information Assurance Common Operational Picture	3.600	3.700	1.800	1.200
Contamination Avoidance at Seaports of Debarkation **	3.400	1.200	1.200	0.000
Expendable Unmanned Aerial Vehicle **	0.900	0.500	0.000	0.000
Homeland Security Command and Control **	6.100	3.600	2.400	0.000
Hyperspectral Collection and Analysis	1.600	0.200	0.400	0.000
Joint Distance Support and Response **	3.600	2.800	2.400	0.000
Joint Explosive Ordnance Disposal	7.100	0.600	0.600	0.000
Language and Speech Exploitation Resources	2.000	0.000	0.000	0.000
Micro Air Vehicle	3.400	3.000	1.200	0.000
Pathfinder	1.000	0.800	0.800	0.000
Signals Intelligence Processing	0.600	0.000	0.600	0.000
Space-Based Moving Target Indicator	6.200	0.600	0.600	0.000
SPARTAN	3.900	2.400	3.600	4.800
Thermobarics	2.200	4.800	2.400	0.000

\*\* Completed the demonstration phase of the ACTD

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<b>FY 2003 ACTDs</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>FY 2006</b>	<b>FY 2007</b>
Adaptive Joint C4ISR Node	6.200	5.900	.800	0.800
Counter Bomb/ Counter Bomber	4.500	6.000	6.000	2.400
Deployable Cargo Screening	1.100	0.400	1.000	0.000
Foliage Penetration Synthetic Aperture Radar	0.000	1.200	1.200	0.000
Gridlock	4.400	3.900	0.000	0.000
High Altitude Airship	4.500	4.800	4.800	2.400
Joint Blue Force Situational Awareness **	2.800	0.900	0.500	0.000
Midnight Stand	2.800	1.200	0.000	0.000
Night Vision Cave and Urban Assault	6.300	6.300	1.700	0.800
Overwatch	2.800	4.500	1.200	0.000
Tactical IFSAR Mapping	5.700	1.200	1.200	1.200
Theater Support Vessel	5.600	9.100	0.000	0.000
Tunnel Target Defeat	0.000	0.000	0.000	0.000
Urban Recon	1.600	1.500	0.300	0.300

\*\* Completed the demonstration phase of the ACTD

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<b>FY 2004 ACTDs</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>FY 2006</b>	<b>FY 2007</b>
Advanced Tactical Targeting Technology	5.000	6.000	4.800	0.000
Agile Rapid Global Combat Support	3.000	4.800	4.800	1.900
Coalition Reception Staging and Inward Movement	0.300	0.300	0.100	0.100
Coalition Shared Intelligence Network Environment	0.200	0.300	0.200	0.200
Future Tactical Truck System	4.500	7.200	1.200	0.600
Joint Precision Airdrop System	0.500	2.800	4.300	1.300
Joint Unmanned System Common Control	3.500	4.200	0.600	0.600
Man-Portable Threat Warning System	4.500	6.000	4.200	0.000
Multi-Sensor Aerospace/ Ground Joint ISR Interoperability Coalition	2.500	2.100	2.000	2.000
MAGNUM	2.500	2.400	1.800	0.000
Protected Landing and Takeoff	0.000	0.000	0.600	0.600
Psychological Operations Global Reach	2.900	8.000	4.700	2.400
Theater Effects-Based Operations	4.000	5.300	4.800	4.800

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<b>FY 2005 ACTDs</b>	FY 2004	FY 2005	FY 2006	FY 2007
Actionable Situational Awareness Pull (ASAP)	0.000	3.000	1.800	0.600
CBRN Unmanned Ground Reconnaissance (CUGR)	0.000	3.600	3.500	1.700
Coalition Secure Management and Operations System (COSMOS)	0.000	2.250	2.400	2.400
Danger Close CAS/AC-130 Standoff PGM Viper	0.000	0.000	6.000	6.000
Epidemic Outbreak Surveillance (EOS)	0.000	6.000	7.200	7.200
Joint Coordinated Real-Time Engagement (JCRE)	0.000	2.500	2.700	2.400
Joint Enhanced Explosion Resistant Coating (JEERC)	0.000	1.538	1.800	1.500
Joint Force Protection (JFP)	0.000	0.000	4.500	3.700
Medical Situational Awareness in Theater (MSAT)	0.000	4.000	3.600	1.200
Rapid airborne Reporting & Exploitation (RARE)	0.000	0.900	1.200	0.400
Sea Eagle	0.000	1.019	2.000	1.000
Sea Talon	0.000	4.000	2.400	1.200
SOCOM Long Endurance Demonstrator (SLED)	0.000	3.000	6.000	4.800
TACSAT-2 Roadrunner	0.000	2.000	2.800	0.000
Weapons Data Link (WDL)	0.000	4.500	4.800	0.000

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Exhibit R-2, RDT&E Budget Item Justification							Date: February 2005	
Appropriation/Budget Activity RDT&E, DW BA3				R-1 Item Nomenclature: High Performance Computing Modernization Program PE 0603755D8Z				
Cost (\$ in millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Total PE Cost	197.526	222.927	189.747	192.101	201.127	200.471	204.635	209.272
<b>A. Mission Description and Budget Item Justification:</b>								
<u>BRIEF DESCRIPTION OF ELEMENT</u>								
<p>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 high performance computing technology, the defense research, development, test and evaluation (RDT&amp;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&amp;T) and test and evaluation (T&amp;E) programs.</p> <p>The HPC Modernization Program has established and supports four major shared resource supercomputing centers (MSRCs) as well as several smaller, special-purpose distributed supercomputing centers (DCs). These centers directly support the DoD S&amp;T and T&amp;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&amp;T and T&amp;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.</p> <p>The HPC Modernization Program user base includes 4,572 Scientists and Engineers at about 180 (Department of Defense Laboratories and Test Centers, academic institutions and commercial businesses). The integrated HPC program consists of Shared Resource Centers; the Defense Research and Engineering Network; and Software Application Support. The MSRCs are responsible for as large a fraction of DoD's S&amp;T and T&amp;E computational workload as feasible. These MSRCs provide extensive capabilities to address user requirements for hardware, software, and programming environments. A limited set of smaller shared resource centers, Distributed Centers (DCs), augment the MSRCs to form the total HPC Modernization Program computational capability. Distributed Centers address critical HPC requirements that cannot be met at MSRCs, such as real-time, and near real-time computing requirements, and leverage significant HPC and mission expertise located at these</p>								

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remote sites. The MSRCs and DCs are currently 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 environment, 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:

- Provide the best commercially available high-end HPC capability.
- Acquire and develop joint-need HPC applications, software tools and programming environments.
- Educate and train DOD's scientists and engineers to effectively use advanced computational environments.
- Link users and computer sites via high-capacity networks, facilitating user access and distributed computing environments.
- Promote collaborative relationships among the DoD HPC community, the National HPC community and MSIs in network, computer and computational science.

There are currently 16 distributed centers. In FY 2004 five existing centers were upgraded, and funding exists in the 2005 Procurement budget to upgrade or establish approximately five distributed centers. Currently supported distributed centers and their locations are as follows:

- Aberdeen Test Center, Aberdeen, MD
- Aeronautical Systems Center Simulation and Analysis Facility, Wright-Patterson AFB, OH
- Air Force Research Laboratory/ Information Directorate (AFRL/IF), Rome, NY
- Air Force Weather Agency, Offutt AFB, NE
- Army High Performance Computing Research Center (AHPARC), Minneapolis, MN
- Arnold Engineering Development Center (AEDC), Arnold AFB, TN
- Arctic Region Supercomputing Center (ARSC), Fairbanks, AK
- Fleet Numerical Meteorology and Oceanography Center, Monterey, CA
- Joint Forces Command (J9), Wright-Patterson AFB, OH and Maui, HI
- Maui High Performance Computing Center (MHPCC), Maui, HI
- Naval Air Warfare Center - Aircraft Division (NAWC-AD), Patuxent River NAS, MD
- Naval Research Laboratory (NRL-DC), Washington, DC
- Redstone Technical Test Center, Huntsville, AL
- Space and Missile Defense Command (SMDC), Huntsville, AL

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- Space and Naval Warfare Systems Center, San Diego, San Diego, CA
- White Sands Missile Range, White Sands Missile Range, NM

In FY 2004 two MSRCs were upgraded and funding exists in the FY 2005 Procurement budget to upgrade 2 centers. The four MSRCs are:

- Army Research Laboratory (ARL), Aberdeen Proving Grounds, MD
- Aeronautical Systems Center (ASC), Wright-Patterson AFB, OH
- US Army Engineer Research and Development Center, Vicksburg, MS
- Naval Oceanographic Office, Stennis Space Center, MS

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 (WORLD.COM) during FY 2002. DREN currently provides services to sites throughout the continental United States, Alaska, Hawaii, and can be extended overseas where necessary. Minimal access is DS-3 (45 Mbps) with potential high-end access of OC-768 (40 Gbps) over the next 9 years. Current site connectivity ranges from DS-3 to OC-48 (2 Gbps). 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 as well as strong host and user security creating a defense-in-depth security architecture.

**B. Program Change Summary:** The Program was transferred by direction of Congress from the Department of the Air Force to the Department of Defense for FY 2004 execution.

	<u>FY 2004</u>	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>
Previous President's Budget:	202.492	186.666	191.114	193.090
Current FY 2006 President's Budget Submission:	197.526	222.927	189.747	192.101
Adjustments to Appropriated Value:	-4.966	+36.261	-1.367	-0.989
Congressional Program Reductions:	-1.370	-15.289		
Congressional Rescissions:				
Congressional Increases:		+51.550		
Reprogrammings				
SBIR/STTR Transfers:	-3.596			
Program Adjustment:			-1.367	-0.989

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**C. Other Program Funding Summary:**

	<u>FY 2004</u>	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>	<u>FY 2011</u>
0902198D8Z Major Equipment OSD	48.428	52.369	49.501	50.582	51.958	53.332	54.687	57.322

**D. Acquisition Strategy:** N/A

**E. Performance Metrics:**

The HPC Modernization Program supports a cross-Service virtual community of computational scientists and engineers who work together to solve DoD's most challenging problems. Ten computational technology areas have been established to categorize computational projects: Computational Structural Mechanics; Computational Fluid Dynamics; Computational Electromagnetics and Acoustics; Environmental Quality Modeling and Simulation; Climate/Weather/Ocean Modeling and Simulation; Signal and Image Processing; Computational Chemistry and Materials Science; Computational Electronics and Nanoelectronics; Forces Modeling and Simulation/C4I; and Integrated Modeling and Test Environments. These Computational Technology areas were established as fully integrated cross Service entities. Hence DoD's top scientists are working together to solve DoD's most challenging problems. The vast majority of data used on the HPC systems is created on these systems through modeling and simulation efforts associated with specific research and development efforts.

The bulk of program funding is used for operations and maintenance; therefore most costs at a given point in time are fixed rather than variable. When new contracts are awarded variance is limited to the year in which the work is transitioned from the old to the new provider. Based upon work accomplished to date, performance goals will be achieved if funding remains sufficient to satisfy minimum requirements. The HPC Modernization Program is a modernization effort that must attempt to provide the best commercially available supercomputing capability to the DoD laboratories and test centers. Requirements are projected to exceed funding available for the foreseeable future. The program develops projects in the most efficient manner possible based upon funding available.

Performance Metrics Table

Fiscal Year	Strategic Goals Supported	Existing Baseline	Planned Performance Improvement Goal	Actual Performance Improvement Results	Planned Performance Metric	Actual Performance Metric
2004	Provide the best commercially available high-end HPC capability	37.9 Habu Equivalents	Add 50% more capability	TBD	Add 19.0 Habu Equivalents	TBD

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2004	Link users and computer sites via high-capacity networks, facilitating user access and distributed computing environments.	Virtual Private Network on shared Infrastructure - 0% links encrypted	Add encryption to further secure communications	TBD	95% links encrypted by end of FY	TBD	
Fiscal Year	Measurement Area	Measurement Category	Measurement Indicator	Baseline	Planned Improvements to Baseline	Actual Results	
2005	Networking	Total Aggregate Bandwidth Delivered to the User Community	Gigabits per Second (Gbps)	14.3 Gbps	4.7 Gbps	TBD	
2005	Networking	Customer Satisfaction: Users / Customers Rating DREN Above Average	1 to 5 scale	4	4	TBD	
2005	Security	Cat 1 & Cat 2 Security Incidents as Percent of Number of events	Percent of Total Security Events	0.02%	0.02%	TBD	
2005	HPC Capability	Percent of non-real-time Systems' Requirements (Projected) Satisfied (Actual)	Habu Equivalents	72.4 Habus	43.4 Habus	TBD	
2006	Networking	Total Aggregate Bandwidth Delivered to the User Community	Gigabits per Second (Gbps)	19.0 Gbps	1.0 Gbps	TBD	
2006	Networking	Customer Satisfaction: Users / Customers Rating DREN Above Average	1 to 5 scale	4	4	TBD	

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2006	Security	Cat 1 & Cat 2 Security Incidents as Percent of Number of events	Percent of Total Security Events	.02%	.02%	TBD
2006	HPC Capability	Percent of non-real-time Systems' Requirements (Projected) Satisfied (Actual)	Habu Equivalentents	115.8 Habus	69.4 Habus	TBD
2007	Networking	Total Aggregate Bandwidth Delivered to the User Community	Gigabits per Second (Gbps)	20.0 Gbps	1.0 Gbps	TBD
2007	Networking	Customer Satisfaction: Users / Customers Rating DREN Above Average	1 to 5 scale	4	4	TBD
2007	Security	Cat 1 & Cat 2 Security Incidents as Percent of Number of events	Percent of Total Security Events	.02%	.02%	TBD
2007	HPC Capability	Percent of non-real-time Systems' Requirements (Projected) Satisfied (Actual)	Habu Equivalentents	185.2 Habus	111.1 Habus	TBD

Generally, the HPC Modernization Program management team evaluates the effectiveness of each program component by measuring actual cost and schedule performance versus planned cost and schedule performance and through the measurement of actual outcomes verses planned outcomes. The financial manager conducts in-depth semi-annual reviews with each major component manager and major field activity to review actual cost performance against budgeted cost goals in a tailored WBS format with special attention on variance analysis. Significant variances are reported to the program director and corrective actions taken. Prior to each review, each major component provides data in a standardized format provided by the program office

HPC Centers: Operations and maintenance activities are tracked through weekly teleconferences, monthly reports and semi-annual budget reviews. The MSRC contractors submit several reports on a regularly scheduled basis including a monthly financial summary report (FSR) and

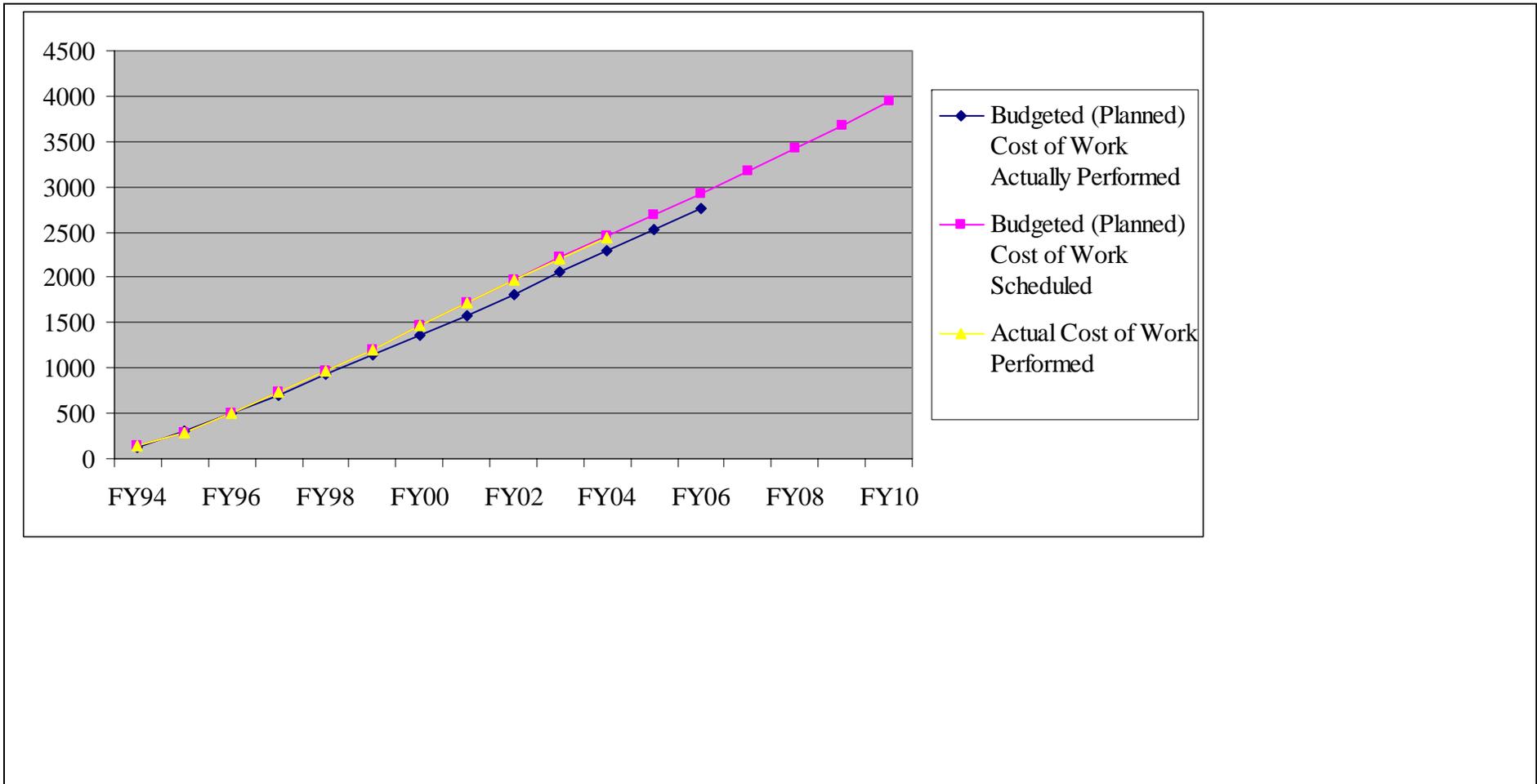
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a quarterly contract funds status report (CFSR). Each contract specifies as a deliverable a work breakdown structure (WBS) to facilitate on-going review of smaller task components. Cost/schedule status reports are one of the primary tools used for oversight management of Major Shared Resource Centers. Extensive cost variance analysis is used to compare costs across the centers and to compare current and projected operating & maintenance costs to historical records and approved operating plans. All sites report on a common work break down structure facilitating this level of review. Extensive Excel spreadsheets have been developed to facilitate comparisons. Sites report monthly operating performance against established performance metrics. Cumulative and site specific performance is analyzed and summarized in an Oracle database and presented on a set of standard reports.

Networking: Near-real-time tracking of key performance measures is available through a browser interface. Monthly reports are provided that track performance and assess any incurred penalty credits. Subprojects (e.g. IPv6 transition) are reviewed monthly against cost schedule and performance goals.

Software Applications Support: The Programming Environments and Training contractors submit several reports on a regularly scheduled basis including a monthly financial summary report (FSR) and a quarterly contract funds status report (CFSR). Each contract specifies as a deliverable a work breakdown structure (WBS) to facilitate on-going review of smaller task components. Cost/schedule status reports are one of the primary tools used SAS program manager. Extensive cost variance analysis is used to compare current and projected costs to historical records and approved plans. All software projects establish a baseline that includes project technical, cost, and schedule goals and requirements for protection of government intellectual property rights and national security assets, which might result from the software development.

Performance Summary Table (\$ in millions)



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Exhibit R-2a, RDT&E Project Justification							Date: February 2005	
Appropriation/Budget Activity RDT&E, DW BA3				R-1 Item Nomenclature: High Performance Computing Modernization Program PE 0603755D8Z				
Cost (\$ in millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Total PE Cost	197.526	222.927	189.747	192.101	201.127	200.471	204.635	209.272
<p><b>A. Brief Description Of Element</b></p> <p>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.</p> <p>The HPC Modernization Program has established and supports four major shared resource supercomputing centers (MSRCs) as well as several smaller, special-purpose distributed supercomputing centers (DCs).</p> <p>The HPC Modernization Program user base includes 4,572 Scientists and Engineers at about 180 sites (Department of Defense Laboratories and Test Centers, academic institutions and commercial businesses). The integrated HPC program consists of shared resource centers, networking and software initiatives.</p> <p>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.</p> <p>In FY 2004 two of 4 MSRCs were upgraded and funding exists in the FY 2005 Procurement budget to upgrade 2 centers.</p> <p>There are currently 16 distributed centers. In FY 2004 five existing centers were upgraded, and funding exists in the 2005 Procurement budget to upgrade or establish approximately five distributed centers.</p> <p>The Defense Research and Engineering Network (DREN) provides wide area network (WAN) connectivity among the Department's S&amp;T and T&amp;E communities.</p> <p>The HPC Modernization Program employs state-of-the-art WAN security as well as strong host and user security creating a defense-in-depth security architecture.</p>								

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<b>B. Accomplishments/Planned Program</b>				
Shared Resource Centers	FY 2004	FY 2005	FY 2006	FY 2007
Accomplishment/ Effort/Subtotal Cost	118.673	139.517	93.806	97.766
<p>FY 2004 Accomplishments:</p> <p>Shared Resource Centers: The program sustained existing capability and continued modernizing HPC systems, storage, and scientific data analysis and visualization capabilities to fulfill a significant portion of the science and technology (S&amp;T) and test and evaluation (T&amp;E) community HPC requirements.</p> <p>MSRC Sustainment: The program sustained and supported the integration, operation, and use of HPC computational resources at the four MSRCs. (\$79.962 million)</p> <p>Distributed Center Sustainment: Due to program funding limitations recognized in 1996, a decision was made to only support investments in HPC systems at new or existing DCs with HPC Modernization Program procurement funding. In return for the HPC Modernization Program investment, the DC organization agrees to appropriately fund the sustainment and operations of the HPC equipment located at the site. There are two exceptions. The program partially funded sustainment and operations at the Maui High Performance Computing Center and the Arctic Region Supercomputer Center. FY 2004 funding was increased \$18.100 million by Congress. (\$38.711 million)</p> <p>FY 2005 Plans:</p> <p>Shared Resource Centers: The program will sustain existing capability and continued modernizing HPC systems, storage, and scientific data analysis and visualization capabilities to fulfill a significant portion of the science and technology (S&amp;T) and test and evaluation (T&amp;E) community HPC requirements.</p> <p>MSRC Sustainment: The program will sustain and support the integration, operation and use of HPC computational resources at the four MSRCs. (\$76.491 million)</p> <p>Distributed Center Sustainment: Due to program funding limitations recognized in 1996, a decision was made to only support investments in HPC systems at new or existing DCs with HPC Modernization Program procurement funding. In return for the HPC Modernization Program investment, the DC organization agrees to appropriately fund the sustainment and operations of the HPC Modernization Program equipment located at the site. There are two exceptions. The program budget includes funds for partial sustainment and operations at the Maui High Performance Computing Center and the Arctic Region Supercomputer Center. The FY2005 Defense Appropriation Acts included an additional</p>				

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\$46.6 million for Distributed Centers. (\$63.026 million)

FY 2006 Plans:

Shared Resource Centers: The program will sustain existing capability and continued modernizing 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.

MSRC Sustainment: The program will sustain and support the integration, operation and use of HPC computational resources at the four MSRCs. (\$70.237 million)

Distributed Center Sustainment: Due to program funding limitations recognized in 1996, a decision was made to only support investments in HPC systems at new or existing DCs with HPC Modernization Program procurement funding. In return for the HPC Modernization Program investment, the DC organization agrees to appropriately fund the sustainment and operations of the HPC Modernization Program equipment located at the site. There are two exceptions. The program budget includes funds for partial sustainment and operations at the Maui High Performance Computing Center and the Arctic Region Supercomputer Center. (\$23.569 million)

FY 2007 Plans:

Shared Resource Centers: The program will sustain existing capability and continued modernizing 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.

MSRC Sustainment: The program will sustain and support the integration, operation and use of HPC computational resources at the four MSRCs. (\$73.745 million)

Distributed Center Sustainment: Due to program funding limitations recognized in 1996, a decision was made to only support investments in HPC systems at new or existing DCs with HPC Modernization Program procurement funding. In return for the HPC Modernization Program investment, the DC organization agrees to appropriately fund the sustainment and operations of the HPC Modernization Program equipment located at the site. There are two exceptions. The program budget includes funds for partial sustainment and operations at the Maui High Performance Computing Center and the Arctic Region Supercomputer Center. (\$24.021 million)

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Defense Research and Engineering Network	FY 2004	FY 2005	FY 2006	FY 2007
Accomplishment/ Effort/Subtotal Cost	32.317	28.399	32.766	31.570
<p>FY 2004 Accomplishments:</p> <p>Network services continued to be provided. Operation of security systems and enhancements continued. The DREN expanded internet protocol (IPv-6) testing for the Department of Defense and upgrade to full point-to-point encryption of the network. Collaborative work continued with the Federal networking community and standards associations to assure DREN remains compatible with future technology change.</p> <p>FY 2005 Plans:</p> <p>Network services will be provided. Operation of security systems and enhancements will continue. Collaborative work will continue with the Federal networking community and standards associations to assure DREN remains compatible with future technology change.</p> <p>FY 2006 Plans:</p> <p>Network services will be provided. Operation of security systems and enhancements will continue. Collaborative work will continue with the Federal networking community and standards associations to assure DREN remains compatible with future technology change.</p> <p>FY 2007 Plans:</p> <p>Network services will be provided. Operation of security systems and enhancements will continue. Collaborative work will continue with the Federal networking community and standards associations to assure DREN remains compatible with future technology change.</p>				
Software Applications Support	FY 2004	FY 2005	FY 2006	FY 2007
Accomplishment/ Effort/Subtotal Cost	46.536	55.011	63.175	62.765

FY 2004 Accomplishments:

Development efforts in software programs continued to mature as projects were completed, and others begun. A new Academic Outreach Program was implemented to encourage and support computational science in universities across the United States. New Software Institutes were created to better develop shared scalable applications to exploit scalable HPC assets. The Programming Environments and Training effort continued to provide computational and computer science support to the DoD HPC user community through interaction and collaborative projects with academic and industrial partners. Efforts continued 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.

FY 2005 Plans:

Development efforts in software programs will continue to mature as projects are completed, and others begin. The Software Institutes will be fully implemented. Software projects will continue developing shared scalable applications to exploit scalable HPC assets. The Programming Environments and Training effort will continue to provide computational and computer science support to the DoD HPC user community through interaction and collaborative projects with academic and industrial partners. Efforts will continue 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.

FY 2006 Plans:

Development efforts in software programs will continue to mature as projects are completed, and others begin. Software projects will continue developing shared scalable applications to exploit scalable HPC assets. The Programming Environments and Training effort will continue to provide computational and computer science support to the DoD HPC user community through interaction and collaborative projects with academic and industrial partners. Efforts will continue 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.

FY 2007 Plans:

Development efforts in software programs will continue to mature as projects are completed, and others begin. Software projects will continue developing shared scalable applications to exploit scalable HPC assets. The Programming Environments and Training effort will continue to provide computational and computer science support to the DoD HPC user community through interaction and collaborative projects with academic and industrial partners. Efforts will continue 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.

**C. Other Program Funding Summary:**

	<u>FY 2004</u>	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>	<u>FY 2011</u>
0902198D8Z Major Equipment OSD	48.428	52.369	49.501	50.582	51.958	53.332	54.687	57.322

**D. Acquisition Strategy:** N/A**E. Performance Metrics:**

## Major Performers:

Four major contracts to support the MSRCs were competitively awarded between fourth quarter FY 2002 and first quarter FY 2003. These contracts provide comprehensive support services for up to eight years.

- Computer Science Corporation, Huntsville, AL (awarded two contracts)
- Lockheed Martin of Herndon, VA
- Raytheon E-Systems, Garland, TX

The DREN is implemented through the follow-on DREN Intersite Services Contract (DISC) awarded in FY 2002 and fully transitioned in FY 2003

- MCI WorldCom Communications, Inc, McLean, VA (FY 2002 – 2012)

Two contracts to provide programming environment and training services were awarded in FY 2001.

- Mississippi State University, Starkville, MS
- High Performance Technologies, Inc. (HPTi), Arlington, VA.

## Other Major Contracts.

- Instrumental, Inc., Garland, TX (FY 2003)
- University of Alaska., Fairbanks, AK (FY 2002)

The HPC Modernization Program supports a cross-Service virtual community of computational scientists and engineers who work together to solve DoD's most challenging problems. Ten computational technology areas have been established to categorize computational projects:

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Computational Structural Mechanics; Computational Fluid Dynamics; Computational Electromagnetics and Acoustics; Environmental Quality Modeling and Simulation; Climate/Weather/Ocean Modeling and Simulation; Signal and Image Processing; Computational Chemistry and Materials Science; Computational Electronics and Nanoelectronics; Forces Modeling and Simulation/C4I; and Integrated Modeling and Test Environments. These Computational Technology areas were established as fully integrated cross Service entities. Hence DoD's top scientists are working together to solve DoD's most challenging problems. The vast majority of data used on the HPC systems is created on these systems through modeling and simulation efforts associated with specific research and development efforts.

The bulk of program funding is used for operations and maintenance; therefore most costs at a given point in time are fixed rather than variable. When new contracts are awarded variance is limited to the year in which the work is transitioned from the old to the new provider. Based upon work accomplished to date, performance goals will be achieved if funding remains sufficient to satisfy minimum requirements. The HPC Modernization Program is a modernization effort that must attempt to provide the best commercially available supercomputing capability to the DoD laboratories and test centers. Requirements are projected to exceed funding available for the foreseeable future. The program develops projects in the most efficient manner possible based upon funding available.

Performance Metrics Table

Fiscal Year	Strategic Goals Supported	Existing Baseline	Planned Performance Improvement Goal	Actual Performance Improvement Results	Planned Performance Metric	Actual Performance Metric
2004	Provide the best commercially available high-end HPC capability	37.9 Habu Equivalents	Add 50% more capability	TBD	Add 19.0 Habu Equivalents	TBD
2004	Link users and computer sites via high-capacity networks, facilitating user access and distributed computing environments.	Virtual Private Network on shared Infrastructure - 0% links encrypted	Add encryption to further secure communications	TBD	95% links encrypted by end of FY	TBD

Fiscal Year	Measurement Area	Measurement Category	Measurement Indicator	Baseline	Planned Improvements to Baseline	Actual Results
2005	Networking	Total Aggregate Bandwidth Delivered to the User Community	Gigabits per Second (Gbps)	14.3 Gbps	4.7 Gbps	TBD

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2005	Networking	Customer Satisfaction: Users / Customers Rating DREN Above Average	1 to 5 scale	4	4	TBD	
2005	Security	Cat 1 & Cat 2 Security Incidents as Percent of Number of events	Percent of Total Security Events	0.02%	0.02%	TBD	
2005	HPC Capability	Percent of non-real-time Systems' Requirements (Projected) Satisfied (Actual)	Habu Equivalents	72.4 Habus	43.4 Habus	TBD	
2006	Networking	Total Aggregate Bandwidth Delivered to the User Community	Gigabits per Second (Gbps)	19.0 Gbps	1.0 Gbps	TBD	
2006	Networking	Customer Satisfaction: Users / Customers Rating DREN Above Average	1 to 5 scale	4	4	TBD	
2006	Security	Cat 1 & Cat 2 Security Incidents as Percent of Number of events	Percent of Total Security Events	.02%	.02%	TBD	
2006	HPC Capability	Percent of non-real-time Systems' Requirements (Projected) Satisfied (Actual)	Habu Equivalents	115.8 Habus	69.4 Habus	TBD	

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2007	Networking	Total Aggregate Bandwidth Delivered to the User Community	Gigabits per Second (Gbps)	20.0 Gbps	1.0 Gbps	TBD
2007	Networking	Customer Satisfaction: Users / Customers Rating DREN Above Average	1 to 5 scale	4	4	TBD
2007	Security	Cat 1 & Cat 2 Security Incidents as Percent of Number of events	Percent of Total Security Events	.02%	.02%	TBD
2007	HPC Capability	Percent of non-real-time Systems' Requirements (Projected) Satisfied (Actual)	Habu Equivalents	185.2 Habus	111.1 Habus	TBD

Generally, the HPC Modernization Program management team evaluates the effectiveness of each program component by measuring actual cost and schedule performance versus planned cost and schedule performance and through the measurement of actual outcomes versus planned outcomes. The financial manager conducts in-depth semi-annual reviews with each major component manager and major field activity to review actual cost performance against budgeted cost goals in a tailored WBS format with special attention on variance analysis. Significant variances are reported to the program director and corrective actions taken. Prior to each review, each major component provides data in a standardized format provided by the program office

HPC Centers: Operations and maintenance activities are tracked through weekly teleconferences, monthly reports and semi-annual budget reviews. The MSRC contractors submit several reports on a regularly scheduled basis including a monthly financial summary report (FSR) and a quarterly contract funds status report (CFSR). Each contract specifies as a deliverable a work breakdown structure (WBS) to facilitate on-going review of smaller task components. Cost/schedule status reports are one of the primary tools used for oversight management of Major Shared Resource Centers. Extensive cost variance analysis is used to compare costs across the centers and to compare current and projected

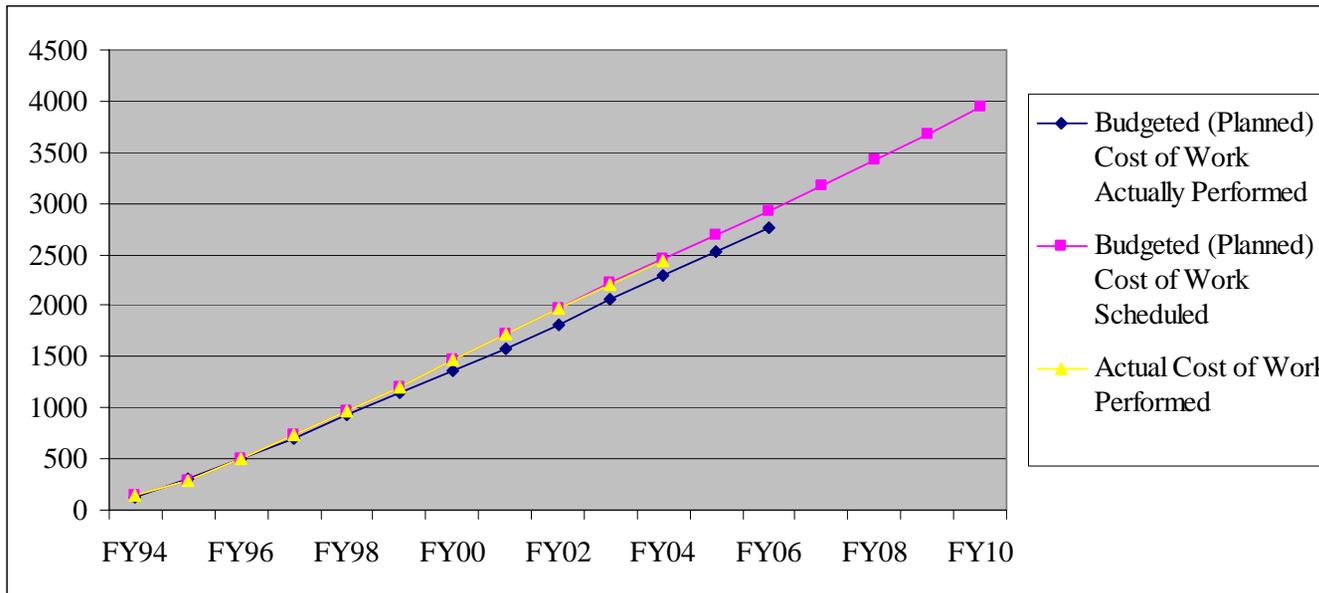
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operating & maintenance costs to historical records and approved operating plans. All sites report on a common work break down structure facilitating this level of review. Extensive Excel spreadsheets have been developed to facilitate comparisons. Sites report monthly operating performance against established performance metrics. Cumulative and site specific performance is analyzed and summarized in an Oracle database and presented on a set of standard reports.

Networking: Near-real-time tracking of key performance measures is available through a browser interface. Monthly reports are provided that track performance and assess any incurred penalty credits. Subprojects (e.g. IPv6 transition) are reviewed monthly against cost schedule and performance goals.

Software Applications Support: The Programming Environments and Training contractors submit several reports on a regularly scheduled basis including a monthly financial summary report (FSR) and a quarterly contract funds status report (CFSR). Each contract specifies as a deliverable a work breakdown structure (WBS) to facilitate on-going review of smaller task components. Cost/schedule status reports are one of the primary tools used SAS program manager. Extensive cost variance analysis is used to compare current and projected costs to historical records and approved plans. All software projects establish a baseline that includes project technical, cost, and schedule goals and requirements for protection of government intellectual property rights and national security assets, which might result from the software development.

Performance Summary Table (\$ in millions)



<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		Date: February, 2005
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 3		R-1 ITEM NOMENCLATURE Software Engineering Institute (SEI) PE 0603781D8Z

COST (In Millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Total Program Element (PE) Cost	21.601	21.096	25.209	26.180	29.156	29.808	30.409	31.196
Project 781/SEI	19.225	18.775	20.606	21.472	23.117	23.766	24.309	25.006
Project 782/ Software Intensive Systems	2.376	2.321	2.547	2.654	2.857	2.937	3.004	3.091
Project 783/Software Producibility Initiative	0.000	0.000	2.056	2.054	3.182	3.105	3.096	3.099

#### **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.

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 are: 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)].

This funding line includes the Software Intensive Systems (SIS) effort under project 782. The SIS mission stems from the recommendations of the FY 2000 DSB Task Force on Software. The Assessments and Support organization within AT&L/Defense Systems/Systems Engineering manages the SIS mission to improve DoD system acquisition and sustainment. The A&S organization, because of its assessment activities, is strategically positioned to ensure that software acquisition and development technology and best practices are adopted and implemented by DoD acquisition programs. The comprehensive A&S resources ensure coverage of the breadth of responsibilities necessary to achieve the mission of improving system acquisition performance, and to act as the DoD software community focal point. The work is divided into 5 focus areas: Policy & Guidance, Education, Best Practices, Software Engineering Technology, and Collaboration. This DoD function is not affiliated with the Software Engineering Institute.

This funding line also includes the Software Produceability Initiative starting in FY 2006 as project 783. 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 and tools.

**B. Program Change Summary:**

	<u>FY 2004</u>	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>
Previous President's Budget:	22.324	21.599	23.296	23.286
Current FY2006 President's Budget Submission:	21.601	21.096	25.209	26.180
Adjustments to Appropriated Value:	-0.723	-0.503	+1.913	+2.894
Congressional Program Reductions:		-0.503		
Congressional Rescissions:	-0.168			
Congressional Increases:				
Reprogrammings:				
SBIR/STTR Transfers:	-0.555			
Program Adjustment:			+1.913	+2.894

**C. Other Program Funding Summary: N/A****D. Acquisition Strategy: N/A****E. Performance Metrics:**

<b>A&amp;S Performance Measures for Products</b>				
<b>Customer Supported</b>	<b>Activity</b>	<b>Performance Requirement</b>	<b>Performance Measure</b>	<b>Method of Measurement</b>
SEI Admin Agent	Ensure value to PWS Customers	Average rating of 4 or higher	Level of overall performance	Paper or electronic survey of customers
SEI Admin Agent	Contract Billings	All costs are allowable and allocable	Contract costs	Approval by ACO
SEI Admin Agent	Performance and Cost Review	Less than 5% of solicited programs	Number of unsatisfactory ratings	DCAA conducts periodic review
For SIS: PM	Ensure valuable assistance to programs' success	Provide actionable and effective recommendations to PMs	Percentage of recommendations implemented	Customer Satisfaction Survey to PMs
			Cost avoidance realized as result of implementing recommendations	Interview w/PM as follow-up to Survey

Exhibit R-2a, RDT&E Project Justification							Date: February 2005	
Appropriation/Budget Activity RDT&E, DW/ BA 3				Project Name and Number: 781/Software Engineering Institute (SEI) PE 0603781D8Z				
Cost (\$ in millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Total PE	21.601	21.096	25.209	26.180	29.156	29.808	30.409	31.196
Software Engineering Institute P781	19.225	18.775	20.606	21.472	23.117	23.766	24.309	25.006
<p><b>A. Mission Description and Budget Item Justification: P781</b> 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.</p> <p>The SEI enables the exploitation of emerging software technology by bringing engineering discipline to software acquisition, development, and evolution.</p>								
<b>B. Accomplishments/Planned Program</b>								
Acquisition Practices for DoD Software Intensive Systems	FY 2004	FY 2005	FY 2006	FY 2007				
Accomplishment/ Effort/Subtotal Cost	2.023	2.002	2.145	2.145				
<p>FY 2004 Accomplishments:</p> <ul style="list-style-type: none"> <li>- Conducted Acquisition Support Program, initiating pilot demonstrations of adopting new technology within the DoD program-office environment, coordinating and broadly disseminating lessons learned from these pilots, and providing selected and strategically important software engineering services to the DoD acquisition community.</li> <li>- Enhanced support to those responsible for acquiring software in the Army, Navy, and Air Force, actively working with each service to establish a Strategic Impact Program (SIP) for software-intensive systems.</li> <li>- Established work plans with DoD programs identified as top priorities by the principal SEI sponsor, the Office of the Secretary of Defense (Acquisition, Technology, &amp; Logistics), and increased interaction and support to DoD agencies and joint programs; the SEI participated with OSD on 804 activities. Activities included acquisition pilots and performing diagnostics to aid in early program and engineering risk identification.</li> <li>- Completed development of a Software Acquisition Survival Skills course</li> <li>- Supported OSD on the SISAIG Trilateral (US-UK-AUS) Working Group</li> <li>- Released the CMMI Acquisition Module (CMMI-AM), Version 1.0 for use by DoD and federal government acquisition offices to enable individual process improvement efforts within government program offices.</li> <li>- Conducted a conference on the acquisition of software-intensive systems for government acquisition organization employees, their support agencies</li> </ul>								

(i.e., support contractors, FFRDCs), and federal government contractors.

- Published technical reports on risk-based diagnostics, the benefits of acquisition improvement, CMMI-AM, software process improvement for small manufacturers, measurements for software product lines, and system-of-systems interoperability

**FY 2005 Accomplishments and Plans:**

- Work with key acquisition programs to continually understand and meet the needs of the acquisition community.
- Build delivery teams to support the needs of Army, Air Force, Navy, and civil agency acquisition programs.
- Determine gaps in current acquisition practices and strengthen those practices in support of acquisition programs
- Define mechanisms to support active and ongoing collection and dissemination of lessons learned in support of the acquisition community.

**FY 2006-2007 Plans:**

- Drawing on SEI expertise in software engineering, help DoD and other government acquirers improve their ability to acquire, deploy, and sustain systems and capabilities. Identify opportunities for the SEI to create, apply, and amplify technologies that respond to customer needs.

Software Engineering Technical Practices	FY 2004	FY 2005	FY 2006	FY 2007
Accomplishment/ Effort/Subtotal Cost	12.602	12.576	13.841	14.491

**FY 2004 Accomplishments:**

- Developed technologies in support of survivable systems engineering, enabling organizations to quantitatively assess security posture, characterize threats, and give security analysts and network operators a better overall understanding of their networks; established techniques for modeling and predicting survivability attributes of systems; and matured technology necessary for active network defense.
- Released into the open source community the System for Internet-Level Knowledge (SiLK), a suite of tools to help operators and security analysts better understand their networks
- Analyzed malicious code to determine defenses against it and to identify trends that enable the DoD, federal agencies, and the private sector to anticipate the future evolution of threats from attack technology.
- Designed a sustainable and extensible information assurance training program for the U.S. Army Reserve Information Operations Command (ARIOC)
- Matured and piloted techniques for the largely under-explored, high risk areas of product derivation and sustainment in a product line context.
- Provided integrated, easily accessible knowledge repositories of software product line technology and experience as well as derivative methods and adoption and practice guides.
- Developed, delivered, and licensed software product line courses and certificate programs.
- Worked with U.S. Army to train Army personnel in SEI software architecture courses, principles, and methods.
- Developed and widely distributed books, support aids, case studies, and guidelines that assisted developers and acquirers in using effective software architectural practices.
- Developed, delivered, and licensed courses and certificate programs for software professionals in software architecture.
- Researched and developed quality attribute analysis techniques and their automation, and packaged them in a starter kit.

- Conducted pilots of predictable assembly from certifiable component (PACC) technologies and disseminated results.
- Defined key practices for constructive and programmatic interoperability, and developed and piloted tools and technologies to support the key practices.
- Conducted four workshops with stakeholders from the DoD and other government agencies to identify primary interoperability issues that they are facing and to provide input on emerging areas of focus
- Published key technical reports identifying the basic issues, programs, and research trends in interoperability, including an analysis of open challenges; and analyzing current technological issues and gaps in research, providing the foundation for a research program and a set of experiments in interoperability technologies
- Led development of SAE AADL standard for embedded real-time systems; finalized and balloted in March 2004, approved in September 2004.
- Developed training and tool support for AADL standard.

#### FY 2005 Accomplishments and Plans:

- Mature survivable systems engineering.
- Improve survivable enterprise management.
- Enhance the transition of information-assurance knowledge through practices and training.
- Build a national cyber response and readiness capability and build international computer security information exchange and collaborative analysis capabilities.
- Develop a comprehensive strategy for enhancing situational awareness.
- Mature and enable adoption of product line practices.
- Mature and transition software architecture technology.
- Mature PACC technology and build mechanisms to guide its maturation and transition.
- Develop a conceptual basis for understanding integration and interoperability of software-intensive systems; and identify and plan for the development of mechanisms to guide the maturation and transition of interoperability practices and technologies.
- Develop and apply SAE AADL as a model-based method for specifying, modeling, analyzing, and predicting performance and dependability properties of embedded and real-time systems.

#### FY 2006-2007 Plans:

- Survivable Systems: Ensure that appropriate technology and systems management practices are being used to design and implement networked systems so they recognize, resist, and recover quickly from attacks. •
- Product Line Practice: Provide the technical, business, and acquisition techniques and guidance required for organizations to achieve the significant cost, schedule, and quality benefits associated with using a product line approach for similar systems. •
- Software Architecture Technology: Harness innovations in quality attribute reasoning and software architecture technology for practical use. Provide an effective, integrated, widely available, and widely applicable set of architectural practices, enabling and providing automated support wherever possible.
- Predictable Assembly from Certifiable Components: Provide support for predicting properties of assemblies of components. Ensure that the builders of systems have the ability to select software components on the basis of their predicted runtime behavior within specific assemblies and therefore to predict the runtime behavior of these assemblies or systems.

- Integration of Software-Intensive Systems: Provide the development and acquisition community with principles, methods, and techniques to accomplish broad-based and sustainable integration and interoperation across components, systems, and systems of systems.
- Performance-Critical Systems: Establish a model-based software systems engineering practice for embedded real-time systems. Develop and mature methods for creating and documenting structured rationales showing how evidence gathered during system design and test supports dependability and real-time performance claims for specific systems.

Software Engineering Management Practices	FY 2004	FY 2005	FY 2006	FY 2007
Accomplishment/ Effort/Subtotal Cost	4.600	4.197	4.620	4.836

#### FY 2004 Accomplishments:

- Held workshops, delivered courses, conducted Standard Capability Maturity Model Integration (CMMI) Appraisal Method for Process Improvement (SCAMPI) appraisals, provided direct assistance to organizations, and supported a vast transition partner program to ensure that the acquisition and development communities can implement process improvement programs, understand the applicability and coverage of CMMI best practices, and understand the relationships these models have to other sets of best engineering, management, workforce, and acquisition practices and standards.
- Established proactive certification and quality assurance programs for SCAMPI lead appraisers and instructors to ensure that appraisals are performed with integrity by qualified individuals.
- Set direction for Version 1.2 of the CMMI Product Suite based on input from the user community, analysis, and research.
- Produced interpretive guidance for use of CMMI Product Suite in software-only organizations and in acquisition environments.
- Worked with DoD, government, and industry software developers and acquirers to apply Team Software Process (TSP) to software development and gathered the data and experience to mature the technology to meet early-majority needs.
- Developed and disseminated guidance regarding how to rigorously and systematically assess the value and impact of selected innovations to the engineering of software, systems, and acquisition.
- Developed the indicator template, a tool for documenting an organization's measurement and analysis processes

#### FY 2005 Accomplishments and Plans:

- Develop Version 1.2 of the CMMI Product Suite (models, appraisal methods, and training).
- Maintain CMMI Product Suite by creating, maintaining, and appropriately updating or enhancing products, including appraisal and improvement courseware and guidance for small organizations.
- Manage and administer transition programs and services for the CMMI Product Suite.
- Evolve TSP process and measurement framework and extend to increase breadth and scale of applicability.
- Extend and accelerate transition of TSP.
- Define an engineering process improvement strategy that utilizes TSP to accelerate CMMI-based organizational improvement.
- Provide expertise and specific techniques for software and acquisition organizations to use for measuring and analyzing their performance and managing their projects and processes, and research new areas with promise for improving organizational measurement and analysis capability.

FY 2006-2007 Plans:

- Capability Maturity Model Integration: Provide stewardship for and transition into practice an integrated Capability Maturity Model (CMMI) product suite that provides the DoD and industry with support for process and product improvement.
- Team Software Process: Define explicit team process techniques whose use predictably improves the cost, schedule, quality, and survivability of software-intensive systems developed by an integrated engineering team. Determine cost, schedule, and quality performance that the DoD can expect from teams using the TSP and establish metrics for use in software acquisition.
- Software Engineering Measurement and Analysis: Develop measurement and analysis guidance, information resources, and practices that assist DoD and industry software organizations in managing and improving their software engineering practices.

Exhibit R-2a, RDT&E Project Justification							Date: February 2005	
Appropriation/Budget Activity RDT&E, DW/ BA 3				Project Name and Number P782 Software Intensive Systems PE 0603781D8Z				
Cost (\$ in millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Total PE	21.601	21.096	25.209	26.180	29.156	29.808	30.409	31.196
Software Intensive Systems P782	2.376	2.321	2.547	2.654	2.857	2.937	3.004	3.091
<p><b>A. <u>Mission Description and Budget Item Justification:</u></b> P782 Software-Intensive Systems (SIS). The Systems Engineering Directorate (AT&amp;L/Defense Systems) manages the Software Intensive Systems (SIS) mission to improve DoD SIS acquisition and sustainment. The SE Directorate is the focal point for DoD initiatives that reduce software risk. The SIS mission stems from the recommendations of the FY 2000 DSB Task Force on Software. The SE Directorate is organized into elements that ensure coverage of the breadth of responsibilities necessary to achieve the mission of improving SIS acquisition performance, and to act as the DoD software community focal point. These elements focus on Policy &amp; Guidance, Education, Best Practices, Software Engineering Technology, and Collaboration. SE Directorate conducts its SIS efforts by understanding DoD needs, issues, and solutions; and acting on/transitioning improvements to DoD Enterprise-, Program- and practitioner-levels.</p>								
<p><b>B. <u>Accomplishments/Planned Program</u></b>  <u>FY 2004 accomplishments.</u>  Policy and Guidance:  - Monitored Defense Authorization Section 804 Process Improvement activities implemented by the Services and Agencies.  - Developed guidance for software aspects of systems engineering revitalization effort and the DoD 5000 policy series.  - Issued requirements and monitored the development of CMMI Acquisition Module Version 1.0 (2/ 2004). Validated the module through pilot assessments on 8 diverse DOD programs.</p> <p>Best Practices:  - Contributed software expertise to Defense Acquisition Program Support Reviews.  - Developed initial process and system concepts for the DoD Best Practices Clearinghouse.  - Measurement: Support research into evolutionary acquisition measures and measures to track process improvement programs (in response to Section 804 language). Continue efforts of the DoD Measurement Initiative.</p> <p>Software Engineering Technology:  - Participated in the DUSD(S&amp;T) study into software engineering technology gaps and investment needs.  - Continued software expertise support to the Army's Future Combat Systems program, collected lessons learned on acquiring complex systems of</p>								

systems.

Collaboration:

- Continued the Tri-lateral Software Acquisition Working Group with the UK and Australia. Developed products addressing software product maturity, milestone decision criteria, training, and requirements elicitation.
- Continued membership on SSTC Program Committee and leadership in the Top 5 Software Projects awards.

FY 2005 Plans:

Policy and Guidance:

- Complete implementation of Section 804 and transition monitoring function to the Systems Engineering Forum.
- Revise and publish CMMI AM based on pilot feedback.
- Align systems engineering process guidance and software acquisition/development processes.

Best Practices:

- DoD Best Practices Clearinghouse: Develop two prototypes for operational evaluation. Populate Clearinghouse with initial practice set.
- Actively participate in assessments and systemic analysis activities to identify software-related best practices and practice gaps.

Technology:

- Support research into the integration of iterative software development into the traditional systems engineering process.
- Develop technology for program assessments and systemic analysis
- Continue technology watch activities and software engineering technology needs studies

Collaboration:

- Continue collaborative efforts across DoD and the international community

FY 2006-2007 Plans:

Policy and Guidance:

- Support systemic analysis of program assessments for software-related issues, inadequate or ineffective guidance, or unintended consequences.

Best Practices:

- DoD Best Practices Clearinghouse: Initiate operations and transfer responsibility to DAU. Continue to support clearinghouse population and update.
- Continue to participate in acquisition program assessments

Technology:

- Continue the technology watch activities and software engineering technology needs studies

Collaboration:

- Continue collaborative efforts across DoD and the international community

**C. Other Program Funding Summary: N/A**

Exhibit R-2a, RDT&E Project Justification							Date: February 2005	
Appropriation/Budget Activity RDT&E, DW/ BA 3				Project Name and Number P783/Software Produceability Initiative PE 0603781D8Z				
Cost (\$ in millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Total PE	21.601	21.096	25.209	26.180	29.156	29.808	30.409	31.196
Software Produceability Initiative P783	0.000	0.000	2.056	2.054	3.181	3.104	3.095	3.099
<p><b>A. Mission Description and Budget Item Justification:</b></p> <p>P783 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.</p> <p>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. Establish cost avoidance goals of 10% - requirements phase, 60% - design phase, 80% - code/unit test phase and 40% - integration and test phase in the software development lifecycle. Based on these goals, annuals cost avoidance is estimated at \$10.6 billion. Additionally, these software experts would directly advise ongoing acquisition programs.</p>								
<p><b>B. Accomplishments/Planned Program</b></p> <p>FY 2004 Accomplishments: N/A</p> <p>FY 2005 Plans: N/A</p>								

**FY 2006– FY 2007 Plans:**

In FY 2006, we will develop and finalize technical plans for future research, conduct government/industry/academia workshops and conferences, and begin sponsoring university-based research. We will also fund a study by the National Academy of Sciences on software research needs. Depending upon the Service and Agency commitment of research funds for related initiatives, we will, in FY2007, coordinate joint university/industry/Government research efforts to take promising prototype software techniques and tools and mature them for applicability to Defense acquisition programs. We will also coordinate the initiation of at least one joint university/industry/Government virtual (i.e., not physically collocated) center for integration of tools and techniques into prototype software produceability capabilities. We intend to obtain substantial participation, and possible cost sharing, by traditional Defense contractors and commercial software tool vendors, and also by standards bodies for open source development, industry associations, and consortia (such as ESCHER research institute) for tech transition.

Also depending upon the Service and Agency commitment of research funds for related initiatives, we will coordinate, starting in FY 2007, a software produceability testbed that will host challenging DoD software problem sets, both synthetic and drawn from real DoD programs. The testbed will serve to focus the diverse research projects on common problem statements, thereby facilitating comparison of new techniques and measurement of effectiveness in controlled analyses. The supportability aspects of new technologies will be addressed, including tool documentation, maintenance, integration, and upgrade.

**C. Other Program Funding Summary:**

Not Applicable

**D. Acquisition Strategy:**

Not Applicable

**E. Major Performers:**

National Academy of Sciences, ESCHER Research Institute, Software Productivity Consortium, Other industry (selected competitively) and government performers

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)							DATE February 2005	
APPROPRIATION/BUDGET ACTIVITY RDT&E/Defense Wide/BA 3				R-1 ITEM NOMENCLATURE Quick Reaction Special Projects (QRSP), PE 0603826D8Z				
COST (In Millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Total Program Element (PE) Cost	71.352	41.929	110.717	111.026	115.395	114.248	115.788	117.333
Quick Reaction Fund Project P826	14.911	20.965	29.717	29.926	31.288	31.346	32.098	32.842
Defense Acquisition Challenge Program (DACP) Project P827	17.093	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rapid Reaction Fund Project P828 *Reprogramming Actions	26.619*	75.000**	51.283	51.174	52.819	51.556	51.591	51.650
Technology Transition Initiative (TTI) Project P829	12.729	20.964	29.717	29.926	31.288	31.346	32.099	32.841

\*\*Note: \$75.0 million FY 2005 Reprogramming Action not reflected in control totals.

### **A. Mission Description and Budget Item Justification**

(U)The Quick Reaction Special Projects Program (Program Element 0603826D8Z) QRSP 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 Funding (QRF), Technology Transition Initiative (TTI), and the Rapid Reaction Fund (RRF). The FY 2004/2005 funding in RRF is the result of internal Reprogramming Actions to allow a rapid response to operations in Iraq and is used to initiate high-priority science and technology projects in the execution years. 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 DACP and TTI programs are mandated by Congress and receive high congressional interest. The DACP program transferred in FY2005 and outyears to PE 0604051D8Z to comply with congressional direction.

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2005
APPROPRIATION/BUDGET ACTIVITY RDT&E/Defense Wide/BA 3	R-1 ITEM NOMENCLATURE Quick Reaction Special Projects (QRSP), PE 0603826D8Z	

(U) 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. In FY 2004, over 100 proposals were reviewed and 12 projects were funded.

(U) The Technology Transition Initiative addresses the funding gaps that exist between the time a technology is demonstrated and the time it is procured for use in an intended weapons system. The Technology Transition Initiative was authorized under Title 10, Section 215 of the Defense Authorization Act to facilitate the rapid transition of new technologies from S&T into acquisition programs. The initiative's objectives are to accelerate the introduction of new technologies into operational capabilities for the armed forces.

**B. Program Change Summary:**

	<u>FY 2004</u>	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>
Previous President's Budget	46.566	64.389	89.927	90.408
Current FY 2006 President's Budget Submission	71.352	41.929	110.717	111.026
Adjustments to Appropriate Value	+24.786	-22.460	+20.790	+20.618
Congressional Program Reductions				
Congressional Rescissions				
Congressional Increases				
Program Increase (Rapid Reaction Fund (RRF))			+50.000	+50.000
Reprogrammings (Rapid Reaction Fund (RRF))	+26.619			
Defense Challenge Program Transfer		-25.713	-28.975	-29.238
SBIR/STTR Transfers				
Other	-1.833	+3.253	-0.235	-0.144

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**C. Other Program Funding:** N/A

**D. Acquisition Strategy:** N/A

**E. Performance Metrics:**

**QRF/RRF:** Program completion and success will be monitored against program schedule and deliverable stated in the proposals.

**DACP:** For FY2003, initiated the new start of twenty (20) new start DACP Projects.  
For FY2004, initiated the new start of eight (8) new start DACP Projects.

**TTI:** In FY2005, initiate the new start of 13 projects and conclude activities on many continuing projects with the result of at least 10 technologies transitioning to the warfighter.  
In FY2006, initiate the new start of 18 projects and conclude the activities on many continuing projects with the result of at least 12 technologies transitioning to the warfighter.  
In FY2007, initiate the new start of 19 projects and conclude the activities on many continuing projects with the result of at least 14 technologies transitioning to the warfighter.

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)							DATE February 2005	
APPROPRIATION/BUDGET ACTIVITY RDT&E/Defense Wide/BA 3					R-1 ITEM NOMENCLATURE Quick Reaction Special Projects (QRSP), PE 0603826D8Z Quick Reaction Fund (QRF), Project 826			
	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
COST (In Millions)								
Quick Reaction Fund Project P826	14.911	20.965	29.717	29.926	31.288	31.346	32.098	32.842

**A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:**

The Quick Reaction Fund (QRF) provides flexibility to respond to emergent warfighter needs in the execution years. It takes advantage of technology breakthroughs in rapidly evolving technologies with expected completion within 6 to 12 months.

**B. (U) Accomplishments**

(U) Quick Reaction Fund - A data call was released on October 20, 2003 requesting proposals in response to emergent operational needs and to capitalize on technologies. To assist in prioritizing the proposals, the call letter requested the Service and Agency Science and Technology Executives and the DDR&E principles submit their top ten proposals. A notification on the DDR&E website was also posted so there was another avenue to submit proposals. Candidate proposals were focused in the areas of technology required to reduce the unanticipated risk in acquisition programs, technology opportunities in rapidly evolving disciplines or technology maturation opportunities to support real-time operational needs. Each proposal addressed the description of the technology/concept, description of any demonstration testing required, description of technical, funding, and schedule risk, proposed executing Service/Agency and User. The proposals were reviewed for technical and warfighter relevance review. Projects awarded with FY 2004 funding include Surveillance Systems for border security, and Greaseless M-4 Demonstration and Fielding, both of which were successfully used in the CENTCOM theater of operation. Other projects were PING, two Change Detection efforts, Alternative materials for SAPI, Fieldable Automative Surveillance and the TACSAT system. Below is more in-depth discussion of the projects. Because these programs are one time efforts, there are currently no plans to fund them in other years. However, for the overall QRF program, FY 2005, 2006 and 2007 plans are to continue to respond to critical operational needs and technology opportunities.

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	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
High Value Target Detection and Surveillance	SOCOM/Army	3.500	0.000	0.000	0.000

High Value Target Detection and Surveillance is a system used to monitor border crossings in the CENTCOM theater of operations. This project was funded from the QRF and RRF (see below for RRF). This project provided project management, engineering support and test and evaluation for integration and rapid prototyping of equipment to survey mobile and fleeting targets that threatens US Military forces in the AOR. This system consists of tactical camera and optical systems with video and audio recording as well as tagging and tracking capabilities.

	Service/Agency	FY 2004	FY 2005	FY 2003	FY 2007
PING	Air Force	1.500	0.000	0.000	0.000

The PING technology based concept uses a fixed-point ultra wideband microwave-based interrogation system to identify concealed weapons such as RPGs, Suicide Bomber Vests, and AK 47s out to 100 meters in the open (just underneath clothing or behind people, not behind walls or foliage) with an 80% confidence in unique target identification. The PING system is intended for use at checkpoints, fixed-point entry sites, and buildings. The system radiates a human-safe electric field impulse (60kV/m at 1m; the DOD, IEEE Permissible Exposure Limit for unlimited exposure is 100kV/m) toward the target, which causes the target's metallic and dielectric substructures to resonate at their natural frequencies. The antenna receives the resonate responses, which are then analyzed by an algorithm contained in a laptop computer. The resonance combinations serve to uniquely identify the target or targets in question and the range for each. Once identified, a picture of the weapon, range, and the confidence level of the identification are displayed on the computer screen is a concealed weapon detection system developed by the Air Force Research Laboratory using high power microwave. The system is designed to be deployed on a HMMWVEE.

	Service/Agency	FY 2004	FY 2005	FY 2003	FY 2007
Change Detection	Lincoln Lab	1.000	0.000	0.000	0.000

This effort will assess the feasibility of detecting improvised explosive devices (IEDs) by using airborne sensors and change detection. Change detection analyzes changes to a specified area over time and is complex due to the size of the IEDs, size of terrain and amount of material (garbage) in the AOR. This assessment will involve both field measurements and theoretical analysis. Measurements will use an existing Lincoln Laboratory airborne sensor platform called ALIRT (for Airborne Ladar Imaging Research Test bed). Using the upgraded ALIRT

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system Lincoln Laboratory will conduct a series of flight measurements at the IED test range that has been established at Yuma, AZ. These tests involve a wide range of IED-like targets in background environments similar to those being encountered in Iraq.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Change Detection	Air Force	.800	0.000	0.000	0.000

AFRL/SNHI has developed a crossed-dispersion prism (CDP), visible/MWIR wide field of view spectral imaging sensor to support theater surveillance and intelligence. The emerging technologies sensor will employ wide area spectral imaging to increase countermeasure effectiveness to combat explosive projectile threats based on three factors: detection, tracking, and classification. The crossed-dispersion prism system has been proof of concept demonstrated by AFRL/SNHI on an optical bench. AFRL/SNHI will conduct both ground and air tests with the CDP on targets of opportunity to show technology maturation to support real time operational needs. AFRL/SNHI will deliver a fieldable prototype system with software and documentation that could be transferred to production in nine months. Completed initial design work and procurement of long lead materials.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Greaseless M-4's Demonstration and Fielding	Army	.560	0.000	0.000	0.000

The extreme environmental conditions in Iraq are proving that the available suite of weapon cleaning solutions and lubricants are not sufficient to ensure continuous and effective operations of their armaments. Failure to properly clean and apply lubrication to a weapon can have devastating consequences to both weapon and soldier. Even when lubrications are properly applied, the lubrication itself attracts sand, dust, dirt and other foreign materials that cause malfunctions and lower system reliability. The multi-functional Nickel Boron coating, known as UltraCem, exhibits a unique combination of physical properties to provide friction and heat reduction, wear and abrasion resistance, lubricity, temperature tolerance and extreme hardness. The Army, SOCOM and UCTD have performed feasibility demonstrations on a greaseless M-9, M-4, and MK-19 weapons, with 14,000 rounds fired on the M-9 and 3,600 rounds fired on the M-4.

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	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Alternate Material for SAPI	Army	.800	0.000	0.000	0.000

The Interceptor Body Armor system combines a soft Outer Tactical Vest with two Small Arms Protective Inserts (SAPI). As of September 30, 2003, 135,860 SAPI sets have been fielded. However, there is a limited SAPI production due to lack of ceramic tiles and backing materials (Spectra Shield). Proposed work will focus on several materials, such as Metal Matrix Ceramics, Carbon matrix ceramics, and other materials as alternatives for high performance ceramic tiles (SiC, B4C), and domestic Dyneema (similar to Spectra) as alternative for Spectra Shield material. This effort will look at ceramic tile production to provide new material source for SAPI production. The proposed work will be mainly testing and evaluation of various materials which can be used to produce SAPI plates. Prototype materials were made and ballistic tests are planned.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Fieldable Automative Surveillance Technology	Army	.623	0.000	0.000	0.000

This effort will mature a commercial automated video surveillance technology to fieldable systems supporting operational needs in the war on terrorism, particularly in protecting ports, cargo staging areas and possibly pipelines. GuardianWATCH, uses advanced computer vision to detect subtle targets and analyze the motion of potential targets, allowing it to ignore insignificant motion, such as blowing trees or waves on water, while tracking targets, such as camouflaged soldiers or small rafts. The GuardianWATCH system controls the cameras to actively follow targets as well as to respond to other system alarms to automatically provide video for assessment of the cause. The cameras communicate their results via wireless (IP) networking with self-adapting bandwidth. Initiated R&D effort to provide the extension necessary for general field operations of a surveillance system. This includes supporting longer distance, satellite communication, support of military coordinates/maps, and integration with existing and emerging sensors, improving power consumption/supply, and reducing system weight while improving power and system ruggedization.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Tactical Satellite (TACSAT) – 2	Air Force	2.0	0.000	0.000	0.000

The Tactical Satellite (TacSat) program is a series of space missions designed to place rapidly evolving technologies in the Warfighters' hands on nine to twelve month delivery cycles. TacSat-2 will provide the warfighter with near-real-time 1-m resolution visible imagery from a

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microsatellite. Warfighters with SIPRNET access can request and receive imagery from a Roadrunner spacecraft. AFRL has fully funded the primary space and ground segments of the mission. The QRF funds the Advance Target Indicator payload, launch, and military utility assessment. TacSat-2 has approximately a one-year development effort with a launch planned during CY 2005 and a military utility assessment planned for the following 12 months. The Advanced Target Indicator will geo-locate a wide range of radio frequency emitters and also cue the visible imager. Autonomous operations and check-out will be performed with an anticipated five times reduction in support staff. Operational concepts include a series of experiments over the first six months to demonstrate improvements over current operations.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Ground Data Collection System for Force Protection	Air Force	2.155	0.000	0.000	0.000

The objective of fielding the Ground Data Collection System is to continuously collect wideband data, with the expectation that events related to IED detonation will be recorded and post-event be detected and correlated with the time of the IED event itself. If the IED is RF-detonated, signal analysis of IED-related RF will reveal the method of detonation and lead to the development of IED countermeasures. COMINT signals related to IED events and/or ambushes will also be captured and analyzed.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Yuma Proving Ground's Test Site	Navy	.482	0.000	0.000	0.000

Yuma Proving Ground's (YPG) is a dedicated test site for end-to-end evaluation under realistic real world environments. This includes construction of representative rural village, expansion of representative rural environment, development of representative urban environment and application of a range instrumentation. The YPG is a comprehensive test site for these purposes in a geographically remote area within DoD controlled restricted airspace. Over 20 systems have utilized the site as a representative environment to conditions in Iraq before deployment to Iraq. These funds were used for environmental and site improvements.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
OSPREY QUAHOG	Navy	.153	0.000	0.000	0.000

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	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
U.S. Air Defense Capabilities and Plans Study	MDA/DARPA/DHS	.800	0.000	0.000	0.000
<p>This study is a joint effort examining capabilities and efforts to include the North American Aerospace Defense Command, the Missile Defense Agency, the Department of Homeland Security, and the Defense Advanced Research Projects Agency, all of whom play a significant role in developing or operating air defense systems. The study examines both theater and homeland air defense, highlighting both similarities and differences between the two problems. The study develops a time-phased approach to deploying air defense architectures for both the theater and homeland arenas. Strategies for providing various levels of capability as a function of investment level is also described.</p>					

**C. Other Program Funding: N/A**

Exhibit R-2a, RDT&E Budget Item Justification					Date: February 2005			
APPROPRIATION/BUDGET ACTIVITY RDT&E/Defense Wide/BA 3			R-1 ITEM NOMENCLATURE Quick Reaction Special Projects (QRSP), PE 0603826D8Z Defense Acquisition Challenge Program (DACP), Project P827					
COST (In Millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Defense Acquisition Challenge Program P827	17.093	0.000*	0.000*	0.000*	0.000*	0.000*	0.000*	0.000*

\*Out year funding for this program is provided under the new Defense Acquisition Challenge Program (DACP) PE 0604051D8Z

**A.(U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:**

Authorized by Title 10, Section 2395b, the Defense Acquisition Challenge Program (DACP) provides increased opportunities to insert innovative and cost-saving technologies into acquisition programs of the Department of Defense. DACP funds the test and evaluation of technologies and products that have the potential to improve performance, affordability, manufacturability, or operational capability of current acquisition programs at the component, subcomponent, or system level.

In FY 2003/2004, DACP was a sub element in the Quick Reaction Special Projects Program (Program Element 0603826D8Z), which had three sub-elements: Defense Acquisition Challenge Program (DACP), Technology Transition Initiative (TTI) and Quick Reaction Special Projects (QRSP). A fourth project, the Rapid Reaction Fund (RRF) was added for FY2004 only, to allow a rapid response to operations in Iraq and funded through a BTR and FY01-14 PA Reprogramming.

In FY 2005, the Defense Appropriation Act directed the Department of Defense to transfer the Defense Acquisition Challenge Program (DACP) from Budget Activity 3 to Budget Activity 5. The DACP for FY 2005-2011 will execute under Program Element 0604051D8Z, Budget Activity 5.

As a result of the Defense Acquisition Challenge Program's rapid establishment in mid-FY 2003, the Comparative Testing Office and its Foreign Comparative Testing (FCT) Program were selected by OUSD(AT&L) as the infrastructure to support the DACP pilot business model. Currently, U.S. Special Forces Command, U.S. Army, U.S. Marine Corp, and the Navy's Naval Sea Systems Command, Naval Air Systems Command, and Naval Space and Naval Warfare Systems Command are supporting DACP with the current FCT service infrastructure. The U.S. Air Force is supporting DACP through Secretary of the Air Force for Acquisition (SAF/AQ).

### Proposal Solicitation Process

The DACP process is a two-phased annual process. During Phase I, interested parties, within and outside the DoD, are invited through a Broad Area Announcement (BAA) to submit summary proposals. Summary proposals are evaluated and prioritized based on merit and their potential to benefit a DoD Program of Record (POR). In Phase II, candidate summary proposals are matched to the PORs that have the potential to benefit from the proposed technology. POR Program managers, in collaboration with the weapon prime where applicable, evaluate and either “accept” or “reject” the proposed technology. A “reject” is defined as the POR has determined that the technology can not benefit the POR. An “accept” is defined as the POR determines the technology has potential benefit and wishes to compete for funding. The POR then develops a final proposal to compete for DACP funding to test and evaluate the proposed technology. The final proposal contains a brief description of the issue and how the proposed technology resolves the issue, test and evaluation strategy, and procurement and transition strategy if the technology meets the PORs requirements. Final proposals are submitted into OSD DACP by the POR where the proposals are evaluated and prioritized, and selected for funding by the OSD DACP Program Manager.

The DACP pilot business model leverages off the successful FCT personnel and business processes, where possible, except OSD DACP will issue a Broad Agency Announcement (BAA) annually inviting interested parties to submit summary proposals. As a result of DACP’s rapid establishment in 2<sup>nd</sup> Quarter FY 2003, the FY 2003 BAA served as the only call for proposals in FY 2003 and FY 2004. The FY 2005 cycle began with a BAA release in mid-February 2004 and is addressed under the Defense Acquisition Challenge Program (DACP) PE 0604051D8Z.

### Results of FY 2003/2004 BAA Solicitation

More than 300 summary proposals were submitted during Phase I by industry and government representatives in response to the March 2003 BAA. Approximately one third of the proposals were rejected during an administrative review for lack of proper documentation. The remaining proposals were prioritized for potential benefit to the POR. Nearly 125 Program Managers were contacted during Phase II and asked to consider proposed technologies for use within their program. Program Managers from all Services and USSOCOM submitted more than 80 final proposals, covering a broad range of technologies, to compete for FY 2003 and FY 2004 new start funding. Twenty proposals were selected for FY 2003 new start funding. An additional eight proposals were selected for FY 2004 new start funding.

**B. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:**

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Automated EPLRS Planner	Marine Corps	0.464	0.000	0.000	0.000

The Automated Enhanced Position Location Reporting System (EPLRS) Planner is a “technology insertion” into the Systems, Planning, Engineering, and Evaluation Device (SPEED) software application. The product fills a critical USMC need to automate planning for communications networks. This technology supports the tactical data network at Regiment and below; including the more efficient use of reduced manpower to plan and manage an EPLRS network, and the potentially life saving ability to step through planning processes of a military operation prior to deployment.

Vendor: Northrop Grumman Information Technology, Winter Park, FL  
 Program Office of Record: PM Communications, Marine Corps Systems Command, 2200 Lester Street, Quantico, VA 22134

FY2004 Accomplishments: Contract signed 17 May 2004. Drafted quality assurance plan and initiated in-process review working group. Completed systems requirement specifications and systems design document.

FY2005 Plans: Deliver final software design. Complete EPLRS planner coding and unit testing for SPEED v.10 (nearly 90% complete). Execute integration testing, conduct functional qualification testing to support procurement, and final acceptance test. Provide software test report and fielding decision.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Common Tactical Picture Ground Mobile and Air Based Command and Control Systems	Marine Corps	1.610	0.000	0.000	0.000

The Common Tactical Picture (CTP) is integrating spray cooling technology into the C<sup>2</sup> advanced rugged mobile enclosure of the Expeditionary Fighting Vehicle (EFV)(C) and EFV(P) variants. The EFV needs to effectively integrate multiple coordinated Army Fire Zone and USMC blue and red force databases to provide a ground, mobile CTP. By utilizing spray cooling technology into the C<sup>2</sup> hardware, COTS technology can be utilized in the C<sup>4</sup>I suite for on the move capability, hardened for harsh environments, be readily

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integrated with satellite communications, and provide for much faster processing time. The enclosure will be qualified for use in wheeled, tracked, and air systems.

Vendor: Isothermal Systems Inc., Clarkston, WA  
 Program Office of Record: DRPM AAA, Worth Avenue  
 Technology Annex, 14041 Worth Ave,  
 Woodbridge, VA 22192

FY 2004 Accomplishments: Contract awarded on 13 May 2004. Conversion of MPUs 4-6 to HEUs to incorporate C2 systems of EFV(P). Conducted technical interchange meetings and APM(C)/ISR meetings for HEU. No Cost, Restructure Mod completed for HEU build. MPU-II test articles nearly complete (85%). HEU-II specifications complete and test articles are being manufactured.  
 FY 2005 Plans: Conduct System and Integration; Receive test articles (6 systems); Conduct qualification testing; Conduct Quarterly Integrated Product Team (IPT) Meetings; Conduct Wheeled Vehicle Demonstration (MCSC UoC); Conduct Rotary Wing Demonstration (USMC AH1 or Army H60); Procurement Decision 4th quarter FY05.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Dismounted Infantry Virtual Simulation for Military Operations in Urban Terrain	Army	0.753	0.000	0.000	0.000

This project is evaluating a virtual training system that if successful will lay the foundation for rapid technology insertion into three major acquisition programs: (1) Integrated Military Operations in Urban Terrain (MOUT) Training System (I-MTS); (2) Virtual Emergency Response Training System (VERTS); and (3) Soldier Combined Arms Tactical Trainer (Soldier CATT). This dual use technology can be used to immerse a war fighter or emergency responder into a networked simulation, providing a training capability for homeland security, urban operations, and Weapons of Mass Destruction (WMD) detection. This capability is critical due to the ever increasing scarcity of real-life training resources, such as time, space (terrain), and funding.

Vendor: Advanced Interactive Systems/Reality by Design, Orlando, FL  
 Program Office of Record: Army PEO Simulation, Training and Instrumentation (PEO STRI)

FY 2004 Accomplishments: Performed government inspection (July 2004). Deliver, install and test the system at Fort Campbell (Aug 2004). Conduct user evaluations with the 101<sup>st</sup> Airborne Division (Sept 20-30, 2004).  
 FY 2005 Plans: Complete development of the virtual Fort Campbell database. Procure initial spares for sustainment.

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	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Embedded Integrated Broadcast Service (IBS) Receiver (EIR)	USSOCOM	1.209	0.000	0.000	0.000

This project is evaluating the next generation IBS receiver which is smaller, lighter, and less costly than current equipment. EIR will provide timely receipt of intelligence data required by the tactical war fighter. The tactical war fighter, especially aircraft, relies heavily on near real-time intelligence information for threat avoidance, detection, targeting, blue force tracking and personnel recovery.

Vendor: L-3 Communications, Telemetry-West, San Diego, CA

Program Office of Record: USSOCOM PEO, Intelligence and Information Systems (IIS)

FY 2004 Accomplishments: Award contract for design modifications and production-representative systems. Completed Phase 1 and Phase 2 Firmware Developments. Initiated software modifications. Test items built and delivered.

FY 2005 Plans: Technical, verification and validation testing. Conduct an interoperability assessment. Compile test results and prepare project close out documentation. Incorporate results into production configuration. Submit DACP Close-out Report.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Enhanced Gunfire Detection System	USSOCOM	0.631	0.000*	0.000*	0.000*

\*Out year funding for this project is provided under the new Defense Acquisition Challenge Program (DACP) PE 0604051D8Z

This project is evaluating system enhancements (i.e., addition of sensors and processors) which have the potential to significantly improve the accuracy of the Gunfire Detection System (GDS) and locate a sniper prior to the sniper's first shot. This improved technology will be brought about through the integration of selected sensors (e.g., hyper-spectral imagers, unattended ground sensors, visible micro-sensors, infrared sensors, etc.) in the GDS and through the inclusion of automatic processing software.

Vendor(s): Metravib, France

Program Office of Record: USSOCOM PEO, Special Programs (SP)

FY 2004 Accomplishments: Fielding & Deployment Release (F&DR) approved. Successfully integrated a Vehicle GDS with the Kongsberg (Norway) Remote-controlled Weapon System (weapon turret) on a HMMWV in support of the Anti Sniper Vehicle program (sponsored by the Rapid Equipping Force Office) and conducted live-fire testing of the combined system with excellent

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results. Let a contract modification to procure 32 GDS Vehicle systems for USSOCOM. Project Manager awarded contract for system modification. Complete integration of sensors into the gunfire detection system. Initiate technical testing.

FY 2005 Plans: Complete technical testing. Conduct operational testing and user evaluation. Compile test results and prepare documentation in support of a milestone decision. Award contract for production buys. Incorporate plans for a rotary wing version of gunfire detection system for testing in FY 2005-2006. Submit DACP Close-out Report.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Enhanced Optical System – Rolling Airframe Missile (RAM)	Navy	0.294	0.000	0.000	0.000

This project will evaluate an alternative optical system to an existing production design that will improve performance, manufacturability, and operational capability while providing several million dollars in cost savings.

Major Vendor(s): Axsys - IR Systems (formerly Telic Optics, Inc.), North Billerica, MA;  
 Janos Technology, Townshend, VT;  
 Optical Coating Corporation, Natick, MA;  
 Exotic Electro-Optics, Murrieta, CA;  
 Surmet Precision Optics (formerly Precise Surface Finishing), Murrieta, CA;  
 Scarrott Metallurgical, Los Angeles, CA;  
 Schmitt Measurements Systems, Inc., Portland, OR;  
 Parallel Ventures, Inc., Tucson, AZ;  
 Optimum Optical Systems, Inc., Camarillo, CA;  
 Program Office of Record: PEO (IWS3) RAM/CIWS project office

FY 2004 Accomplishments: Multiple material subcontracts have been fulfilled. Sapphire domes have successfully been polished and coated with an anti-reflection coating. Titanium and aluminum optical assemblies have also successfully been produced and tested. The feasibility of both bonding and brazing the domes has been demonstrated. All remaining components will be forwarded to the RAM Prime contractor, for design evaluation, missile incorporation

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Enhancements for Fly Away SATCOM (FASC)	USSOCOM	0.857	0.000	0.000	0.000

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This project is evaluating operational enhancements to SOF's Fly Away Satellite Communications (FASC) Terminal tracking for inclined satellites, and improve satellite acquisition while providing Built-in-Test and Training. This project, if successful, will provide critical operational enhancements to the FASC terminals enabling faster world wide deployments, higher transmit and receive high bandwidth/performance, ease-of-use, and Ka Band communication satellite integration.

Vendor: SWE-DISH Satellite Systems, Inc., Washington, DC

Program Office of Record: USSOCOM PEO, Intelligence and Information Systems/Special Projects (IIS/SP)

FY 2004 Accomplishments: Tested and evaluated the Enhanced FASC hardware and software deliverables in a lab and field environment (auto tracking capability). A SWE-DISH (CoBRA) users' group/program review was conducted April 26-30, 2004, at SPAWAR, Charleston and June 2, 2004, at Reston, VA., to validate enhancements and upgrades.

FY 2005 Plans: If operationally feasible, upgrades will be inserted into operational systems and deployed for real world testing. Test and evaluate software enhancements that will automatically initiate SATCOM acquisition. A SWE-DISH (CoBRA) users' group/program review will be scheduled. Facilitate the awarding of a \$29 million full and open contract with SWE-DISH Satellite Communications Inc. Submit DACP Close-out Report.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Friction Stir Processing for Virginia Class Submarines	Navy	0.263	0.000*	0.000*	0.000*

\*Out year funding for this project is provided under the new Defense Acquisition Challenge Program (DACP) PE 0604051D8Z

This project is assisting in the transition of a new manufacturing technology into the US Navy's propeller manufacturing infrastructure. In FY 2002, friction stir processing showed feasibility to significantly improve the surface condition of Ni Al bronze propeller castings by repairing inherent surface defects while also greatly improving the strength of the processed area. In FY 2003, an aggressive effort was initiated to refine processing parameters and tools for Ni Al bronze castings. This process is continuing, in parallel with the equipment design and manufacturing effort. Because the process is adaptable to the numeric controlled machining process, which is used extensively at the Naval Foundry and Propeller Center to finish the propeller castings, developing a prototype attachment that could both machine the surface of the propeller and repair it, without moving the propeller, will result in time and cost savings.

Vendor(s): TBD; likely candidates are General Tool Company, Cincinnati OH, and Friction Stir Link, Waukesha, WI who produce similar equipment

Program Office of Record: Virginia Class Submarine Program Office, PMS 450

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FY 2004 Accomplishments: Developed FSP attachment specification. Initiated contracting efforts to design and manufacture the prototype unit for the US Navy production facility.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Integrated Defensive Countermeasures Alternative	Air Force	0.315	0.000	0.000	0.000

This project is evaluating a fiber optic (FO) alternative to a towed decoy presently deployed to the warfighters. This proven technology has shown superior performance in the laboratory and requires engineering efforts to establish a qualified commodity for Air Force platforms integration and testing.

Vendor: Raytheon Space & Airborne Systems, Goleta, CA  
 Program Office of Record: Air Force Towed Decoy

FY 2004 Accomplishments: Procured 80% of the material purchases for the building of 12 FO-50 mass models and 6 full-up decoy rounds for F-15 testing. Delivered 40% of the material, remaining 40% on-order. Assembly of some of the decoys has begun but will not ramp-up until the majority of the material is in place. Towline design refined based upon FY 2003 flight testing. Conducted flight test of upgraded configuration in Aug 2004. Completion of the operating software with the IDECM hardware finalized prior to integration testing at the F-18 laboratory at Point Mugu.

FY2005 Planned Actions: Final integration testing followed at the F-18 IDECM integration facility and was successfully completed at Pt. Mugu on 17 Nov 04. Track delivery of 12 mass models with new towline configuration for testing on F-15 aircraft at Eglin AFB in 2 Qtr FY 05. The AFOTD effort successfully completed two milestones: Critical Design Review (CDR) (14 Dec 04) and software Preliminary Design Review (PDR) (15 Dec 04). Track progress of material deliveries and build-up of 6 electrical decoys for anticipated delivery in Jun 05. Begin Test Working Group discussions to prepare for AFOTD future effectiveness range testing. Using the AFOTD hardware, the program office will perform airborne effectiveness testing to all the AF and Navy to see the performance of this product against ground threats on government ranges. Completion of these tests will allow the joint services to evaluate transition to procurement during the FOTD MS III decision in 4th Qtr FY 06.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Integrated Schedule/Process for Global Hawk Spiral Development	Air Force	0.335	0.000*	0.000*	0.000*

\*Out year funding for this project is provided under the new Defense Acquisition Challenge Program (DACP) PE 0604051D8Z

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To date neither industry nor Government program offices have developed an effective means of implementing existing integrated scheduling techniques into the spiral development process. This project seeks to provide the Global Hawk program with an integrated schedule to be used daily with schedule risk tools and at all reviews, to optimize program management and reduce future program risk. If successful, this project will provide defense organizations a more robust and disciplined process to use in scheduling spiral development (multiple spirals) programs.

Vendor: Dayton Aerospace, Inc., Dayton, OH  
 Program Office of Record: Global Hawk Program Office

FY 2004 Accomplishments: Researched existing state of practice. Explored how various companies and government organizations are currently incorporating evolutionary acquisition approaches into their program schedules. Researched new acquisition guidance and assessed changes in the evolutionary acquisition environment. Interviewed DAU, ASC and AFRL ACE teams, several acquisition programs, AFMC/DRA, AT&L. Reviewed existing individual Global Hawk spiral schedules and recommended a restructure approach. Facilitated joint Global Hawk SPO/Northrop Grumman Information Management System (IMS) development meeting. Reached concurrence on upper level program events; drafted accomplishments/criteria. Initiated process for linking existing individual IMSs to overall integrating schedule. Guided activities to ensure all functional areas from SPO and government were represented in the products. Completed initial draft of final report. Prepared briefing of draft results and presented at the Global Hawk SPO/Northrop Grumman IMS offsite meeting.

FY 2005 Plans: Provide recommendations for growth to full program IMS. Incorporate additional Global Hawk lessons learned into report. Complete final report and briefing.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Low Cost Aerogel Insulation for Shipboard Fire and Thermal Protection	Navy	1.157	0.000	0.000	0.000

This project is evaluating a flexible aerogel thermal insulating blanket for use on the DD(X). The proposed nano-porous material has the potential to provide a fire barrier protection layer with large weight and volume savings compared with compatible composite and steel structures. The Aerogel Insulation has the potential to provide a thermal barrier, reduced signature and blast mitigation.

Vendor: Aspen Aerogel, Marlborough Massachusetts  
 Program Office of Record: PM for Auxiliaries, Recoverability and Materials

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FY 2004 Accomplishments: Vendor has completed the UL1709 screening testing at Southwest Research Institute and is down selecting the material selections for the remaining tests. Configurations tested consisted of different combinations of facing materials, i.e., Marine Board, FyreRoc and Avtec Coated Fiberglass.

FY 2005 Plans: Initiated full scale fire testing on Ex-USS Shadwell. Develop cost analysis-benefit report comparing using aerogel for shipboard applications vs. baseline method. Develop transition plan for full-scale aerogel installation. Cost analysis-benefit report and transition plan will address issues concerning the acceptance and transition of the aerogel insulation material for shipboard applications by the end user and fabrication community.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Mini Combat Trauma Patient Simulation System	Army	0.336	0.000	0.000	0.000

This project is evaluating a newly developed low cost, physiologically modeled Emergency Care Simulator (ECS™) that can provide a military medical simulation system for training, test and evaluation. The ECS in a Mini Combat Trauma Patient Simulation (CTPS) configuration will enhance portability, affordability and ease of deployment with active forces. It is hoped that training on this system will lead to more quick and realistic assessments of battlefield casualties, thus greatly increasing Soldier survivability.

Vendor: Medical Education Technologies, Inc. (METI), Sarasota, FL

Program Office of Record: Army PEO Simulation, Training and Instrumentation (PEO STRI)

FY 2004 Accomplishments: Acquired and integrated hardware. Modified the Combat Trauma Patient Simulation (CTPS) infrastructure to make it much more scalable and flexible. Now CTPS and Mini-CTPS systems can be tailored to the specific training levels as needed. Delivered prototype to USNS Mercy for 5 day training cruise and user test. Feedback was positive. Delivered the prototype system to the Field Medical Service School (FMSS) at Camp Pendleton where it has been integrated into the curriculum for corpsmen supporting the marines. The vast majority of graduates from the FMSS are being deployed to the Middle East immediately upon graduation.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Miniature – Controlled Receive Pattern Antenna (MCRPA)	Navy	1.272	0.000*	0.000*	0.000*

\*Out year funding for this project is provided under the new Defense Acquisition Challenge Program (DACP) PE 0604051D8Z

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The Miniature–Controlled Reception Pattern Antenna (M-CRPA) will provide anti-jamming (A/J) GPS capability to the Navy’s platforms that have size and weight restrictions for antenna systems, such as the UH-1Y and AH-1Z helicopters and submarines. The small footprint, integrated antenna electronics, light weight, and low cost of M-CRPA all make it a viable solution for the size and weight restrictive platforms than the only other production CRPA available to the Navy today, the GAS-1.

Vendor: Titan Corporations, Greenbelt, Maryland  
 Program Office of Record: PEO C4I, PMW/PMA-170 (formerly 156) Navy

FY 2004 Accomplishments: Designed and fabricated three M-CRPA GPPO prototype antennas. Preliminary range measurements went well. The three antennas are being tested at NAVAIR before a final design is selected to produce. Preliminary mechanical design is complete. This includes the antenna, radome, ground plane, mounting bracket, and housing. Safety of Flight (SOF) test plan was completed. Preliminary M-CRPA antenna electronics (AE) design 95% complete. The AE outline and mounting drawings, AE performance specification, and AE ICD are essentially complete. The detailed AE design and fabrication has begun.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Mortar Plating System using Vacuum Arc Vapor Deposition (VAVD)Technology	Marine Corps	0.584	0.000*	0.000*	0.000*

\*Out year funding for this project is provided under the new Defense Acquisition Challenge Program (DACP) PE 0604051D8Z

This project is evaluating a process for plating the interiors of worn 60mm and 81mm mortar tubes that are wearing faster than expected. Specifically, the project examines the use of Vacuum Arc Vapor Deposition (VAVD) technology. If this process is successful, the USMC will be able to plate material in worn areas and economically restore the infantry mortar tubes to a serviceable condition, providing a more cost-effective method in restoring mortar tubes to combat ready status.

Vendor: Alpen Technology Group, Inc., Brownsboro, AL  
 Program Office of Record: USMC Warfighting Laboratory, Quantico, VA 22134

FY 2004 Accomplishments: Phase I Contract awarded March 2004. Initial IPT was conducted at Huntsville, AL. Finalized Phase I timeline and objectives. Samples of Mortar steel were machined into test coupons, cleaned, and furnished to Alpen Technologies Group (ATG) per the requirements of the contract. ATG acquired the vacuum test chamber and other critical items to conduct Phase

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I plating activities. ATG plated the mortar steel sample coupons and furnished them to NSWC Dahlgren for Testing. Initial tests of Phase I plating indicated that the VAVD technology failed. Plating was 40 times too thin and the bonding failed during cleaning.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
New Secure Version of Army Wireless Intercommunication System	Army	0.368	0.000*	0.000*	0.000*

\*Out year funding for this project is provided under the new Defense Acquisition Challenge Program (DACP) PE 0604051D8Z

This project is the adaptation of an existing, certified wireless encryption device to an aircraft wireless intercom system to provide a close range secure communications capability for tactical rotary wing operations. This technology will decrease the risk of mission compromise and increase mission effectiveness and soldier safety. This technology is an excellent candidate for horizontal technology insertion with ground or mounted soldier small team communications devices and has joint service application potential.

Vendor: Telephonics Corporation, Communication Systems Division, Farmingdale, NY  
 Program Office of Record: Army PEO Soldier/PM Air Warrior

FY 2004 Accomplishments: Awarded contract with prime vendor and developed a preliminary hardware and system certification plan. Briefed the National Security Agency (NSA) and requested support.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
“On Aircraft” Laser Additive Repair of Titanium Components	Air Force	0.756	0.000*	0.000*	0.000*

\*Out year funding for this project is provided under the new Defense Acquisition Challenge Program (DACP) PE 0604051D8Z

This project is implementing the process of Laser Additive (on Aircraft) repair of damaged titanium B-2 airframe surfaces. This technology will improve mission readiness, currently compromised by cracks which develop on the aft deck. The proposed technology insertion program will improve the maintenance of mission readiness which is currently compromised by cracks which develop on the Aft Deck. The program will be enabled by the integration of a laser head and titanium feeding mechanism with a portable, adaptive, multifunctional machine tool pod incorporating a conformal inert gas shielding shroud and the development of a comprehensive process to fill cracks with micro-welded titanium alloy to restore the stealth integrity of the damaged surfaces.

Vendor: Triton Systems, Inc., Chelmsford, MA

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Program Office of Record: B-2 Systems Program Office

FY 2004 Accomplishments: Program is currently in the final stages of contract award. Before receiving a contract proposal, the B-2 SPO, AFRL/VA, AFRL/ML and Triton Systems established a go/no-go decision point. The SPO and AFRL are concerned that the laser weld may not work on titanium (Ti) 6-2-4-2. The contractor must first demonstrate that the laser weld repair works on Ti 6-4, before proceeding to Ti 6-2-4-2. AFLR has provided the \$275K in SBIR funding for this additional work, which will add six months to the schedule, but will mitigate program risk.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Precision Parachute Delivery System (PPDS)	USSOCOM	0.789	0.000*	0.000*	0.000*

\*Out year funding for this project is provided under the new Defense Acquisition Challenge Program (DACP) PE 0604051D8Z

This project is evaluating the High Altitude-Low Opening/High Altitude-High Opening (HALO/HAHO) Navigation Aid which will allow Special Operations Forces (SOF) infiltration capabilities in all environmental situations. Currently teams have little ability to navigate to a target unless it is seen at exit. This system makes it possible to land precisely during adverse weather conditions, which greatly reduces the possibility of detection, i.e. clouds, rain, and snow. This program will give the SOF community the capability and the confidence to accomplish the infiltration portion of their mission safely, accurately, and undetected in a wider range of environmental conditions.

Vendor: Prescott Products, Lockhart, Texas (Prime); European Aeronautical Defense and Space (Sub)  
 Program Office of Record: USSOCOM PEO, Special Programs (SP)

FY 2004 Accomplishments: A Basic Ordering Agreement (BOA) was initiated thru Yuma Proving Ground's contracting center to support tests and evaluation. A firm fixed price contract was awarded to Prescott Products. Discussions regarding equipment integration conducted with the user community as well as the prime contractor. Development of an IPT is underway with NSC, USSOCOM and USASOC. The Special Operations Airborne Test Board completed six High Altitude High Opening Free Fall operations to collect eight data sets, which defines the flight characteristics of the standard free fall parachute system (MC4 / MC5).

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Portable Continuity of Operations Communication Appliance	Army	0.699	0.000	0.000	0.000

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This project is evaluating the capability of Web Assured Response Protocol (WARP) to provide disaster recovery and continuity of operations (COOP) solutions to the U.S. government. WARP, if successful, will provide a solution to enable users to continue to perform vital IP-based functions over damaged or overloaded networks. This capability is vital in Continuity of Operations environments. This is extremely critical during periods of emergencies, such as terrorist attack, severe weather, etc.

Vendor: Circadence Corporation, Boulder, CO  
 Program Office of Record: Army Chief Information Officer/DoD COOP Integrated Network (DCIN)

FY 2004 Accomplishments: Contract awarded, test plan generated, work plans (spending plans) developed for testing facility scope of work defined for implementation PM (PENREN/C) Tentative Pilot Program Defined. Initiated testing. Test plan revised from information gathered in preliminary tests. Phase One testing completed, results published in report from USAISEC-TIC. Test results indicated a very strong match in a tactical go-to-war capability. CIO/G6 received permission to shift testing emphasis from original intent to this tactical capability. Phase Two testing will now be completed in partnership with Battle Command Battle Lab (BCBL) Ft. Gordon. Agreement has been reached on MIPR'ing funds to this effect and actual transfers are expected in January 2005.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Restore Effective Survival in Shock (RESUS)	Air Force	1.262	0.000*	0.000*	0.000*

\*Out year funding for this project is provided under the new Defense Acquisition Challenge Program (DACP) PE 0604051D8Z

This is a trial of bovine polymerized hemoglobin for the prehospital resuscitation of casualties in hemorrhagic shock. The item is a low volume and weight, room temperature stable substitute for blood transfusions. It is expected to significantly decrease combat casualty morbidity and mortality. Hemorrhage accounts for 60% of potentially salvageable combat casualties. Because 90% of these deaths occur prior to evacuation to a forward surgical theater, decreasing combat morbidity and mortality must focus on optimizing pre-evacuation resuscitation. Unlike older WWII and Vietnam resuscitation fluids, such as plasma, new products are effective as oxygen carriers and are highly likely to decrease hemorrhagic shock casualties, which remain at 30-100% depending on severity. The benefit of this program is that it will save lives of combat troops. Hemopure circulates directly in plasma when infused, increasing oxygen diffusion to the body's tissues and is compatible with all blood types, can be stored for 3 years without refrigeration, and is pathogen free. RESUS is a two-stage phase IIb/pivotal clinical trial project to compare the relative efficacy and safety of Hemopure with standard care products.

Vendor: BIOPURE Corporation, Cambridge, Massachusetts

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Program Office of Record: 311 HSW, Human Systems Program Office, Brooks Air Force Base, Texas

FY 2004 Accomplishments: NMRC Institutional Review Board process initiated and close to completion. NMRC prepared and submitted a pre-IND (Investigational New Drug) package to the FDA in February 2004 and are preparing for IND submission to the FDA. The FDA pre-IND meeting took place on 14 April 2004; subsequent teleconferences and correspondence with the FDA has led to protocol and IND optimization. Key issues were agreed to.

1st, the FDA concurred that the predicted risk/benefit ratio for HBOC-201 is favorable and reasonable for an IND allowance in the prehospital trauma setting where blood transfusion is not available.

--2nd, the FDA concurred that RESUS may proceed in parallel (rather than in series) to Biopure's response to the FDA Complete Response Letter.

--3rd, the FDA accepted preclinical data for prehospital use of HBOC-201 in HS based on 2 series of studies (i.e., uncontrolled HS studies performed at UNC-Chapel Hill and controlled and uncontrolled HS studies completed at NMRC as part of the Hematomimetics Core Program).

--4th, protocol modifications are required as part of the final IND submission—most notably, the FDA insisted on 28-day survival [rather than survival to hospital arrival] as the 1o outcome measurement).

--5th, lab validation (HBOC interference) and animal husbandry/bovine veterinary techniques QA data must be submitted.

--6th, a preclinical HS/traumatic brain injury (TBI) study must be completed prior to an IND allowance. WHMC just completed an HBOC-201 rat HS/TBI study which will be submitted to the FDA.

·6 sites have been recruited as stage 1 trauma centers. Recruitment of additional trauma centers (8) for Stage II of the project is ahead of schedule. Thus, more rapid enrollment is expected in FYs 05 and 06, such that the FY06 completion date has not changed.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Ship Hull Inspection and Harbor Security Autonomous Underwater Vehicle	Navy	0.828	0.000	0.000	0.000

This project is evaluating a Ship Hull Inspection and Harbor Security Unmanned Underwater Vehicle (UUV) System, designed to inspect ship berthing, piers, and ship hulls for explosives or weapons of mass destruction. The system is comprised of a portable un-tethered UUV with unique inspection sensors and navigation capabilities and supporting hardware and software, which reduce manpower requirements and risks. If successful, UUVs will result in a 450% increase in search rate and reduce risk to both divers and shipboard platforms.

Vendor: Lockheed Martin Perry Technologies, Riviera Beach, FL  
Bluefin Robotics Corp / Massachusetts Institute of Technology, Boston, MA

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Program Office of Record: PEO Littoral and Mine Warfare (PMS EOD)

FY 2004 Accomplishments: Established an IPT team (March 2004) with representatives from vendors, government labs and EOD Fleet. Letter of intent authorized for procurement prior to contract award. A planned demonstration of UUV in San Diego was postponed from May 2004 and again in July 2004 to November 2004 due to reliability problems with thrusters and Desert Star Navigation System.

FY 2005 Accomplishments (1<sup>st</sup> Quarter): Planned demonstration of CETUS II was accomplished on 17 Nov 2004. Due to these reliability concerns, the decision was made to modify the contract to extend delivery of two Harbor Security Configuration (HSC) CETUS II vehicles. Additional non-DACP (EOD UUV/ONR funding) was provided to Lockheed Martin to initiate a reliability enhancement program before build of the CETUS II vehicles in accordance with subject contract. Delivery date extended to 15 July 2005 (CLIN 0001) and delivery date for test and evaluation support extended to 16 Dec 2006 (CLIN 0002). SPAWARSYSCEN San Diego is developing a one-way fiber optic data tether for CETUS II and currently conducting integration tests.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
SOF Machinegun Enhancements - (Collapsible Stocks for Special Operations Machine Gun & MK48 Semi-Rigid Ammunition Container)	USSOCOM	0.164	0.000	0.000	0.000

This project is incorporating an enhanced collapsible stock and ammo container for the MK46 and MK48 machine guns. Incorporating a collapsible stock and ammo container will make the weapons more effective when operating in an urban environment, close quarters combat and in vehicles. This project combined the previously approved and funded Foreign Comparative Test Project for the MK48 Semi-Rigid Ammunition Container and the Defense Acquisition Challenge project Collapsible Stocks for Special Operations Machine Gun. The ammo container technology has been transferred from FN Herstal (Belgium) to FN Manufacturing in South Carolina.

Vendor: FN Manufacturing Inc., Columbia, South Carolina.

Program Office of Record: Special Operations Peculiar Modification (SOPMOD) Program Office,

FY 2004 Accomplishments: Contract awarded for design modifications and prototype systems. PM conducted technical, operational and interoperability testing. Compiled test results and prepare project close out documentation to support procurement decision.

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FY 2005 Plans: Technical and Operational testing of the collapsible buttstock will be completed and documented. Delivery of ammunition containers will be completed and Technical/Operational testing and documentation of the ammunition container will be processed. Final procurement decisions will be made. Project Manager will produce close-out report.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Speed QoS Planner	Marine Corps	0.371	0.000	0.000	0.000

The Systems, Planning, Engineering, and Evaluation Device (SPEED) Quality of Service (QoS) Planner is a “technology insertion” into the SPEED software application. The project is enhancing the capability of radio frequency (RF) path engineering to ensure the quality performance for tactical networks such as the Enhanced Position Location Reporting System (EPLRS) with applicability to the Joint Tactical Radio System (JTRS). The SPEED QoS Planner will enable the communications operator to dynamically engineer and plan networks as needed to ensure that data flow and priority are supportable prior to tactically deploying a network.

Vendor: Northrop Grumman Information Technology, Winter Park, FL

Program Office of Record: PM Communications, Marine Corps Systems Command, 2200 Lester Street, Quantico, VA 22134

FY 2004 Accomplishments: Contract signed 17 May 2004. Completed Quality Assurance Plan. Established work breakdown structure and schedule. Initiated IPR working group. Completed Software Requirements Specification and Systems Design Document. Delivered final software design.

FY 2005 Plans: QoS Planner coding and unit testing for SPEED v.10 nearly complete (90%). Execute integration testing, conduct functional qualification testing to support procurement, and final acceptance test. Provide software test report and fielding decision.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Spray Cool™ Counter Targeting System (CTS)	Army	0.096	0.000*	0.000*	0.000*

\*Out year funding for this project is provided under the new Defense Acquisition Challenge Program (DACP) PE 0604051D8Z

This project is evaluating a new technology insertion to enable spiral development of the Counter Targeting System (CTS). CTS utilizes an infra-red (IR) sensor at high frame rates to detect sniper, mortar, RPG, and large caliber weapons fires. This system will assist in near real-time targeting and situational awareness for direct support of combat troops in operations such as Iraq and Afghanistan. If successful, the Spray Cool technology will reduce CTS weight of 400+ pounds to less than 100 pounds. First test articles will be field tested in Iraq.

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Vendor: Isothermal Systems Research (ISR), Inc., Clarkston, WA  
 Program Office of Record: Army Intelligence and Security Command

FY 2004 Accomplishments: Compiled and submitted evaluation. Initiated sensor miniaturization effort to obtain a form and fit processor of ~ 18 – 20 lbs. Conducted successful Military Utility Assessment (MUA) resulted in sensor being selected for integration as the primary queuing sensor into INSCOM’s Persistent Threat Detection System (PTDS) supporting OIF. Integrated enhanced target detection sets. designed miniaturized CTS processor, FPGA and Chip Scale Packaging to conform to military needs.

FY 2005 Plans: Receive delivery of miniaturized processors (Jul 05). Integrate into network centric operations and aerial vehicle configuration for wide area surveillance. Integrate into the CENTCOM Counter Strike Task Force system for combating terrorism in OIF.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Transcritical CO2 Environmental Control System	Army	0.681	0.000	0.000	0.000

This project is evaluating CO<sub>2</sub> environmental control technologies (refrigerant, compressors, and heat exchangers) for insertion into the Up-Armored HMMWV program as logistics improvements. If successful, CO<sub>2</sub> technologies will replace current environmentally-harmful synthetic refrigerants and systems with smaller, lighter and higher-capacity systems which are vital to the legacy fleet, the Future Tactical Truck System (FTTS), and the Future Combat System (FCS). This is extremely critical for the US Army to meet international environmental protocols, in order to allow it to operate worldwide in several different countries.

Vendor: Modine Manufacturing, Harrodsburg, Kentucky  
 Program Office of Record: Army PM-Light Tactical Vehicles (LTV), PEO Combat Support & Combat Service Support (CS/CSS)

FY 2004 Accomplishments: The CO<sub>2</sub> system was installed in test vehicle, tested in a laboratory (wind tunnel) and field-tested at the Society of Automotive Engineers Alternate Refrigerant System Symposium, demonstrating quicker and deeper pull-down of the vehicle's interior temperature. Designed and fabricated a CO<sub>2</sub> system with new components incorporating lessons learned from the first system.

FY 2005 Plans: Perform Operational/ Integration Testing of the latest improved design at a Test Range/Proving Grounds.

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	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
WDM Fiber Optic Global Position System Anti-Jam Antenna	Navy	0.158	0.000*	0.000*	0.000*

\*Out year funding for this project is provided under the new Defense Acquisition Challenge Program (DACP) PE 0604051D8Z

This project is evaluating Wave Division Multiplexing (WDM) technology with shipboard GPS Anti-Jam antenna assembly to determine if it can provide transmission of multiple RF signals through a single optic fiber. If successful, this project will enable relocation of the GPS antenna electronics from high on the mast to below decks where it is protected and readily accessible for maintenance.

Vendor(s): Gould Fiber Optics, Millersville, MD; Optiwork, Fremont, CA; JDS Uniphase Corp., San Jose, CA; Tempo Research, Camarillo, CA; Fiber-Span LCC, Piscataway, NJ

Program Office of Record: SPAWAR PEO Command, Control, Communications, Computers, and Intelligence and Space (PMW/A-170)

FY 2004 Accomplishments: Request for Quote (RFQ) was released in Jun 04 with contract award in Sept 04. Proofs of concept (3-channel) and follow-on (7-channel) test effort have been completed. WDM GPS feasibility has been briefed at the Position, Location and Navigation symposium in April and the Joint Navigation Conference in May. The filters used in the WDM implementation are also being evaluated to improve current antenna systems design. The CWDM design approach, using uncooled DFB lasers, have been proposed and are in review for additional design considerations. However, further test effort will evaluate requirements it imposes on cable lengths and ship logistics issues.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
X-Cor as a Replacement for Conventional Honeycomb	Army	0.841	0.000*	0.000*	0.000*

\*Out year funding for this project is provided under the new Defense Acquisition Challenge Program (DACP) PE 0604051D8Z

X-Cor is a lightweight, damage tolerant core material that replaces conventional honeycomb in aerospace structures. A 10% weight reduction over the baseline honeycomb on Black Hawk is estimated. This is critical because weight reduction is quite significant to the program in two respects. First, it greatly increases helicopter performance, particularly in vertical lift/rise capability, which greatly

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increases aircraft survivability and capacity; and, second, this 10% reduction could amount to a 25% RDT&E cost avoidance over other weight reducing alternatives.

Vendor: Aztex, Inc, Waltham, MA  
Program Office of Record: PM-Black Hawk

FY 2004 Accomplishments: Core design optimization is complete. Sikorsky has completed a weight analysis based on the higher density Rohacell foam needed to prevent core crush. As described in the last report, some core crushing was exhibited by cores made with very low density foams in the 1.2 – 1.5 pcf range. Based on these results, Aztex will change the density range of the foam specification to 1.8 +/- .2 pcf (from 1.4 +/- .2 pcf) FY 2005 Plans: Complete qualification program and produce 4 ship-sets of finished detailed parts. Develop and secure approval of the quality plan and all the necessary production control documentation

**C. (U) OTHER PROGRAM FUNDING:** N/A

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)			DATE February 2005		
APPROPRIATION/BUDGET ACTIVITY RDT&E/Defense Wide/BA 3		R-1 ITEM NOMENCLATURE Quick Reaction Special Projects (QRSP), PE 0603826D8Z Rapid Reaction Fund (RRF), Project 828			
COST (In Millions)		FY 2004	FY 2005	FY 2006	FY 2007
Rapid Reaction Fund (RRF) Project 828		26.619	75.000*	51.283	51.174

\*Internal Reprogramming Action (not reflected in control totals).

**A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:**

The Quick Reaction Special Projects Program (Program Element 0603826D8Z) QRSP 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 Funding (QRF), Technology Transition Initiative (TTI), and Defense Acquisition Challenge Program (DACP).

A fourth project, the Rapid Reaction Fund (RRF) was added for FY2004 only, to allow a rapid response to operations in Iraq and funded through a BTR and FY01-14 PA Reprogramming.

**B. (U) ACCOMPLISHMENTS**

IEDs have been a significant problem in Iraq, causing numerous casualties and affecting operations. The RRF was focused to develop new technologies or apply existing technologies to counter the threat of IEDs.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Active Denial System (ADS)	Air Force	8.430	0.000	0.000	0.000

The ADS is a high energy weapon that provides an invisible beam that while causing pain, does not maim or kill the target. The purpose was to provide standoff, non-lethal counter-personnel capabilities. The funds requested were used to purchase critical long-lead items to support the future production of a copy of the Active Denial System ACTD original prototype and the project completed in FY 2004.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007

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Epoxy Foam	Marine Corp	.277	0.000	0.000	0.000
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The Joint Non-Lethal Weapons Division (JNLW) through Marine Corps Systems Command, designed and tested the feasibility of developing an Epoxy Foam Denial System (EFDS). EFDS dispenses an Expanding Epoxy Polymer Concrete (EEPC) onto captured enemy ammunition, weapons and equipment to prevent these items from being used to make Improvised Explosive Devices (IEDS) for use against US Forces. Phase 1 efforts included Safety Testing on inert munitions to investigate the thermal effects of the chemical reaction and ensure that it would not initiate the munitions. Testing complete and the compound performed as expected. Awaiting decision to deploy to the theater.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Automated Adversarial Targeting Assessment (AATA)	Navy	2.000	0.000	0.000	0.000

AATA is a predictive tool that conducts high resolution modeling and analysis of terrain and cultural features to identify insurgency threat areas (details classified). In FY 2004, system completed and tested in CONUS. System deployed to Iraq for final testing in September 2004.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
High Value Target Detection and Surveillance	SOCOM/Army	4.500	0.000	0.000	0.000

High Value Target Detection and Surveillance is a system used to monitor border crossings in the CENTCOM theater of operations (details classified). This project was funded from the QRF and the RRF (see above for QRF) in FY 2004. This project provided project management, engineering support and test and evaluation for integration and rapid prototyping of equipment to survey mobile and fleeting targets that threaten US Military forces in the AOR. This system will be installed to monitor borders and consists of tactical camera and optical systems with video and audio recording as well as tagging and tracking capabilities.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007

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Persistent Threat Detection System (PTDS)	Army	3.000	0.000	0.000	0.000
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This effort deployed the PTDS onto an aerostat that is located within proximity to US forces in Baghdad to conduct surveillance to defend against MANPADS and mortar attacks. The PTDS effort integrated sensors into an existing aerostat system for continuous airborne surveillance of high value targets. These EO/IR and UV rocket threat warning sensors were installed onboard an aerostat that surveys a specific threat area to provide video to a Sensor Fusion Station. The Sensor Fusion Station goal is to then interface with Q37 Fire Finder Radars and the AAR-57 UV Detection systems to detect both mortar and MANPAD threats emanating within a 30 km range of the system. Relevant threat information is to be automatically plotted on resident common operating picture and viewed in real time through full motion video, which allows the Warfighter to immediately respond with a mitigating force or capability. Design and test completed in FY 2004 and an aerostat was initially fielded in Iraq in November 2004 for testing in critical theater locations.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Biometrics	Army	1.780	0.000	0.000	0.000

The Biometrics Automated Toolset (BAT) is a system used to conclusively identify people by taking a biometric measurement and comparing it to a database of stored templates of biometric data. The BAT system has been successfully fielded in Operation Enduring Freedom, Operation Iraqi Freedom, and Kosovo. The system is used to enroll and track detainees, host nation workers, human intelligence sources, and other persons of interest. In its current configuration the system consists of a laptop computer and three biometric sensing devices: fingerprint scanner, iris recognition reader, and a digital camera for facial recognition. System design and test completed in FY 2004 and an initial prototype was deployed to Iraq.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Data Dissemination	DTIC	1.500	0.000	0.000	0.000

This effort is in support of an ongoing content management initiative, the Antiterrorism Enterprise Portal (ATEP). Funds were used to procure hardware and software and support from Vignette to implement a companion ATEP environment on the NIPRNET. The objective was to continue seamless development and implementation of leading edge information technology management strategies, applications, processes and procedures to improve and /or maintain the electronic information gathering, storage and dissemination capabilities associated within ATEP from an IED perspective. This effort integrated and disseminated currently stove piped information allowing users to quickly aggregate information, established a coherent situational awareness, and performed analysis to determine the best course of action to mitigate the IED. The support infrastructure was extended to the NIPRNET, at a sensitive but unclassified level (NIPRNET-SBU) to support

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information dissemination to US and coalition forces. Design and test completed in FY 2004 and awaiting installation in Iraq.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Test Site	Navy	2.300	0.000	0.000	0.000

This effort provided a dedicated site for end-to-end evaluation of force protection technology (e.g., IED detect and defeat technology) under realistic real world environments at the Yuma Proving Ground (YPG). In addition to providing test and evaluation studies, this effort included construction of representative rural village, expansion of representative rural environment, development of representative urban environment and application of range instrumentation. This effort also resulted in the establishment of a comprehensive test site for purposes of testing prototype force protection echnologies before deployment to Iraq in a geographically remote area, within DoD controlled restricted airspace. Site design completed in FY 2004. Over 30 systems have utilized the site as a representative environment to conditions in Iraq, before deployment to Iraq.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Testing of a Prototype Fiber Surveillance System – JACK RABBIT	NSA	.100	0.000	0.000	0.000

This effort performed field evaluation of a surveillance system to support counter-insurgency operations in Iraq. The fiber surveillance system is a self-contained, portable system that has many applications, including detecting and locating disturbances and damage or interference to fiber cables, intrusion into buildings, attempted crossing of perimeters or borders, vibration from structures or machines and audio surveillance. The program was completed in FY 2004.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Support of Testing a LIBS Standoff Sensor	Army	.117	0.000	0.000	0.000

This effort reconfigured and tested the existing standoff laser induced breakdown spectronscopy (LIBS) instrument that is used to identify vehicle borne improvised explosive devices (VBIEDs) by detection of trace elements of explosive residue on vehicle surfaces. The improved LIBS instrument may used for dual-pulse operation. The LIBS system is currently in test at YPG for consideration as possible deployment to Iraq pending successful testing.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007

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Cave Urban Assault Kit – Multi-spectral Vision System	Army	.201	0.000	0.000	0.000
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This effort allows soldiers to operate in tight spaces and in complete darkness. The system is comprised of multiple cameras each imaging in separate spectral bands and with the output presented to the soldier via a high-resolution micro-format display. The project completed in FY 2004 and the technology was transitioned to the Army.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Force Protection Needs in Support of OIF Military Forces	Air Force	1.000	0.000	0.000	0.000

This effort developed a prototype and evaluated a compact system that can detect RF devices used to detonated IEDs., and was completed in FY 2004.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Classified Sensor Testing Support	Air Force/Navy	1.000	0.000	0.000	0.000

This project enables standoff detection of indications of threat activity. FY2004 provided funding for technology evaluation and determination of operational constraints.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Video Change Detection	DARPA	.200	0.000	0.000	0.000

This project employs newly-developed vision and graphical techniques to analyze video of repeated observations of field events in order to flag visible changes. Applications include IED detection, monitoring of ammunition storage sites, and tamper detection for special operations. Can be configured for use as a vehicle-mounted roadside IED detector or as a standalone tool for use with video from UAVs, aerostats or handheld cameras.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007

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Industry Assessment on IED Threat	Air Force	.084	0.000	0.000	0.000
<p>This project supported an industry conference in FY 2004 focused on IEDs. The conference provided industry with information on the nature of the IED threat and the process for communications between DoD and companies so that industry could more effectively develop responses to the threat.</p>					

**C. OTHER PROGRAM FUNDING: N/A**

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2a Exhibit)				Date: February 2005				
APPROPRIATION/BUDGET ACTIVITY RDT&E/Defense Wide/BA 3				R-1 ITEM NOMENCLATURE Quick Reaction Special Projects/Technology Transition Initiative (TTI) Program, PE 0603826D8Z P829				
COST (In Millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Technology Transition Initiative (TTI) Project P829	12.729	20.964	29.717	29.926	31.288	31.346	32.099	32.841

**A. (U) 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 Defense Acquisition Challenge Program (DACP), and Quick Reaction Fund (QRF). The fiscal controls above represent the investment of the QRSP Program funding for the TTI Program.

Authorized by Title 10 and Section 215 of the FY2003 Defense Authorization Act, the TTI 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. Typically, these technologies are completed in the laboratories and shelved until procurement funding is made available by the respective Service to transition the item from S&T base into the acquisition community. The TTI Program facilitates the rapid transition of mature technologies from the S&T base into procurement or acquisition programs. The TTI objectives are to accelerate the introduction of new technologies into operational capabilities for the armed forces and to successfully demonstrate new technologies in relevant environments.

Technology Transition projects are selected by the Technology Manager 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 Technology Transition proposals is distributed to the DoD Services and Agencies through the Technology Transition Working Group (TTWG) members, designated by the TTC. The TTWG gather the proposals from the service/agency S&T base and then prioritizes them based on Joint, Service or Agency capabilities needed and submits them to the Technology Manager. The Technology Manager's senior staff consolidates the proposal submissions, evaluates the Service/Agency recommendations, compares with

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available resources, and prepares a recommended list to the Technology Manager for funding. The Technology Manager in coordination with the TTC select the highest priority proposals for funding.

**B. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:**

Projects funded with FY2004 TTI Program Funding:

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Battlespace Terrain Reasoning Awareness (BTRA)	Army	1.015	0.000	0.000	0.000

Battlespace Terrain Reasoning Awareness (BTRA) is a software product constructed on the stability of a premier Commercial-Off-the-Shelf (COTS) Geographic Information System. BTRA tactical decision aids (TDAs) integrate terrain and weather (current and forecasted) data and provide actionable, integratable, predictive information regarding their effects on platforms, sensors, systems, small units, large forces and their associated tactics and behaviors. BTRA provides specific analysis tools addressing positions of advantage, mobility and maneuver and effects on sensors (imaging, seismic and acoustic). BTRA also provides predictive terrain and weather decision tools addressing maneuver, situation and threat analysis and Intelligence, Surveillance and Recognizance (ISR) management within Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) processes. BTRA capability addresses several joint systems requirements for terrain and weather tactical decision aids (TDAs) from Army (Digital Topographic Support System (DTSS) and All-Source Analysis System-Light (ASAS-L)), Air Force (Time Critical Targeting Facility (TCTF) of their Theater Battle Management Core System (TBMCS) C4ISR), and DISA/NGA's Commercial Joint Mapping Toolkit (CJMTK) Software Requirement. The BTRA TTI project will transition five (5) information generating TDAs, four (4) decision tools, and one (1) Service Architecture. The benefit of TTI funding for this project was a successful transition in 17 months which was estimated to be 28 months without the influx of the TTI Program funding. Through this TTI transition, functionality to CJMTK has been increased and improved the quality and OPTEMPO in C4ISR.

FY 2004 Accomplishments: Fully transitioned three phases of three information generating TDAs; partially transitioned a phase of a fourth TDA. Fully transitioned one phase of all four decision tools.

FY 2005 Accomplishments: Completed transition of BTRA v2.0 which included: a) two decision tools supporting C2 (planning and COA) and IPB; b) four decision aids to calculate terrain and weather effects; and c) eight data prep engines. The BTRA greatly expanded CJMTK utility resulting in redundant system investment in terrain and geospatial analysis. Transition of BTRA to CJMTK supports 137 programs. Through the BTRA TTI project, a partnership with NGA was established to create and maintain the CJMTK Portal. Additional enhancements to BTRA and the CJMTK Portal, funded by NGA and other sources, which will tear down

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"stovepipes" within the Joint geospatial community and will greatly increase the "sharability" of common geospatial information. Close Out Brief presented to OSD TTI Program Manager on 12 January 2004.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Unmanned Vehicle Spiral Upgrade (IROS3 Spartan)	Navy	0.620	0.000	0.000	0.000

IROS3 is a network centric overarching Anti-Terrorism/Force Protection (AT/FP) system which integrates sensor information while combining semi-automated engagement capability to provide shipboard protection, pier side, at anchorage and transiting restricted waterways. Spartan is a modular, reconfigurable, multi-mission, high-speed, semi-autonomous unmanned sensor and weapon system against asymmetric threats. This project will conduct a spiral upgrade of the IROS3 system to accommodate the integration of an unmanned vehicle. Concept will be proven using the Spartan USV ISR/FP module as a sensor inputs to IROS3.

FY 2004 Accomplishments: Completed the open system-to-system communication design baseline, integrating SPARTAN into the IROS<sup>3</sup> system. The necessary interfaces have been developed to support full-scale system integration, and were successfully tested as part of a full-scale demonstration of SPARTAN sensor control via the shipboard IROS<sup>3</sup> systems console. The test was conducted 27 May 2004 at NUWC, Newport, Rhode Island, successfully demonstrating the integration of the SPARTAN USV with an ISR Mission Module and the IROS<sup>3</sup> system architecture and validating the open architecture and increased potential AT/FP mission capabilities. IROS<sup>3</sup> is in use on the USS RAMAGE and demonstrated on the USS GETTYSBURG during its last deployment to Naples. System transitioned to the PEO(LM&W) and PEO (IWS) Program Offices.

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	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Lightweight Steel Track	Marine Corps	0.365	0.000	0.000	0.000

The U.S. Marine Corps is seeking a lightweight steel track for the Advanced Amphibious Assault Vehicle (AAAV). The German track manufactured by Diehl has a candidate ultra-light steel prototype track, which has the potential to meet or exceed AAAV's track performance criteria. This track weighs approximately 40% less than typical steel track (at comparable cost) and is expected to have a minimum life of 3,000 miles. This ultra light steel track is significantly more robust than the current aluminum now being used on AAAV, is less expensive, and weighs the same. The goal of this TTI project is to procure and test the Diehl Ultra-light Steel Track on an AAV with the intent to purchase additional track sets if performance meets expectations. Test will demonstrate and validate the track integrity and robustness suitable for a harsh Marine field environment.

FY 2004 Accomplishments: Project was planned for FY 2003 new start. Due to contract award issues, project start was delayed until FY2004 with a funds release in 3rd Qtr FY2004. Awarded contract to General Dynamics (prime vendor) Sep 2004. Contract award to Diehl Remschied (test track vendor) in Dec 2004.

FY 2005 Plans: Receive and install test track on prototype EFV test vehicle. Conduct initial track testing to evaluate durability (3,000 miles per track; 1,000 for track pads). Conduct analysis and prepare final close out report.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Low-Cost Flame Resistant Coveralls	Army	0.350	0.000	0.000	0.000

There is a critical need to address the high cost of flame resistant material used to protect our warfighters. Currently aviators and tankers wear protective clothing made from woven Nomex and Kevlar fiber. However, these fabrics are too expensive to issue to every infantry soldier. A study was undertaken to evaluate and develop new materials that provide a 30%-50% cost savings over existing flame resistant materials as well as camouflage protection, comfort and durability. This new fabric is a lightweight, open, air-permeable construction, spun-laced and non-woven fabric that is enhanced to military specifications. It is estimated to save more than 40% in costs from the current materials, potentially increasing the number of warfighters protected by 40%.

FY 2004 Accomplishments: Commercial garment sizes were not relative for military user wear. Resized and redesigned military unique version to provide appropriate sizing and additional pockets/straps to accommodate equipment the warfighter attaches to the coveralls. Manufactured military version in required test quantities

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FY 2005 Plans: Procure large quantities of coveralls for the final field evaluation planned for February 2005. Complete analysis and conduct TTI Project Close Out Brief (March 2005).

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Overwatch	Army	0.509	0.000	0.000	0.000

Overwatch helps the warfighter detect, locate, and classify hostile firings. It also conducts area surveillance in real time to assess, neutralize, and mitigate the enemy by providing counterfire targeting data. Overwatch is focused on developing and testing an on the move tactical Overwatch Weapon Recognition Equipment tactical, which is mountable on ground vehicles. The current risk reduction program is enhancing this capability by extending the field of view to 120 degrees by providing a higher bandwidth interface between the electro-optic/infra-red sensor and processor, and incorporating a laser ranger for precise geo-location.

FY 2004 Accomplishments: Completed the build and testing of the STARE; transitioned to PACOM/ONR for integration into Spiral 1 Gunslinger Project objective in 3<sup>rd</sup> Quarter FY 2004.

FY 2005 Plans: Conduct TTI Project Close Out brief to OSD TTI Program Manager.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Special Operations Forces (SOF) Demolition Kit	SOCOM	0.395	0.000	0.000	0.000

This project is an acceleration of existing initiative to provide SOF operators with a replacement of the Army's 1950 vintage demolition kit, using improved pre-loaded explosively formed penetrators (for fence piercing and cable cutting). Payoffs include increased performance, wider range of targets, and equipment that can be easily tailored for mission requirements.

FY 2004 Accomplishments: Conducted first iteration of "scaled down" design of medium to small Special Operation Forces Demolition Kit (SDK) PAX-2A Explosively Formed Penetrator (EFP).

FY2005 Plans: Conduct second design iteration (1QFY05). Conduct design validation repeatability tests of final design (2QFY05). Fabricated and delivered 55 units of final design delivered (2QFY05). Conduct TTI Project Close Out Brief to OSD TTI Program Manager.

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	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Special Operations Forces (SOF) Alternative Power Sources	USSOCOM	1.375	0.000	0.000	0.000

The SOCOM Advanced Technology Program has been exploring alternative power sources to reduce the weight that Tactical Operators must carry and extend the life of equipment while in the field. Numerous mature technology products have been identified in both the S&T base and in the commercial world. This effort transitions advanced alternative power sources (e.g., fuel cell, solar panels, and mini diesel engines) of various DoD Science and Technology efforts. TTI funding provided will be used for the SOF Alternative Power Source project to bridge the gap between DARPA funding and SOCOM procurement funding in FY 2005.

FY 2004 Accomplishments: Procured and demonstrated four (4) additional power sources for application in the SOF environment. These sources are: MTI Fuel Cell – SISA; MTI Fuel Cell – PDA; AET Generator and Uni-Solar Uni-Pac. Conduct TTI Project Close Out Brief.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Titanium Nitride (TiN) Coating for T-58 Engine Compressor Blades	Marine Corps	0.485	0.000	0.000	0.000

The U.S. Marine Corps H-46 helicopter is experiencing a high rate of premature engine removals while operating in Afghanistan and Iraq. Substantial engine performance loss results from compressor airfoil erosion due to particle ingestion during routine operation in desert environments. TiN coating for the T-58 engine will double compressor life in a sand environment and is projected to save about \$56 million in Life Cycle Costs through FY12 and will increase compressor life in a sand environment by a minimum factor of two. The airfoils will be installed in nearly 300 new T-58-16A ERIP compressor cores procured for USMC CH-46 helicopters beginning in FY 2005 through FY 2007.

FY 2004 Accomplishments: Completed fatigue testing of coated airfoils; fully coated two (2) sets of T58 compressor airfoils; initiate and completed the build of a Lead the Fleet engine with coated airfoils to be evaluated in South West Asia; built two (2) sand ingestion test engines, one coated – one uncoated. For final qualification of coating; completed the design change and approve the ECP; performed all coating vendor substantiation engineering; and modified the ERIP contract to include coated airfoils in module production.

FY 2005 Plans: Begin Fleet Introduction.

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	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Water Purification System/ Water Pen	DARPA	0.425	0.000	0.000	0.000

For tactical situations in which deployed troops do not have quick and easy access to potable water, the water purification pen will allow soldiers to treat up to 300 liters of any available, non-brackish water source, eliminating the risk of their exposure to diseases and biochemical pollutants.

Mixed oxidants electrochemically generated from common table salt via several small lithium camera batteries kill a wider range of resistant microorganisms (e.g., Cryptosporidium, Giardia, and E.Coli) present in contaminated, non-brackish water than more traditional means of disinfection (e.g., chlorine and iodine).

FY 2004 Accomplishments: Through a GSA Schedule contract, procured 4,157 additional water purification pens and distributed them throughout the Services and U.S. Special Operations Command. After all water purification pens (total 6,651; 2,494 distributed in FY 2003) are procured and distributed, each Service (Army, Air Force, Navy and Marine Corps) and U.S. SOCOM will receive 1,200 pens each with remaining pens distributed to stock testing units who will evaluate item.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
High Altitude Performance Improvements for Global Hawk	Air Force	1.130	3.650	0.000	0.000

The technology to be transitioned is increased high altitude electrical power generation capability that will provide the Global Hawk with 75kW of payload power at high altitude (65K feet). This is triple the current onboard power capability and allows the Global Hawk to support planned payloads that cannot be supported with the existing power system. The improved electrical power generation provides the additional power for the Global Hawk system to meet Mission Area Needs for expanded data fusion, ground/airborne target ID, and EO/IR countermeasures. The proposed concept extracts power from the AE3007 engine's low pressure (LP) turbine instead of the high pressure (HP) turbine. LP spool power extraction versus HP spool power extraction enables the Global Hawk to achieve U-2 sensor parity. The system benefits to Global Hawk of LP spool power extraction relative to HP spool power extraction are: 5.1% increase in endurance, 6.7% increase in maximum altitude, and 4.2% increase in range. The TTI initiative accelerates the transition of this technology by 24 months.

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FY 2004 Accomplishments: Conducted stand alone altitude test of LP Generator; performed revisions to AE 3007 Engine Generator Interface.

FY 2005 Plans: Install LP Generator on AE 3007H and perform calibration runs; ship engine-generator set to Rolls Royce/Allison Advanced Development Company and perform altitude tests.

FY 2006 Plans: Planned integration on Global Hawk.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Automated Change Detection	Army	2.260	1.830	1.850	0.000

This effort accelerates transition of an automated Change Detection capability from the JAC ACTD into the U.S. Army, Airborne Standoff Minefield Detection (ASTAMIDS) and Ground Standoff Minefield Detection (GSTAMIDS) programs. This new capability will be used by the warfighter to address a critical need to rapidly identify and locate landmines and Improvised Explosive Devices (IEDs) along routes. The CERDEC-NVESD Change Detection Workstation (CDWS) has been demonstrated under the Joint Area Clearance (JAC) Advanced Technology Demonstration (ACTD) and consists of a field-portable workstation with user-friendly interface that supports the detection of recently buried mines by means of change detection. The system can accept a wide variety of imagery from various sensors. The current configuration is dependent upon an operator to analyze, process, and identify possible landmine and improvised explosive device (IED) signatures in the imagery. This effort will automate the change detection process by adding an algorithm designed to detect landmines and IEDs which will significantly increase the detection rate. TTI project accelerated a capability into current operations 12-24 months faster and accelerated a capability from the Joint Area Clearance (JAC) ACTD into acquisition 18-24 months sooner. Based on CTTTF results and TTI progress, the USMC requested five (5) Change Detection systems for use with their UH-1N helicopters and F/A-18 fixed wing aircraft.

FY 2004 Accomplishments: Developed automated algorithms and data collection POD. Conduct test and evaluation of algorithm and hardware/software integration. Automation progress demonstrated. Results identified the need for better imagery to yield acceptable probability of detection with low false alarms. FY2005 Science & Technology Objective (STO) will provide better imagery for TTI automation effort.

FY 2005-2006 Plans: Complete systems engineering and systems integration with JAC ACTD CDWS. Continue data collection (real-world) to enhance database of target geometries, essential for finding roadside threats. Capability will transition to Project Manager for Close Combat Systems (PM-CCS) into ASTAMIDS program in FY2007.

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	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Low Cost, Light Weight Unitized Composite Manifolds for Attitude Control (ACS) Systems	MDA	0.900	0.000	0.000	0.000

This effort will explore the replacement of the Theatre High Altitude Defense (THAAD) system’s Aluminum Attitude Control System (ACS) manifold with a composite version that utilizes a unitized HyperVARTM process, and demonstrate applicability of the composites technology to the Exoatmospheric Interceptor Kill Vehicle (EKV) Divert Attitude Control System (DACS). The THAAD ACS composite manifold development will produce a 24% reduction in unit cost and manufacturing processing and improve system reliability. The effort will also improve system operability and reliability by through a 29% weight reduction. The EKV DACS composite development will reduce costs and provide lightweight shock and vibration damping solutions for the DACS nozzle support structures.

FY 2004 Accomplishments: Developed requirements, design and process of Integrally Composite Manifold -Altitude Control Section (ICM-ACS). Conducted material characterization tests and performed design upgrade (as necessary). Perform full scale prototype fabrication.

FY 2005 Plans: Conduct prototype full-scale test and article fabrication/structure testing. Prepare final report and TTI Close Out brief.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Seal Delivery Vehicle Advanced Reconnaissance System (ARS)	SOCOM	0.375	0.475	0.000	0.000

The SDV ARS project is developing a stabilized low light color video camera and thermal imager configured in a MK 8 MOD 1 SDV-compatible mast-mounted device. The system will provide SDV operators the ability to clandestinely maintain situational awareness, while tracking, recording and storing target data in the SDV. The project is being executed under a US/UK Cooperative R&D agreement established in FY 2002.

- (1) The reconnaissance and surveillance Modular Mast Device will be configured as a Mission Kit that will include: (1) the periscope controller, which provides required computer processing, interface and controller boards, recording media, and a monitor for viewing imagery, (2) interfaces, connectivity and cabling between the camera control unit (Figure 1) and the camera unit, as well as ports or plugs for interface to future transmission or storage devices, and (3) a camera, which provides a mast-mounted image capture device.

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(2) The SDV ARS project’s advances include camera stabilization in Sea State 3 conditions and use of uncooled IR microbolometer technology.

FY 2004 Accomplishments: Obtained one (1) prototype optical sensor and integrated into SDV ARS Mission Kit.

FY 2005 Plans: Fabricate a new or enhanced periscope controller and integrated into SDV ARS Mission Kit. Conduct SDVARS Mission Kit testing to verify performance and reliability. Provide completed Periscope Mission Kit to SDV Teams for operational testing.

FY 2006 Plans: Achieve Milestone B Approval and initiate production of prototype.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Wide Field of View Goggles (WFOV)	SOCOM	1.265	0.549	0.000	0.000

The goal of the Night Vision Electro-Optics (NVEO) project is to improve operator night vision devices with respect to increased range, magnification, field of view (FOV), sensitivity, and resolution, during periods of both good and obstructed visibility. Project technologies that can be applied to existing night vision goggles (NVG) through modifications or retrofit. Initial efforts focused on increasing the FOV and anti-blooming technologies. The NVEO project will reduce NVG blooming, increase system sensitivity, and create a Wide Field of View (WFOV) goggle with enhanced range, field of view (current NVG is 40 degrees), and sensitivity. Eventually, these WFOV goggles, which have been developed in two phases, will replace all current SOF ground operator NVGs. Funding support from the TTI Program accelerated the WFOV NVG capability by 3 to 4 years.

(1) Phase I - Research and design a WFOV Image Intensifier (I<sup>2</sup>) device.

(2) Phase II - Develop and fabricate up to eight (8) prototype WFOV I<sup>2</sup> systems IAW the approved design in Phase I. Nine prototype systems (see Figure 1) were developed and sent to SOAL-T for evaluation. The evaluations continue, and initial tests found user acceptance of the system to be good - except in the area of weight.

FY 2004 Accomplishments: Completed product/process development for eight (8) prototypes.

FY 2005 Plans: Conduct product demonstration to determine if prototypes meet the weight and wider field of vision objectives. Transition to PEO for Special Programs (PEO-SP) will be driven by the positive user feedback during evaluations and operational testing in 4Q FY2005.

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	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Accelerate Transition of Area Security Operations Command & Control (ASOCC)	DISA	0.675	0.250	0.000	0.000

The CRASOC2/ASOCC system integrates IT tools critical to Anti-Terrorism/Force Protection (AT/FP) missions. The system provides assured C2 to forward bases around the world and ties together information and data from DoD, the Intelligence Community, Federal Agencies, and Force Commanders.

The ASOCC system integrates numerous COTS and GOTS components including:

- Deployment Visualization Toolkit (DVT)
- Java Imagery Video Exploitation (JIVE)
- Defense Collaboration Tool Suite (DCTS)
- Knowledge Board (KB)
- eX-Panel
- eXtensible Information System (XIS) and Adaptive Battlespace Awareness Common Operational Picture (COP)
- Baseline Microsoft Suite
- Doctrine, Organization, Training, Materiel, Leadership, Personnel, and Facilities (DOTMLPF) documentation

FY 2004 Accomplishments: Initiated technology development of web-based capabilities. Expanded command and control pilot opportunities in multiple communities (Navy IMPP, Fort Monroe, Guardian, NYPD and NJ Regional Test Bed). Transitioned to NORTHCOM InfraLynx Van for scene-of-action presence and communications. Accelerated CONOPS development to support PACOM adoption of ASOCC as AT/FP C2 tool.

FY 2005 Plans: Conduct ASOCC System Hardening Distribute ASOCC system to Combatant Commanders/Services. Conduct Joint Military Utility Assessment (JMUA).

FY 2006 Plans: Transition system to Global Command and Control System (GCCS) and Joint Command and Control.

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	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Semantic Web Network	NGA	0.585	0.780	0.000	0.000

An XML-based content routing system technology that enhances Command and Control by delivering more relevant and complete information from across Intel Community databases in real-time matured faster than expected and is now ready for transition to the Marine Corp System Command (MARCORSYSCOM), Marine Expeditionary Force-Intelligence Analysis System (MEF-IAS). The USMC wants to deploy this technology as part of current combat operations. Extensive functional testing of the capability was accomplished during the Joint Warrior Interoperability Demonstration (JWID) in June 2003.

The TTI funding will support two phases of the Semantic MEF IAS Integration, Testing and Transition to Operational Forces program by enabling combat readiness testing and support of the deployed system. Phase Two will integrate the Tactical/National Integrated Environment (CPX) with the Semantic Web capability across the SIPRNet at the Marine Corp Intelligence Activity. In addition, it will evaluate integrated data access to MCIA and other IC databases for Rapid Response Planning Process (R2P2) requirements. Finally, Phase Two will combine tactical, operational, and national IC resources with critical command and control information results for unprecedented level of streamlined intelligence support to operations. The resulting system will reduce search time and allow the warfighter more time for collaborative planning and course of action analysis and deployment. Phase III will deliver two Equipment Suites and Software Licenses to the MEF-IAS. The resulting system will reduce search times and allow the warfighter more time for collaborative planning and course of action analysis and deployment.

FY 2004 Accomplishments: Integrated the Tactical/National Integrated Environment (CPX) with the Semantic Web capability across the SIPRNet at the Marine Corp Intelligence Activity. Initiated evaluation of integrated data access to MCIA and other databases for Rapid Response Planning Process (R2P2) requirements. Complete system transition to support 1<sup>st</sup> and 2<sup>nd</sup> Marine Expeditionary Forces (MEF) in combat operations.

FY 2005 Plans: Complete transition of Phase III of the Semantic MEF IAS Integration, Testing and Transition of the technology to 3<sup>rd</sup> MEF by enabling combat readiness testing in support of the deployed system to Okinawa, Japan.

FY 2005 TTI New Start Projects:

The TTI Program selected thirteen (13) projects as new start initiatives. Selected projects were proposed by the Air Force, Army, Navy, Special Operations Command (SOCOM and the Missile Defense Agency. Funding to support the FY2005 TTI New Start projects totaled \$13.430 million.

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	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Ultra Long End Power Generation for Battlefield Air Operations (BAO) Special Ops Warfighter	Air Force	0.000	0.780	0.000	0.000

During a typical deployment, the BAO Special Tactics Warfighter will often need to jump into a forward position carrying more than their body weight in equipment and support ancillaries. The batteries required to support these devices represent a hefty and expensive component of the BAO kit. In an example 72 hour mission, total power consumption of the BAO kit is expected to be approximately 2200 Whrs. If this power were to be supplied conventionally via BA-5590s then 13 separate batteries would be required, translating into more than 29 lbs. The TTI project program will incorporate inexpensive, injection-molded fuel cell technology into a common BA-5590 form factor which can easily be included in to the PRC-117 field radio, which is an essential part of the BAO kit. If this technology were adopted, then the power weight required to complete the example 72 hour mission would drop by more than 13 lbs.

FY2005 Plans: Refine design of refill cartridge and integrate fuel cell sub-systems into BA-5590 battery replacement.

FY2006 Plans: Demonstrate power source in field to facilitate LRIP procurement. Development will produce 40% reduction in weight, 50% reduction in cost and improvement in power capability. Conduct TTI Project Close Out briefing for OSD TTI Program Manager.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Advanced Lightweight Ceramic-Based Armor	Air Force	0.000	1.215	1.120	1.120

The availability of lightweight modern Small Arms Protective Insert (SAPI) body armor has been a critical issue in the Iraqi battle theater. The Air Force and Navy in-house R&D programs working in collaboration with Excera Materials Group of Columbus, Ohio (via Phase I and II SBIR's) have developed a novel ceramic strike face material for use in armor systems. The material has been used in conjunction with traditional polymer-based backing and has passed first article testing by the Army PM. Furthermore, the Army has issued purchase orders for ceramic strike faces that contain the first generation of these materials. Excera has developed a robust manufacturing process concurrently with the material. As a result they have a lightweight, high ballistic performance system that has several manufacturing advantages over traditional armor ceramics. Specifically, the material has a lower manufacturing cost and is easily shaped to meet complex human or vehicle contours. The work proposed in this TTI project will allow for wider availability of this material across the various Agencies and increase its range of capability (i.e., increased ballistic threats) and application (i.e., advanced personnel, vehicle, etc.). Through funding provided under this TTI project, it is estimated to accelerate transition 24 months sooner than originally planned.

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FY2005 Plans: Conduct analysis of SAPI materials to address new DOD specifications (to address BZ armor piercing Incendiary tracer rounds). Perform modification of current SAPI materials to meet new requirements. Initiate production of improved SAPI plates (at 2,000 plates per month).

FY2006 Plans: Increase production of improved SAPI plates (5,000 plates per month).

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Medical Scancorder	Air Force	0.000	1.160	1.065	0.000

Current detection systems used for vital signs monitoring during urban search and rescues are limited by several factors. Medics and Pararescuemen (PJs) are unduly endangered in determining location of casualties because of the “hands-on patient” requirement. Delay in detecting casualties means a delay in treatment. The sooner the patient is found; the sooner care may be given, which may result in more lives saved. The medical scancorder keeps the medic out of the line of fire unless absolutely necessary to treat the most serious casualties and it permits the medic to quickly know which casualties are those needing attention. Thus, it improves the medic’s efficiency as well as providing needed attention to the most seriously wounded.

MIR (Micro Impulse Radar) technology, invented at Lawrence Livermore National Laboratory, emits extremely short, low-power pulses over a wide bandwidth. These pulses are able to detect minute motions, such as those of the heart walls, as well as the boundaries between different materials. Because it is radar technology, it can detect these motions over relatively long ranges—in the case of heart motion it detects at distances up to 20 ft and possibly further.

The project will be conducted three phases. Phase 1 has already been completed and funded by other S&T funding sources. TTI Program funding will support Phases 2 and 3, potentially accelerate product transition by 12 months. The first phase permitted a medic to point the device at a casualty and detect heart rate and breathing. Data will be recorded onto the device with enough storage to record 100 data points for 20 casualties.

FY2005 Plans: Initiate Phase 2 to shrink the radar to a size of 1”x2”x2” which will be placed on each casualty’s chest. These devices will detect the heart rate and breathing and on demand wirelessly (and with low probability of detection) transmit that data through a range up to 40 ft so it can be stored on the device of Phase 1. A go-no go decision will be made before proceeding into Phase 3.

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FY2006 Plans: Initiate Phase 3 to automate the entire process so that the medic receives the data automatically from the radar device on the casualty's chest. The medic can access that data at any time. Conduct TTI Project Close Out Briefing for OSD TTI Program Manager.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Countermeasures Protection System (CMPS)	Army	0.000	2.440	0.000	0.000

The CMPS is a field-programmable Electronic Countermeasures (ECM) system designed to provide force protection against Remote Controlled Improvised Explosive Devices (RCIEDs). The CMPS utilizes a new architecture optimized to defeat both categories of threats, includes multiple upgrades, and is field-programmable. The programming feature provides the crucial capability for gaining units to tailor countermeasures as required during the mission. The CMPS is a vehicle mounted system, thus meeting all elements of the ONS requirement. The prototype system used components currently not mechanically or electronically ruggedized or in a form factor and function for the harsh environment of the intended theater of operation. Further technique development and resource expansion are required to increase the system's capability to meet full ONS requirements. The CMPS system will not be transitioned to PM Signal Warfare until these implementation issues are resolved. It is estimated that TTI Program funding will accelerate these efforts by 6 months.

FY2005 Plans: Complete ruggedization, the refinement of techniques, and resource expansion, while maintaining and potentially reducing size, weight, and power of the system. Transition system to PM Signal Warfare end of FY2005. Conduct TTI Project Close Out briefing for OSD TTI Program Manager.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Command Post of Future (CPOF) and Army Battle Command System (ABCS) Server Software Integration	Army	0.000	0.600	2.240	1.345

The Command Post of the Future (CPoF) is a high priority DARPA-sponsored technology program that will provide a suite of collaboration tools used as an executive decision support system from Corps down through Battalion. CPoF currently has an established 50 user network with the 1<sup>st</sup> Cavalry Division in Iraq and will expand to a 200 user network with the 3<sup>rd</sup> Infantry Division for OIF 3. CPoF is scheduled to transition directly to the Army Acquisition community in 2006 based on a formal agreement between Army G-3 and DARPA. The current CPoF system consists of both clients and servers. In the near/mid-term OIF rotations, CPoF hardware will be fielded side-by-side with ABCS hardware. CPoF is currently scheduled to transition to Project Manager Ground Combat C2 (PM GCC2) under PEO C3T in 2006.

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The Army has currently allocated procurement funding for CPoF beginning in FY08. The TTI Program will bridge this three year gap in funding. TTI Program funding will accelerate the merger and integration of CPoF server software and ABCS Information Server (AIS) software by at least one year and expedite the elimination of additional hardware in the field.

FY2005 Plans: Document CPOF Server software development environment, server configuration guide, client-server interface design and APIs, and internal (CSCI) interfaces. Initiate comparative analysis of evolving CPOF and AIS server functionality, processes, and data threads.

FY2006 Plans: Continue comparative analysis against final CPOF and AIS V6.4 Server software builds. Define and document target system architecture operating environment. Define and document unified server target software and hardware environments. Initiate and examine software coexistence and integration approaches. Develop initial CPOF-AIS server software prototype build. Test, evaluate, and analyze server prototype performance and identify critical-path technical risk areas.

FY2007 Plans: Develop courses of action and conduct ongoing analysis of technical alternatives to simplify CPOF-AIS server software code, processes, and interfaces. Generate subsequent CPOF-AIS server software builds and test/evaluate/analyze via the spiral software development process.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Digital Planning Tools for Joint Ground Warfare	Army	0.000	1.040	0.840	0.000

The Agile Commander ATD has successfully built digital planning solutions for the Army that are being used throughout the Service. The primary product, CAPES, has been identified as one of the non-ABCS “good enough” systems and has been selected as one of the “10 greatest AMC achievements” for 2002. The focus of this TTI project is to use proven planning and decision support solutions from Agile Commander and CAPES to transition a planning capability for Joint Forces via the Joint Common Tactical Workstation (JCTW).

A number of units are using CAPES today. Units that have taken CAPES to Iraq have generated a list of desired features to support SASO and MOUT operations. USFK has generated a list of joint capabilities that would facilitate Ground Component planning in theater. These requests clearly indicate a warfighter need, and are an indication that CAPES provides value in many types of operations.

CAPES is currently scheduled for integration with the Joint Common Tactical Workstation during FY '05. Unfortunately, there is insufficient funding to completely transition all CAPES components into JCTW. TTI Program funding will allow a full and complete integration of CAPES, including Joint planning tools requested by USFK, and SASO/MOUT features requested by 18 ABC, 101<sup>st</sup>, III Corps,

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and 4 ID into JCTW by FY '06. TTI Program funding will accelerate the fielding of digital planning solutions for Joint Ground Warfare by at least one year.

FY2005 Plans: Conduct analysis of CAPES infrastructure and applications to complete modifications allowing for integration of CAPES into JCTW.

FY2006 Plans: Incorporate requested SASO and MOUT features into JCTW. Transition JCTW to the Program Manager for the Army's Maneuver Control System (PM-MCS) and the U.S. Marine Corps Command and Control Personal Computer (C2PC) Programs.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Integrated Precision Underwater Mapping (I-PUMA) Sonar for Small UUVs	Navy	0.000	1.210	1.120	0.000

The objective of this TTI initiative is to provide area search, mapping, and target identification capabilities in very shallow water, harbor, port, and ship berthing environments. This will be accomplished by engineering the submarine precision underwater mapping (PUMA) and 21” UUV Littoral-PUMA (L-PUMA) sensing technologies into a miniaturized integrated-PUMA (i-PUMA) that is capable of operating in these shallow areas on a 12” UUV. In addition to integrating i-PUMA with a small UUV, this project will also develop object detection processing and vehicle processing suites to enable wide area search with change detection and target identification.

The sensor will enable a small easily deployable UUV to efficiently search large areas to a specified level of confidence. The only capability today is via diver teams. The UUV system will greatly improve the effectiveness, efficiency and safety of port surveillance and monitoring operation, lessening the exposure of human divers to explosive devices by minimizing the time to accomplish the mission. The i-PUMA will also enable effective searching of a much higher percentage of domestic and foreign ports, especially those harbor environments with higher amounts of clutter, irregular bottom profiles and large quantities of in-water volume obstacles. This is a goal of EOD AT/FP Program and also of the United States Coast Guard. The eventual product will also meet targeted requirements in the EOD UUV program and the PMS-403 SMCM UUV program.

FY2005 Plans: Conduct i-PUMA requirements and design analysis. Initiate engineering development to miniaturize the 21" UUV L-PUMA for use on a 12" UUV.

FY2006 Plans: Conduct full scale i-PUMA fabrication, sensor integration and testing. Develop final report and conduct TTI Program Close Out brief.

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	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Swimmer Defense	Navy	0.000	1.100	1.000	0.000

Terrorist attacks have heightened the level of interest in enhancing maritime military force protection. An easily deployable system is needed to provide ships with the real time capability to detect and engage swimmers or divers that pose a threat to high value assets while in port or at anchor. Both the Navy and the Coast Guard have identified swimmer detection and swimmer engagement as critical, high priority capability gaps. Swimmer Defense is designed to provide an integrated capability for swimmer detection and engagement, which does not exist today. Swimmer Defense has been identified as a potential spiral development system to be integrated into the Navy Shipboard Protection System (SPS). The current SPS configuration, scheduled to be fielded in FY05, contains only the Integrated Radar Optical Surveillance and Sighting System (IROS<sup>3</sup>) which is only intended for use as a detection system for potentially hostile small craft.

The TTI initiative will transition SDS and SES system technology to acquisition and support the procurement of an additional test article allowing for multiple sonar head interface development, thus reducing the time to field the end item by one to two years. Multiple sonar heads are required to protect large ships in foreign ports and anchorages. TTI funding for SES will allow for testing of two acoustic impulse systems.

FY2005 Plans: Define swimmer defense requirements and develop CONOPS. Initiate system characterization tests.

FY2006 Plans: Complete system characterization tests and conduct design update. Begin fabrication of full scale prototype. Conduct prototype testing.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Special Operations Forces (SOF) Virtual Interpreter	SOCOM	0.000	0.600	0.675	0.000

The SOF Virtual Interpreter (SVI) involves four different technologies: the Phraselator, the Foreign Language tutorial software, the voice to voice translator and the NIPRNET Connectivity. The Phraselator is a ruggedized, one-way, voice-to-voice, handheld translation device designed specifically for the US Military. Since the Phraselator's prototype launch in 2001, it has been used by American Soldiers worldwide more than any other translation device. The Phraselator is a field –proven force multiplier capable of gaining intelligence, providing life-saving direction and enabling civilian outreach efforts.

A substantial new capability (not currently available in the Phraselator) is the ability for the software to record and translate a foreign language response back into English. A two-way capability allowing for the gathering of invaluable time sensitive intelligence information or in a

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medical emergency scenario it would assist in the assessment of a non-English speaking patient's severity of wounds or ailment. Additional capabilities such as communications and language tutorial software would enhance the user's abilities to reach back through the World-Wide-Web to obtain system upgrades and conduct language training from abroad.

The goal of this effort is to enhance and transition twenty (20) SOF Virtual Interpreters (SVI) Systems with the following technology modifications for evaluation by USSOCOM forces and others to effect a rapid transition into acquisition.

FY2005 Plans: Process development and assessment of prototype capabilities. Initiate and continue two-way capability assessment. Perform engineering for web communication, integration of tutorial software tools, and design update, laboratory and initial field testing.

FY2006 Plans: Down select two-way hardware and software. Integrate selected technologies into platform. Field test deliverables. Prepare final report and conduct TTI Program Close Out brief.

	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Rugged ENTR Device (RED)	SOCOM	0.000	2.685	0.000	0.000

The Embedded National Tactical Receiver (ENTR) provides the tactical war fighters with a small, low cost, low power, near-real-time, intelligence data reception capability. It will simultaneously receive, demodulate, and decrypt four independent, Integrated Broadcast Service (IBS) broadcast channels. The IBS architecture disseminates strategic, operational, and tactical intelligence and information to the war fighter. The ENTR form factor allows it to be embedded directly into a variety of host systems (e.g., workstation, laptop, tactical radio). The objective of this TTI is to integrate the ENTR circuit card and IBS message processing software into a rugged, tactical, IBS receiver system, referred to as the Rugged ENTR Device (RED).

RED will be the next generation, technological advancement to fulfill an approaching gap in capability by replacing obsolete and aging legacy IBS receiver systems throughout the Department of Defense (DOD). Unlike most legacy IBS receiver systems, RED also supports the IBS migration to the Common Interactive Broadcast (CIB) and mandated DOD Cryptographic Modernization directives. RED will support air-, ground-, and maritime-based missions in a single, rugged, lightweight package. Supporting multiple platforms and environments in a single design will significantly reduce life cycle management costs and redundant development efforts.

FY2005 Plans: Perform environmental analyses to productize the chassis and final RED design that will meet the RED specification. Conduct qualification testing for electromagnetic interference, environment and TEMPEST requirements. Obtain JITC and NSA INFOSEC certification endorsement for RED.

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	Service/Agency	FY 2004	FY 2005	FY 2006	FY 2007
Lightweight and Conformal Photovoltaic Solutions for the SOF Warrior	SOCOM	0.000	0.600	0.695	0.950

The photovoltaic (PV) technologies being offered through the U. S. Army’s Natick Soldier’s Center (NSC) will provide our SOF operators with unique power generating PV textile systems that are lightweight, conformable, versatile and stealthy for renewable power and potential electronics integration into C4ISR systems and mobile/fixed site systems currently used by SOF forces.

Lightweight and conformal PV systems that will be integrated into SOF Warrior Systems where potentially “any” surface could be power generating. These SOF PV systems could include, but, not limited to, unattended ground sensors, tags, command and control equipment (handheld radios), weapons sights, unmanned ground and aerial vehicles, shelter overheads, portable mats, manned ground and maritime platforms, etc.

This technology offers the SOF operator an unsurpassed versatility for use as a direct energy source and/or battery recharging (hybrid systems) to complement legacy generator and battery systems. This TTI project will focus on the development of four prototype PV devices for lightweight and renewable power generation using two different PV technologies (Iowa Thin Film – Amorphous Silicon and Konarka Technologies – Dye Nanocomposites). The four PV prototypes include: a) PV Bare Base Shelters - provide minimum of 1KW power and reduce solar load 80-90%; b) PV’s for remote sensing – support 30W continuous power load for sensors and remote sensor workstations, c) AA battery and BB2590 battery rechargers -- mini-pocket size and rollable portable solar panels.

FY 2005 Plans: Modify all prototype devices to meet specifications for operational use. Conduct operational test and evaluation of prototype AA battery and PV Solar shade shelter. Analyze test and evaluation data.

FY 2006 Plans: Conduct operational test and evaluation of prototype BB2590 battery rechargers and PV remote sensors. Analyze test and evaluation data. Develop final report on all PV items. Transition to USSOCOM Program Executive Office for Special Projects (PEO-SP).

FY 2006 New Start Projects:

The selection process for the FY 2006 TTI Projects will begin in late 3<sup>rd</sup> Qtr or early 4<sup>th</sup> Qtr FY2005 with the distribution of a call for proposals to all Services and Defense Agencies. The Panel Review of the TTI proposals received is scheduled for October 2004. Final

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selection of FY 2005 New Start TTI Projects will be conducted by the Technology Transition Manager (Deputy Assistant Secretary of Defense (Advanced Systems and Concepts)). Distribution of FY 2006 funding for the selected FY 2006 New Start TTI Projects will begin in December 2006. The total funding available to support the initiation of FY 2006 New Start Projects is \$19.113 million.

**C. OTHER PROGRAM FUNDING: N/A**

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<b>Exhibit R-2, RDT&amp;E Budget Justification</b>							Date: February 2005	
Appropriation/Budget Activity RDT&E, Defense Wide/BA 3				R-1 Item Nomenclature: Joint Wargaming Simulation Management Office, PE 0603832D8Z				
	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Cost (\$ in millions)	40.678	44.942	34.928	35.616	38.345	38.655	39.683	40.833
JSM/P476	40.678	44.942	34.928	35.616	38.345	38.655	39.683	40.833

(U) **A. Mission Description and Budget Item Justification**

(U) **BRIEF DESCRIPTION OF ELEMENT**

M&S has been a critical component in the development, deployment and sustainment of military capability for many years. By the last decade of the twentieth century, it became evident to Congress and the Department that a focused effort was needed to harness the promise M&S for national defense. To provide strategic direction, the Executive Council for Modeling and Simulation (EXCIMS) developed a vision statement for DoD M&S which they reconfirmed in FY 1999. “Defense modeling and simulation will provide readily available, operationally valid environments for use by the DoD Components: (1) To train jointly, develop doctrine and tactics, formulate operational plans, and assess warfighting situations; and (2) To support technology assessment, system upgrade, prototype and full-scale development, and force structuring. Furthermore, common use of these environments will promote a closer interaction between the operations and acquisition communities in carrying out their respective responsibilities.” (DoD5000.59-P)

In responding to the Congressional initiative to “... establish an Office of the Secretary of Defense level joint program office for simulation to coordinate simulation policy, to establish interoperability standards and protocols, to promote simulation within the military departments and to establish guidelines and objectives for [the] coordination [of] simulation, wargaming and training...” (SAC, SR101-521), the DMSO was created under the DDR&E with an S&T budget designed to “ ... promote the enhancements of DoD M&S technologies in support of operational needs and the acquisition process; develop common tools, methodologies, and databases; and establish standards and protocols promoting the internetting, data exchange, open system architecture, and software reusability of M&S applications.” (DoD Directive 5000.59).

DMSO continues to direct a technical program that supports the effective use of simulation across the Department of Defense, provides the foundation for interoperability, enhances cost-effective use of simulation and serves as the laboratory for the development

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of standards or policy. The need for effective M&S capability continues to grow. Transformation Planning Guidance provides a clear statement that transformation must span the way we fight, the way we do business and the way we work with others. The way we fight must be in Joint and Coalition contexts with the equipment, training and planning to enable that type of operation. The business end of Defense, the acquisition of equipment and capabilities, needs to be adaptive to new missions and the introduction of new technology at a far more rapid pace. Finally, Defense must engage other sectors of the US government and our international partners in more effective ways. All of these tasks rely on the ability to use M&S capability that is agile, responsive and interoperable.

M&S requires the appropriate mix of long and short-term investment. The architectural basis that enabled Millennium Challenge 02 and supports on-going experimentation was the result of long-term (7 years) investment at a significant level. The speed and agility of tomorrow's military operations as illustrated in Operation Iraqi Freedom signals the need to link operational systems to simulations that can provide added insight into complex, dynamic situations. USD (AT&L) must rely on effective M&S tools and techniques to assess the military utility of emerging technology and speed its introduction into military products.

Further non-technical requirements in DoDD 5000.59 are to develop a DoD M&S Master Plan; policies and procedures for the validation, verification and accreditation (VV&A) of DoD M&S; designate DoD M&S Executive Agents; establish a Defense Modeling and Simulation Office (DMSO) and establish a M&S Information Repository. DMSO is responsible for developing the DoD modeling and simulation infrastructure (standards, tools, methodologies, etc.) that meet the Department's requirements for Joint Warfighting usage across the domains of analysis, acquisition, training, experimentation, and operations. To accomplish this DMSO stimulates activities for Service cooperation, coordination, and consolidation of effort; establishes interoperability policy, standards and protocols; develops VV&A policy that leverages the expansion of science and technology; and promotes the appropriate use of M&S within the Department. This Program element specifically facilitates cost-effective M&S utilization across the Department through: a common technical framework for M&S which enables interoperability with other systems; timely delivery of the natural environment and common authoritative representations; oversight of authoritative representations of systems and human performance; M&S policy and guidance to meet M&S end-user needs; and a means to share the benefits of M&S.

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**B. Program Change Summary:**

	<u>FY 2004</u>	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>
Previous President's Budget:	41.735	46.017	46.489	47.083
Current FY 2006 President's Budget Submission:	40.678	44.942	34.928	35.616
Adjustments to Appropriated Value:	-1.057	-1.075	-11.561	-11.467
Congressional Program Reductions:	-0.294	-1.075		
Congressional Rescissions:				
Congressional Increases:				
Reprogrammings:			-9.000	-9.000
SBIR/STTR Transfers:	-0.763			
Undistributed Cuts:			-3.519	-3.403
Other:			+0.958	+0.936

(U) C. Other Program Funding Summary: N/A

(U) D. Acquisition Strategy: N/A

(U) E. Performance Metrics: Performance in this program is monitored in the following ways:

- a. for emergent S&T applications the metrics are centered about the number, quality and placement of publications in the open scientific literature;
- b. for more mature S&T capability, the metrics involved presentation and publication of material in proceedings of conferences considered to be central to the development and adoption of M&S standards and best practices
- c. for capabilities that can be represented in software products, the metrics include the ability to demonstrate capability in the context of major programs of record and the inclusion of capability in commercial products
- d. for maturing capabilities, metrics include viable transition plans to include the agreement from the receiving user or acquisition organization
- e. for standards, policy and best practices, the metrics include the number of programs, nationally and internationally, making use of these guidelines.

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Exhibit R-2a, RDT&E Project Justification							Date: February 2005	
Appropriation/Budget Activity RDT&E, Defense Wide/BA 3				Project Name and Number: Joint Wargaming Simulation Management Office, PE 0603832D8Z				
	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Cost (\$ in millions)	40.678	44.942	34.928	35.616	38.345	38.655	39.683	40.833

**(U) A. Mission Description and Budget Item Justification:**

Warfighters, analysts who support decision-making by warfighters and DoD leaders, acquisition professionals who procure warfighting equipment and supplies, and manpower professionals who recruit and train warfighters all need better models and simulations.

Recognizing this and concerned about the uncoordinated efforts across DoD, Congress directed DoD to "... establish an Office of the Secretary of Defense level joint program office for simulation to coordinate simulation policy, to establish interoperability standards and protocols, to promote simulation within the military departments and to establish guidelines and objectives for [the] coordination [of] simulation, wargaming and training..." (SAC, SR101-521). DoD published DoDD 5000.59 creating Executive Council for Modeling and Simulation (EXCIMS) to "Advise and assist the USD(A&T) in strengthening the uses of M&S in the Department of Defense." EXCIMS developed a vision statement for all DoD M&S: "Defense modeling and simulation will provide readily available, operationally valid environments for use by the DoD Components: (1) To train jointly, develop doctrine and tactics, formulate operational plans, and assess warfighting situations; and (2) To support technology assessment, system upgrade, prototype and full-scale development, and force structuring. Furthermore, common use of these environments will promote a closer interaction between the operations and acquisition communities in carrying out their respective responsibilities."

Also under the direction of DoDD 5000.59, DoD created DMSO to "Function as the DoD focal point for M&S, and ensure that M&S technology development is consistent with other related initiatives." DMSO operates under DDR&E with an S&T budget designed to "... promote the enhancements of DoD M&S technologies in support of operational needs and the acquisition process; develop common tools, methodologies, and databases; and establish standards and protocols, data exchange, open system architecture, and software reusability of M&S applications."

More recently, Transformation Planning Guidance (TPG) provides a clear statement that transformation must span the way we fight, the way we do business and the way we work with others. The way we fight must be in Joint and Coalition contexts with the

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equipment, training and planning that enables that type of operation. The business end of Defense – the acquisition of equipment and capabilities – needs to be adaptive to new missions and the introduction of new technology at a far more rapid pace. Finally, Defense must engage other sectors of the US government and our international partners in more effective ways. All of these transformation tasks need M&S capabilities that are agile, responsive and interoperable.

M&S tool development and use is spread throughout DoD across multiple disparate domains (e.g., analysis, training, acquisition, test and evaluation experimentation, and operations), across multiple disparate resolution levels (e.g., atomic, genomic, engineering, tactical, operational, & strategic), and across multiple owning organizations (e.g., Services, OSD, Joint Staff, COCOMs, and DoD agencies). Such M&S development efforts almost always produce tools and data that cannot be readily shared outside of the initial small set of user/developers. No one small set of users/developers is willing to make the investments in technology or in standardization of technology that is required to increase the utility of their M&S tools to the wider DoD community. Ultimately, this increases the costs and limits the utility of M&S tools. Improving this situation is the core function of DMSO, to provide the technologies and technology standardization necessary to reduce the costs and increase the utility of M&S tools across DoD.

This Program element provides these technologies and technology standards by via a DoD M&S Master Plan and a DoD M&S Investment Plan that moves DoD toward a common technical framework for M&S interoperability, natural environment representation, system authoritative representations, authoritative representations of systems and human performance; policies and procedures for the validation, verification and accreditation (VV&A) of M&S tools; a M&S Resource Repository; and improved M&S infrastructures (standards, tools, methodologies, etc.).

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<b>Exhibit R-2a, RDT&amp;E Project Justification</b>							Date: February 2005	
Appropriation/Budget Activity RDT&E, Defense Wide/BA 3				Project Name and Number: M&S Policy and Technical Projects Project A				
	FY2004	FY2005	FY2006	FY2007	FY2008	FY2009	FY2010	FY2011
M&S Policy and Technical Projects	31.678	40.942	34.928	35.616	38.345	38.655	39.683	40.833

**(U) A. Mission Description and Budget Item Justification:**

Warfighters, analysts who support decision-making by warfighters and DoD leaders, acquisition professionals who procure warfighting equipment and supplies, and manpower professionals who recruit and train warfighters all need better models and simulations (M&S). The Defense Modeling and Simulation Office (DMSO) directs a technical program that supports the development of better M&S across the Department of Defense. Key project elements are specifically targeted at: 1) improving the identification of M&S user capability needs and requirements; 2) facilitating the development of interoperable and authoritative M&S representations of the physical world; 3) promoting an integrated science and technology program focused on expanding and improving the scientific and technical underpinnings of DoD M&S; 4) improving the common technical framework for M&S that supports interoperability and re-use of M&S products; 5) improving the supporting services that enable a common M&S infrastructure to support the Department's operations.

**(U) B. FY 2004 Accomplishments:**

- (U) Provided M&S mission planning tools and analysis capabilities that became part of the Department's operations in Iraq.
- (U) Provided investments and oversight to Transformation Initiatives focused on providing the Department of Defense with the next generation of M&S tools and representation of military operations.
- (U) Demonstrated Live-Virtual-Constructive capability in Urban Terrain using cost-effective technology in support of training transformation.
- (U) Delivered "designed to order" weather and ocean scenarios in support of the Analytic Community.
- (U) Delivered server capability to the experimentation community to deliver common data and environmental effects for experimentation and training.
- (U) Enhanced training for coalition operations without having to provide certification for all non-US simulation components by making HLA RTI Certification and Federation Compliance Test Suites ready for export to our NATO allies through the Research and Technology Board.
- (U) Continued providing standards, policies and product support for improving Joint community and Service tools to allow their

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separate models, simulations and command and control systems to effectively operate in a common M&S environment

(U) Continued providing multi-year technology development programs targeted at improving the agility and cost-effectiveness of M&S in support of consistent, interoperable mission spaces that can be used for the full spectrum of military transformational initiatives.

(U) Continued acting as the USD(AT&L) action agent in developing M&S policies, plans and programs that support the effective and efficient management of the Department's M&S resources.

(U) Initiated the development of a DoD Modeling and Simulation Master Plan and a DoD Modeling and Simulation Investment Plan.

(U) Planned Program FY 2005-2007:

(U) Improve the identification of M&S user capability needs and requirements.

(U) Establish a process to identify and analyze validated needs and formal requirements – based upon end-user (operations, training, acquisition, etc) requirements – that are dependent upon or satisfied by M&S capabilities.

(U) Provide M&S capabilities to effectively plan, analyze & train for MOOTW in a timely manner.

(U) Facilitate the development of interoperable and authoritative M&S representations of the physical world.

(U) Synthetic Natural Environment Representation. Continue leading the DoD M&S community in establishing standards for environmental representation and the establishing processes to define, produce and deliver environmental data to simulations.

(U) Master Environmental Library. Develop direct and timely access to environment information through linked resource sites and a structured discovery and ordering process.

(U) Environmental Scenario Generator. Continue to develop a capability to rapidly generate a fully integrated environmental representation to include aspects of the ocean, atmosphere, space and terrain that is internally consistent, cost effective, and authoritative and meets the requirements of the warfighter.

(U) Human Performance Representation (HPR). Improve the DoD's ability to represent the human being and their decision making in simulations.

(U) Promote an integrated science and technology program focused on expanding and improving the scientific and technical (S&T) underpinnings of DoD M&S.

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(U) Science and Technology. Facilitate and coordinate the enhancement of M&S in the DoD's strategic planning process for S&T.

(U) Improve the common technical framework for M&S that supports interoperability and re-use of M&S products.

(U) Provide Oversight of Departmental M&S Plans and Programs. Complete development and formal coordination of the DoD M&S Master Plan (MSMP) to establish M&S objectives for the Department for the next decade. Also, serve as the DoD focal point for M&S and as the USD(AT&L)'s action agent for the administration and support of the DoD M&S management structure.

(U) DoD M&S Standards. Serve as the Standardization Management Activity (SMA)/Lead Standardization Activity (LSA) for DoD Modeling and Simulation. The goal is to develop and maintain M&S standards that improve military operational readiness within the Department of Defense and with our allies and coalition partners, reduce the cost of M&S ownership, and allow for ready insertion of new and transformational M&S capabilities and technologies.

(U) Interagency and International M&S Cooperation. Establish a forum for interagency M&S coordination, cooperation, and standardization; Serve as the US representative to the NATO Modeling and Simulation Group (NMSG) to ensure support for M&S coordination, cooperation and standardization.

(U) Verification, Validation and Accreditation (VV&A). Advance the state of VV&A practice across DoD to include understanding the barriers to successful application of joint VV&A processes and removing them to ensure end-user confidence in the models and simulations produced.

(U) High Level Architecture (HLA). Provide program support to enable the interoperability of large scale distributed simulations.

(U) Knowledge Integration (KI). Capitalize on the increasing linkage between simulations and operational systems to allow warfighters to develop scenarios on operational planning tools and then transfer them to simulations in a automated fashion.

(U) Integration of Simulations and C4I Systems. Facilitate the use of simulations in training and in operations by developing M&S integration strategies with C4I systems.

(U) Composable Modeling and Simulation Framework. Continue to refine the definition of composability and establish the necessary technical, business, and operational initiatives to foster development of composable modules for M&S.

(U) Establish a Community of Interest for M&S support to the GIG. Work with DISA and NII and the broader

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producer/consumer community to identify and implement common M&S services for the GIG.

(U) Improving the supporting services that enable a common M&S infrastructure to support the Department's operations.

U) M&S Education and Training Programs. Sponsor Visiting Professors regarding M&S instruction at the three Military Academies and the National Defense University.

**(U) C. Other Program Funding Summary: N/A**

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Fiscal Year (FY) 2006 Budget Estimates Exhibit R-2a, RDT&E Project Justification							February 2005	
DEFENSE-WIDE, RDT&E (400) BUDGET ACTIVITY 3				Joint Wargaming Simulation Management Office PE 0603832D8Z M&S for Improved Acquisition of Defense Systems <b>Project B</b>				
Cost (\$ in millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
M&S for Improved Acquisition of Defense Systems	9.000	4.000	0.000	0.000	0.000	0.000	0.000	0.000
<p><b>(U) A. Mission Description and Budget Item Justification</b></p> <p>US military force capabilities are today highly dependent upon interoperability within complex systems-of-systems. The shift toward increasing reliance on network centric operations, and systems of increasing complexity linked together in more complex systems-of-systems, will increase the dependency on seamless interoperability across military service and national boundaries, and effective performance by each individual system. The defense acquisition systems engineering process - to design, develop, and test the systems - must exploit the demonstrated value of M&amp;S more effectively to field improved capabilities soonest, with sufficient confidence the fielded capabilities will perform effectively in the systems-of-systems joint mission environment. It is simply not practical to create actual systems-of-systems environments within the acquisition systems engineering processes, but M&amp;S can provide the capability to represent that environment to properly design, develop, and test the individual systems. An increasing body of evidence, including reports by the National Research Council, industry associations, and various DoD organizations all point to the need to transform the acquisition culture, processes, and technology to leverage and exploit to a greater extent the power of M&amp;S for defense systems engineering and test.</p> <p>Accordingly, this project initiates a series of activities to enhance defense systems engineering and test culture, processes, and technology to begin to better leverage M&amp;S technology and collaborative processes. OSD leadership of these activities is essential to provide the focus and interest to assure participation and cooperation of the military departments. All the components must be included in this effort to provide effective joint acquisition environments just as military operations are joint. From the start, this effort will assess progress and problems, develop and implement a strategy, and then continue and sustain the initiative by building upon lessons learned and successes.</p> <p><b>(U) B. Accomplishments.</b> FY 2004 accomplishments include coordinating user requirements; completing background technical research; and drafting program plans, resource requirements, schedules, and milestones.</p> <p><b>(U) Planned Program FY 2004 – FY 2005:</b></p>								

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(U) FY 2004 Accomplishment: In FY 2004, this project will initiate various technical efforts targeted on 2 goals:

1. Establish a centralized, focused effort in OUSD(AT&L) to improve the application of M&S technology across acquisition programs.
2. Plan and initiate a series of technical analysis activities with a goal of developing and instituting a capability to analyze joint integrated architectures to assure they are viable representations of the architecture intended for specific mission areas, and that the generated force capability represented by the architecture is realistic.

Goal 1 Plans: Establish a small community of interest across the DoD acquisition community intended to define a specific vision and roadmap for improving application of M&S in acquisition. FY 2004 is intended to be primarily a planning effort.

Goal 2 Plans: Initiate technical efforts to establish the capability to assess joint integrated architectures. These activities are coordinated with the various Functional Capability Boards of the Joint Staff. Specific objectives include:

- Define a methodology to conduct first order analyses of joint integrated architectures.
- Conduct proof-of-principle implementation of the first order analysis, and determine whether the technology of architecture representation and architecture based analysis is adequate to address user needs.
- Based on findings from the proof-of-principle implementation, define requirements for M&S technology development and application.
- Support development of behavior models and analysis tools to explore solutions to military needs in the precision engagement mission area.
- Support development of a software development roadmap focused on evolution of Service systems to an integrated joint fires network.
- Pursue incorporation of advanced information technologies to resolve interoperability problems.
- Expand M&S tool sets to include trade-space analysis for simulation mission space environments. Support integration of results into Service efforts.
- Initiate activity to develop standards and protocols, including common data models and commercial standards, in order to move toward a consistent, interoperable mission space for trade-off analysis.
- Explore use of software technology to assemble mission scenarios rapidly for execution.
- Integrate data bases associated with establishing a capability for simulation of course of action analysis.
- Investigate underlying technologies and standards to support the ability to rapidly compose mission space models with known, measurable accuracy.
- Assemble a suite of reusable system data to support system level architecture development and analysis.
- Establish baseline portfolios (roadmaps) for current systems in each Functional Capabilities Board.

(U) FY 2005 Plans: Initiate a series of RDT&E activities to exploit the capabilities of M&S to improve effectiveness of Systems

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Engineering (SE) and test of defense systems, and systems-of-systems, to support achievement of joint mission capabilities.

- Define SE M&S policy and guidance necessary to transform culture in defense systems acquisition programs, to facilitate improving effective use of M&S.
  - Establish a small OSD-led steering committee with the military components.
  - Assess and define how M&S is to be integrated into DoD SE and program processes, including use of the Simulation Support Plans. Start by developing a baseline of current use, then develop a strategy to achieve the “how to” end state.
  - Develop DoD policy and guidance, including policy for M&S and information sharing, M&S and data ownership, contracting, and other areas such as consideration of M&S progress in acquisition decision reviews.
  - Establish a training capability expanding on policy, guidance and best practices; “push” education and training to defense acquisition programs.
  - Initiate and lead focused interchange (SE M&S Community of Interest) between DoD, industry, and academia to maintain and inform the community on best practices.
- Assess and recommend improvements to M&S infrastructure to facilitate interoperability and consistent exchange of defense systems M&S and data across DoD and industry.
  - Examine the various data standards and define a strategy for use of standards in the system engineering process in a consistent manner across defense acquisition to facilitate M&S data and content interchange. Build upon lessons learned from JDEP reference Federated Object Model.
  - Initiate activity to mature the Joint Distributed Engineering Plant (JDEP) as a key DoD component-level means for systems-of-systems engineering integration and test.
  - Define appropriate directory services for SE M&S information sharing, and develop a plan to provide services.
- Provide incentives for defense system Program Managers to develop M&S tools which support DoD-wide systems-of-system engineering, and adopt best practices.
  - Establish a council of PM and industry representatives to contribute to prioritization of investments in JDEP infrastructure to support continued maturation of JDEP capability to support all warfare mission areas.
  - Develop a plan and initiate pilot efforts to demonstrate value of systems-of-systems engineering M&S approaches. Pilot projects will include both investment in M&S tools that contribute, and adoption of best practices across the life cycle of a program.

**(U) C. Other Program Funding Summary:** N/A

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<b>Exhibit R-2, RDT&amp;E BUDGET ITEM JUSTIFICATION</b>				February 2005				
RDT&E DEFENSE-WIDE (0400) BUDGET ACTIVITY THREE				TEST AND EVALUATION/SCIENCE AND TECHNOLOGY (T&E/S&T) PROGRAM ELEMENT (PE) 0603941D8Z				
\$ in Millions	FY 2004*	FY 2005*	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
PE 0603941D	0.000	0.000	28.614	44.240	68.826	100.632	102.497	104.806
Hypersonic Test	0.000	0.000	5.824	9.734	16.337	27.676	25.946	24.410
Spectrum Efficient Technology	0.000	0.000	3.764	4.512	5.006	5.658	5.996	6.127
Multi-Spectral Test	0.000	0.000	4.368	5.563	8.359	12.702	12.708	12.981
Embedded Instrumentation	0.000	0.000	4.195	5.281	8.100	11.622	11.624	11.856
Directed Energy Test	0.000	0.000	5.426	9.134	14.797	24.561	25.014	24.361
Information Systems Technology Test	0.000	0.000	2.370	3.759	5.783	6.357	7.201	8.435
Software Test	0.000	0.000	1.304	2.989	5.350	5.897	6.742	8.090
Modeling and Simulation	0.000	0.000	1.304	1.986	2.883	3.384	3.919	4.617
Test Range/Facility Technology Improvements	0.000	0.000	0.059	1.282	2.211	2.775	3.347	3.929

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**\*Language in the National Defense Authorization Act of 2003 directed the establishment of the Defense Test Resource Management Center (DTRMC). The Act also requires the DTRMC to administer the Central Test and Evaluation Investment Program (CTEIP) and the Test and Evaluation/Science and Technology (T&E/S&T) program effective Fiscal Year 2006.**

**Beginning with FY 2006, program elements 0603941D8Z (T&E/S&T) and 0604940D8Z (CTEIP) are transferred from the Operational Test and Evaluation, Defense (OT&E, D) appropriation (0460) to the Defense-wide RDT&E (0400) appropriation. FY 2004 and 2005 Accomplishments are in the OT&E appropriation.**

**A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION**

The T&E/S&T program seeks out and develops test technologies to pace evolving weapons technology. This 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 T&E requirements.
- Expedites the transition of new technologies from the laboratory environment to the T&E community.
- Leverages commercial equipment and networking innovations to support T&E.

Additionally, the program examines emerging test requirements derived from transformation initiatives to identify needed technology areas and develop a long-range roadmap for technology insertion. This program leverages and employs applicable 6.2 applied research from the highly-developed technology base in the DoD laboratories and test centers, industry, and academia to accelerate the development of new test capabilities. This PE also provides funds to perform travel to carry out oversight of the T&E/S&T program.

This Research Category 6.3, Advanced Technology Development PE, develops and demonstrates high payoff technologies for current and future DoD test capabilities.

**B. (U) PROGRAM CHANGE SUMMARY**

	<u>FY 2004</u>	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>
Previous President's Budget:	0.000	0.000	0.000	0.000
Current FY 2006 President's Budget Submission:	0.000	0.000	28.614	44.240
Total Adjustments:			+28.614	+44.240
Congressional Program Reductions:				
Congressional Rescissions:				
Congressional Increases:				
Reprogramming:			+28.614	+44.240
SBIR/STTR:				
Other:				

**C. (U) OTHER PROGRAM FUNDING NA**

**D. (U) ACQUISITION STRATEGY NA**

**E. (U) PERFORMANCE METRICS**

Percentage of T&E/S&T projects progressing satisfactorily toward technical, financial, schedule, and risk mitigation goals.

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RDT&E PROJECT JUSTIFICATION SHEET (R-2a)				February 2005				
DEFENSE WIDE RDT&E (0400) BUDGET ACTIVITY THREE, PE 0603941D				HYPERSONIC TEST				
\$ in Millions	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Hypersonic Test	0.000	0.000	5.824	9.734	16.337	27.676	25.946	24.410

**A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION**

The National Aerospace Initiative (NAI) will develop air-breathing weapons, advanced aircraft, and access to space platforms to operate in the hypersonic speed regimes Mach 5 and higher. Hypersonic systems to be developed under the NAI require T&E capabilities in numerous areas ranging from ground testing (wind tunnels, sled tracks, installed-system test facilities, and modeling and simulation (including computational fluid dynamics)) through flight testing. At hypersonic speeds, flight testing will challenge existing ground instrumentation systems (e.g., tracking system slew rate limitations, telemetry dropouts due to ionization) and range safety decision making. Hypersonic weapon systems will depend on several new technological thrusts in areas such as propulsion and engines, structures and materials, guidance and control, seekers and sensors, warheads and payloads, and weapons delivery techniques and end-game dynamics - each requiring supporting T&E capabilities to determine performance, effectiveness, suitability, survivability, and responsiveness to Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) systems. Service improvement and modernization programs are addressing some basic test facility upgrades using off-the-shelf technologies. However, T&E of hypersonic systems will require technologies not yet developed or available for T&E purposes. The Department must have adequate T&E capabilities in place in time to meet current development, and ultimately, acquisition program schedules. The purpose of this T&E/S&T focus area is to address these T&E technology issues.

**B. (U) ACCOMPLISHMENTS/PLANNED PROGRAM**

	FY 2004	FY 2005	FY 2006	FY 2007
Hypersonic Test	0.000	0.000	5.824	9.734

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**FY 2004 Accomplishments:** See OT&E,D (0460) appropriation.

**FY 2005 Accomplishments:** See OT&E,D (0460) appropriation.

**FY 2006 Plans:**

Efforts initiated in prior fiscal years will continue. These efforts include:

- Test Media Effects will complete development of diagnostic tools to measure chemical species, temperature and velocities in hypersonic flows. These tools will enable measurement of vitiates to support hypersonic engine test and evaluation.

Efforts selected as a result of the FY 2006 Broad Agency Announcement (BAA) will be initiated. Planned efforts include:

- Survivable command destruct package to allow safe and reliable termination of hypersonic flight tests.
- Technology to transmit effects and dynamics of Mach 7 + engagements to support weapon system performance evaluation.
- High speed stores separation measurement technology for accurate store/vehicle separation data in hypersonic flight conditions.
- Advanced distributed simulation capabilities for Mach 7 + engagements to allow analysis of hypersonic system performance between test centers and system developers.

A BAA will be initiated in FY 2006 to select efforts for FY 2007 award.

**FY 2007 Plans:**

Efforts initiated in prior years will continue. These efforts include:

- Test Media Effects will complete efforts to model the effects of vitiates on hypersonic combustion engines to allow prediction of engine performance in clean air flight conditions.

Future investigations will be launched to address T&E technology challenges in this focus area for:

- Continuous and survivable instrumentation and communications to provide system performance (including time-space position and attitude information) and allow test system command and control throughout the hypersonic test regime.
- Realistic ground test environments to adequately simulate flight conditions for hypersonic systems and target interaction.
- Aerodynamic models for analysis of hypersonic weapon systems performance.
- Computational Fluid Dynamics models for performance characterization of Mach 7 + hypersonic weapon systems.

A BAA will be initiated in FY 2007 to select efforts for FY 2008 award.

C. (U) **OTHER PROGRAM FUNDING** NA

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D. (U) ACQUISITION STRATEGY NA

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RDT&E PROJECT JUSTIFICATION SHEET (R-2a)				February 2005				
DEFENSE WIDE RDT&E (0400) BUDGET ACTIVITY THREE, PE 0603941D				SPECTRUM EFFICIENT TECHNOLOGY				
\$ in Millions	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Spectrum Efficient Technology	0.000	0.000	3.764	4.512	5.006	5.658	5.996	6.127

**A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION**

Increased commercial use of the radio frequency (RF) spectrum and DoD's higher demands for bandwidth and test data are impacting the capability to test current weapon systems. Realistic testing of modern military systems, and follow-on training at the completion of a defense system's development phase, rely heavily on the use of the RF spectrum, especially in the "L" and "S" microwave bands. Signal propagation, supportable data rates, and other related characteristics make these bands ideally suited for test telemetry and training applications. However, these are the same characteristics that make these bands highly coveted by the wireless communications industry. The growth in the demand for consumer communication services has resulted in reallocation of RF spectrum from government to non-government use. The reallocation of this spectrum, coupled with the increase in activities that use it, has raised concerns regarding the availability of adequate spectrum to support test and training. Each new generation of military system typically generates ten times more data and information than the system it is replacing, resulting in a 20-year trend of exceptional growth in the demand for test and training related spectrum. The next generation of systems will generate proportionately greater data rates that will exceed the capability of our current test infrastructure. Technological advances in the spectrum efficiency focus area are required to ensure that programs will not have to compromise T&E by reducing the number or quality of tests.

**B. (U) ACCOMPLISHMENTS/PLANNED PROGRAM**

	FY 2004	FY 2005	FY 2006	FY 2007
Spectrum Efficient Technology	0.000	0.000	3.764	4.512

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**FY 2004 Accomplishments:** See OT&E,D (0460) appropriation.

**FY 2005 Accomplishments:** See OT&E,D (0460) appropriation.

**FY 2006 Plans:**

Efforts initiated in prior fiscal years will continue. These efforts include:

- Phased Array Antenna will complete demonstration of an autonomous neural network and antenna algorithms that will provide improved tracking accuracy for ground-based receive antennas. This will allow improved tracking accuracy during dynamic testing and reduce signal fading during high dynamic maneuvers.
- Combined Coding Modulation will complete the development and demonstration of a modulator and demodulator to improve the efficiency of T&E telemetry systems. This will increase the quantity of test vehicles that can be evaluated during weapon system and systems-of-systems testing.

Projects identified by the FY 2006 Program Research & Development Announcement (PRDA) process will be initiated.

Efforts are planned in the following areas:

- Optical communications brassboard to demonstrate optical telemetry to augment the existing and planned RF telemetry spectrum for systems-of-systems testing.
- Advanced modulation and encoding technologies, including methods to deconflict RF spectrum use, to allow T&E of systems-of-systems in a Joint Urban Operations (JUO) environment.
- Development of adaptive antenna arrays for unobtrusive and non-interfering operations for system under test, and variable beamwidth directional antennas for frequency sharing during system-of-systems tests.
- Algorithms that support ultra-high data rate pre-processing, compression, storage, and bandwidth- efficient modulation schemes for transmission of T&E data in dynamic test environments.
- Advanced designs for remotely tunable datalink transceivers to provide increased data security, improve range safety, and allow for inter-range operation coordination.

A PRDA will be initiated in FY 2006 to select efforts for FY 2007 award.

**FY 2007 Plans:**

Efforts initiated in prior fiscal years will continue. These efforts include:

- RF Microelectromechanical System (MEMS) Antenna will complete fabrication and flight testing of a MEMS software-defined antenna system that will allow dynamic reconfiguration of the antenna transmit frequency and polarity to support adaptive use of the telemetry spectrum during test events.

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Additional investigations will be initiated as a result of the PRDA process to address critical T&E technology issues such as:

- Techniques for overcoming transmission losses during ionization periods of hypersonic systems testing.
- Methods to increase efficiency and reliability of future telemetry, command and control, and datalink communications for T&E.
- Methods to improve transmission efficiency by compensating for Doppler shift in coherent telemetry receivers.

A PRDA will be initiated in FY 2007 to select efforts for FY 2008 award.

**C.** (U) OTHER PROGRAM FUNDING NA

**D.** (U) ACQUISITION STRATEGY NA

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RDT&E PROJECT JUSTIFICATION SHEET (R-2a)				February 2005				
DEFENSE WIDE RDT&E (0400) BUDGET ACTIVITY THREE, PE 0603941D				MULTI-SPECTRAL TEST				
\$ in Millions	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Multi-Spectral Test	0.000	0.000	4.368	5.563	8.359	12.702	12.708	12.981

**A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION**

DoD S&T programs are developing new technologies for use in multi-spectral and hyperspectral sensors, seekers, and detectors for weapon systems and intelligence, surveillance, and reconnaissance systems. T&E of new multi-spectral and hyperspectral sensors to be used in these future weapon systems will require new T&E technologies. Current methods for testing multi-spectral and hyperspectral sensors rely heavily on expensive field test programs. While these field tests provide realistic data for sensor testing, they leave several critical gaps. For example, test conditions are not repeatable because environments observed one day will be different the next day. Imagery can be collected and stored to partially mitigate this deficiency, but this process is expensive and cannot cover the full spectrum of environments required for complete test article evaluation and performance analysis. The T&E community needs the ability to test these advanced seekers and sensors in a repeatable, objective fashion before and after integrating them into warfighting systems. This T&E/S&T focus area is addressing these needs through research efforts in scene generation, injection and projection to create test technologies that can be combined into integrated multi-spectral and hyperspectral test capabilities. Without these new T&E technologies, DoD will not be able to adequately test and evaluate the multi-spectral and hyperspectral weapon systems of the future.

**B. (U) ACCOMPLISHMENTS/PLANNED PROGRAM**

	FY 2004	FY 2005	FY 2006	FY 2007
Multi-Spectral Test	0.000	0.000	4.368	5.563

**FY 2004 Accomplishments:** See OT&E,D (0460) appropriation.

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**FY 2005 Accomplishments: See OT&E,D (0460) appropriation.**

**FY 2006 Plans:**

Efforts initiated in prior fiscal years will continue. These efforts include:

- Dynamic Hyperspectral Thermal Signature Model will complete development of the signature model. This final release open-source software package will be capable of generating multi-spectral and hyperspectral imagery for use in testing of advanced weapon systems, such as Future Combat Systems.
- Hyperspectral Testbed Design will complete the testbed design and initiate subsystem fabrication of the prototype Long Wave Infrared (LWIR) hyperspectral testbed.
- Multi-Spectral Stimulator Injection Test Method will demonstrate closed-loop real-time operation of the prototype hardware system. The prototype demonstration will incorporate real-time Radio Frequency (RF) output with clutter, correlated with the Infrared (IR) output. This will allow for realistic, direct injection hardware-in-the-loop testing of multi-spectral weapon systems in the Mid-Wave IR (MWIR), LWIR and millimeter wave (MMW) frequencies.

Projects identified by the FY 2006 Broad Agency Announcement (BAA) process will be initiated. Efforts are planned in the following areas:

- Technologies to support the development and integration of visible and near-IR (NIR) multi-spectral and hyperspectral sensor testbeds including scene generation, image projection, and evaluation of sensor performance.
- Methodologies to evaluate performance of hyperspectral imaging systems including the development of data mining techniques to extract critical test data from massive hyperspectral data sets (hyperspectral/multi-spectral signature, scene and script storage, retrieval and reuse).

A BAA will be initiated in FY 2006 to select efforts for FY 2007 award.

**FY 2007 Plans:**

Efforts initiated in prior fiscal years will continue. These efforts include:

- Hyperspectral Testbed Design will complete fabrication, integration, and demonstration of the prototype hyperspectral image projection system. This testbed will allow repeatable closed loop testing of advanced hyperspectral imagers under controlled, user defined test conditions that can not be efficiently achieved in field testing.

Projects identified by the FY 2007 BAA process will be initiated. Efforts are planned in the following areas:

- Technologies to support the generation and projection of polarized visible and near-IR imagery for T&E of advanced weapon systems.

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- Advanced algorithms for personal computer (PC) based high fidelity scene generation capabilities in the visible and IR spectrum.
  - Calibration techniques to support evaluation of multi-spectral and hyperspectral imagers.
- A BAA will be initiated in FY 2007 to select efforts for FY 2008 award.

C. (U) **OTHER PROGRAM FUNDING** NA

D. (U) **ACQUISITION STRATEGY** NA

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RDT&E PROJECT JUSTIFICATION SHEET (R-2a)				February 2005				
DEFENSE WIDE RDT&E (0400) BUDGET ACTIVITY THREE, PE 0603941D				EMBEDDED INSTRUMENTATION				
\$ in Millions	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Embedded Instrumentation	0.000	0.000	4.195	5.281	8.100	11.622	11.624	11.856

**A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION**

Instrumentation requirements for systems-under-test, hardware-in-the-loop testing, and training are increasing exponentially for new weapon systems. Onboard or personnel-borne instrumentation and equipment 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. These requirements drive the need for enabling technologies for miniaturized, non-intrusive instrumentation suites with increased survivability in harsh environments.

There is minimal space available for adding instrumentation to new weapon systems subsequent to their development. Additional weight and power draw can adversely affect the weapon system’s signature and performance. Instrumentation for humans-in-the-loop, such as a dismounted soldier, should not detrimentally affect the soldier’s performance or operational burden. New technologies can be exploited to integrate small non-intrusive embedded instrumentation (EI) into new platforms during design and development, and, in some cases, into existing platforms. This EI can provide the required data for T&E, training, and logistics throughout the system’s lifecycle, and provide the ability to collect critical system performance data during combat missions.

The use of embedded instrumentation for T&E, training, and logistics has the potential for significantly reducing the total ownership costs of new weapon systems while enhancing force readiness. Accordingly, the Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3170.01D states that acquisition programs should include embedded instrumentation as part of system trade-off studies and design analyses. The EI focus area will advance technologies needed to facilitate compliance with CJCSI 3170.01D.

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**B. (U) ACCOMPLISHMENTS/PLANNED PROGRAM**

	FY 2004	FY 2005	FY 2006	FY 2007
Embedded Instrumentation	0.000	0.000	4.195	5.281

**FY 2004 Accomplishments:** See OT&E,D (0460) appropriation.

**FY 2005 Accomplishments:** See OT&E,D (0460) appropriation.

**FY 2006 Plans:**

Efforts initiated in prior fiscal years will continue. These efforts include:

- Advanced Munitions Flight Test Instrumentation will complete flight tests of the instrumentation module on a munition. This embedded instrumentation package will provide time, space, and position information (TSPI) to improve munition evaluation without adversely impacting the munition design or function.

Projects identified by the FY 2006 Broad Agency Announcement (BAA) will be initiated. Areas of potential research are:

- Synthetic instrumentation that combines sensor technology with integrated processing techniques to create multi-functional instruments.
- Techniques to achieve miniaturized, reduced-weight instrumentation packaging.
- Methods to improve instrument survivability in harsh environments, such as at hypersonic speeds.
- Advanced wireless data and communications techniques, including the use of vehicle power lines as a data bus for data transfer and distribution.
- Low power instrumentation to reduce on-board power demands.
- Smaller, higher capacity recorders to support passive operation of embedded instrumentation.
- Compact and stable timing reference units to support TSPI data and for applying metadata tags to data messages.
- Passive devices for improving ground truth measurements, such as for attitude and miss-distance measurements.

A BAA will be initiated in FY 2006 to select efforts for FY 2007 award.

**FY 2007 Plans:**

Efforts initiated in prior fiscal years will be continued. Future investigations will be launched to address T&E technology challenges in this focus area for:

- Human performance instrumentation to support T&E in Joint Urban Operations environments.

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- Non-intrusive network interfaces with critical operational components including the MIL-STD-1553 data bus to support gathering operational data without affecting operational performance.
  - Instrumentation command and control techniques to provide remote operation of instrumentation during T&E events.
  - High anti-jam signal processing techniques for T&E operations in an electronic warfare and jamming environment.
- A BAA will be initiated in FY 2007 to select efforts for FY 2008 award.

C. (U) **OTHER PROGRAM FUNDING** NA

D. (U) **ACQUISITION STRATEGY** NA

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RDT&E PROJECT JUSTIFICATION SHEET (R-2a)				February 2005				
DEFENSE WIDE RDT&E (0400) BUDGET ACTIVITY THREE, PE 0603941D				DIRECTED ENERGY TEST				
\$ in Millions	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Directed Energy Test	0.000	0.000	5.426	9.134	14.797	24.561	25.014	24.361

**A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION**

Directed Energy (DE) technologies are rapidly transitioning into acquisition programs and Advanced Concept Technology Demonstrations (ACTDs). These weapons technologies, which primarily consist of High Energy Laser (HEL) and High Power Microwaves (HPM), are outpacing their supporting test technologies. Advancements in HEL and HPM have created a new class of weapon systems in which energy is placed on a target instantaneously, making traditional test techniques for evaluating conventional munitions (with flight times ranging from seconds to minutes) not applicable to DE systems' T&E. As a result, new technology solutions are needed to ensure adequate developmental, live fire, and operational test capabilities are available when the DE acquisition programs are ready to test.

DE system and component testing requires two principal assessments: how well the weapon is performing and the specific interaction of energy and target. The current ability to assess DE systems performance and interactions is based on effects testing, i.e. determining if and when the target was destroyed. This does not provide the detailed test data required to understand DE system performance. Military utility of these weapons will be dependent on the knowledge acquired through T&E to know how much to trust the technologies under development and how best to use them. This T&E/S&T focus area is developing the needed technologies to quantitatively assess both HEL and HPM performance and target interaction to support thorough testing of DE systems.

**B. (U) ACCOMPLISHMENTS/PLANNED PROGRAM**

	FY 2004	FY 2005	FY 2006	FY 2007
Directed Energy Test	0.000	0.000	5.426	9.134

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**FY 2004 Accomplishments:** See OT&E,D (0460) appropriation.

**FY 2005 Accomplishments:** See OT&E,D (0460) appropriation.

**FY 2006 Plans:**

Efforts initiated in prior fiscal years will continue. These efforts include:

- The Quantum Well Infrared Photodetector (QWIP) project will complete in FY 2006 with lab and field testing of the integrated QWIP and Computed Tomographic Imaging Spectrometer (CTIS) camera.
- Range Profiles of Turbulence will complete in FY 2006 with the integration and demonstration of a brassboard Differential Image Motion (DIM) Light Detection and Ranging (LIDAR) system. The DIM LIDAR data will be compared to truth data to verify system performance.
- The Modulated Retro Target Sensors (MRTS) project will complete in FY 2006 by conducting field demonstrations of the prototype retroreflector sensor system integrated on the target and the remote data acquisition system. The FY 2006 tests will determine the optimum spacing of the MRTS retroreflectors for various target configurations.

Projects identified by the FY 2006 Broad Agency Announcement (BAA) process will be initiated. Efforts are planned in the following areas:

- Methods to measure and evaluate the total instantaneous output power of continuous wave HEL systems within 1% of the true output power to support static beam/target interaction testing.
- Methods to measure optical transmissivity with a 100 times increase in sampling rates over current measurement techniques at different wavelengths along laser beam paths to support HEL T&E.
- Survivable sensor concepts for airborne and ground targets to measure DE (HEL or HPM) effects without interfering with system operation or perturbing test environment.
- DE (HEL or HPM) hardened flight termination system/range destruct package to safely and reliably provide for termination of the target, even when high concentrations of DE are present on the target.

A BAA will be initiated in FY 2006 to select efforts for FY 2007 award.

**FY 2007 Plans:**

Future investigations will be launched to address T&E technology challenges in this focus area for:

- Techniques to accurately predict and understand the total beam distribution for HEL and HPM systems to address critical safety issues such as ensuring that T&E events do not affect civilian or military infrastructure.

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- Wide-spectrum, single substrate imagers to enhance imaging and detection of HEL beams from a variety of systems/sources.
- Use of physics-based models incorporated into virtual geographical representations of T&E ranges to provide 3-dimensional, geodetically accurate models of beam propagation, beam spread, lethal range, fluence on target, and atmospheric effects.

A BAA will be initiated in FY 2007 to select efforts for FY 2008 award.

C. (U) **OTHER PROGRAM FUNDING** NA

D. (U) **ACQUISITION STRATEGY** NA

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RDT&E PROJECT JUSTIFICATION SHEET (R-2a)				February 2005				
DEFENSE WIDE RDT&E (0400) BUDGET ACTIVITY THREE, PE 0603941D				INFORMATION SYSTEMS TECHNOLOGY TEST				
\$ in Millions	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Information Systems Technology Test	0.000	0.000	2.370	3.759	5.783	6.357	7.201	8.435

**A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION**

The S&T community is developing advanced Information Systems Technology (IST) to support DoD's Critical Transformational Capabilities—Conduct Information Operations, Deny Enemy Sanctuary, and Leverage Information Technologies. Advancements in IST will provide commanders and staff with an adaptive, network-centric, configurable information visualization environment, which will improve the speed and quality of command decisions. Information assurance and survivability are central to achieving these advancements. These IST advances will enable a spectrum of capabilities ranging from enhanced management and exploitation of intelligence, surveillance, and reconnaissance assets to next-generation tactical radio systems. Successful implementation of these transformational capabilities will necessitate a corresponding transformation in DoD's ability to test and evaluate IST. The IST Test (ISTT) focus area will address the T&E scenarios, technologies, and analysis tools required to ensure that information systems delivered to the warfighter provide an assured capability to acquire, verify, protect, and assimilate information necessary for battlefield dominance within a complex network-centric environment.

**B. (U) ACCOMPLISHMENTS/PLANNED PROGRAM**

	FY 2004	FY 2005	FY 2006	FY 2007
Information Systems Technology Test	0.000	0.000	2.370	3.759

**FY 2004 Accomplishments:** See OT&E,D (0460) appropriation.

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**FY 2005 Accomplishments:** See OT&E,D (0460) appropriation.

**FY 2006 Plans:**

Projects identified by the FY 2006 Broad Agency Announcement (BAA) process will be initiated. Potential areas of investigation include:

- Development of T&E metrics to determine the effectiveness of IST and Information Operations.
- Tools that employ artificial intelligence to support the instrumentation and visualization of IST T&E environments.
- Development of non-intrusive instrumentation and T&E communication networks (including networks-of-networks) that do not affect the performance of information systems under evaluation, especially for humans-in-the-loop network-centric environments.
- Methods to support T&E of decision aids used in network-centric operations.
- Ability to assess information assurance within complex systems-of-systems.
- Methods to evaluate the performance of network-centric operations in a multi-node dynamic environment.

A BAA will be issued to select efforts for FY 2007 award.

**FY 2007 Plans:**

Efforts initiated in FY 2006 will continue. Future investigations will be launched to address IST T&E technology challenges.

Areas of potential investigation include:

- Techniques for capturing spatial and temporal registration across large numbers of sensors, multimedia communications, and human-system interface devices.
- Techniques for capturing and evaluating multiple simultaneous collaborative user data links.
- Techniques for capturing and evaluating human physical and cognitive performance.
- Developing T&E capability to evaluate IST advances from a “human-out” perspective; i.e., determine what information actually enhances a warfighter’s performance.
- Technologies to non-intrusively assess low probability of detection/low probability of intercept communications and data links.
- Methods to assess the contribution of IST to decision superiority in operational scenarios.

Additional IST T&E technology issues will be identified, incorporated into the ISTT roadmap, and addressed in future research plans.

A BAA will be initiated in FY 2007 to select efforts for FY 2008 award.

C. (U) **OTHER PROGRAM FUNDING** NA

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D. (U) ACQUISITION STRATEGY NA

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RDT&E PROJECT JUSTIFICATION SHEET (R-2a)				February 2005				
DEFENSE WIDE RDT&E (0400) BUDGET ACTIVITY THREE, PE 0603941D				SOFTWARE TEST				
\$ in Millions	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Software Test	0.000	0.000	1.304	2.989	5.350	5.897	6.742	8.090

**A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION**

Use of complex, high-speed, software-intensive systems is increasing within weapons; Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) systems; and other automated information processing systems. Most software-intensive systems are developed, tested, and fielded in significantly shorter periods than hardware systems. Software components are generally upgraded more frequently than hardware in systems. Testing systems with software components requires rigorous software configuration control to ensure that reported test results apply to the actual fielded software.

Most current software tests are manpower intensive and require expert knowledge of the system under test. An automated, objective test capability is required to assess the effectiveness and performance of future software systems as well as to determine the appropriate amount of regression testing required when that software is modified. As the use of “learning” software proliferates, testing will be required to identify unacceptable behavior, detect defects in behaviors that have yet to be learned, and to predict the future performance of the learning software. Significant integration and interoperability issues among software systems and large databases must be overcome to enable testing of software-intensive systems. Artificial stimulation will be needed for both load and security testing. Methods to verify software integrity must also be identified. The Software Test focus area will develop the T&E technologies necessary to adequately test software intensive systems as the complexity of these systems increases in the future.

**B. (U) ACCOMPLISHMENTS/PLANNED PROGRAM**

	FY 2004	FY 2005	FY 2006	FY 2007
Software Test	0.000	0.000	1.304	2.989

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**FY 2004 Accomplishments:** See OT&E,D (0460) appropriation.

**FY 2005 Accomplishments:** See OT&E,D (0460) appropriation.

**FY 2006 Plans:**

The efforts selected by the FY 2006 Broad Agency Announcement (BAA) process will be awarded. The initial emphasis of this focus area will be developing and demonstrating technologies to objectively test software-intensive systems. Areas of potential investigation are:

- Development of metrics to objectively quantify the performance of software-intensive systems and adaptive software systems.
- Automated techniques to assess software system effectiveness and suitability.
- Development of metrics to quantify standards for regression testing of modified software.
- Methods to perform automated regression testing after accepted software has been modified.

A BAA will be issued to identify additional efforts for FY 2007 award.

**FY 2007 Plans:**

Efforts initiated in FY 2006 will continue. Additional efforts identified by the FY 2007 BAA will be initiated. Efforts will continue to expand the ability to evaluate software-intensive systems. Potential areas of investigation include:

- Techniques to support automated assessment of cognitive/adaptive software systems.
- Ability to test software-intensive systems embedded in systems-of-systems configurations.
- Methods to assess code integrity within software-intensive systems.
- Techniques to assess multi-level security within software intensive system architectures.

Additional T&E technology issues will be identified and incorporated into the Software Test roadmap to support continued development in this focus area. A BAA will be initiated in FY 2007 to select efforts for FY 2008 award.

C. (U) **OTHER PROGRAM FUNDING** NA

D. (U) **ACQUISITION STRATEGY** NA

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RDT&E PROJECT JUSTIFICATION SHEET (R-2a)				February 2005				
DEFENSE WIDE RDT&E (0400) BUDGET ACTIVITY THREE, PE 0603941D				MODELING AND SIMULATION				
\$ in Millions	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Modeling and Simulation	0.000	0.000	1.304	1.986	2.883	3.384	3.919	4.617

**A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION**

Weapon and Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) systems are becoming more complex and software intensive as well as increasingly interdependent and interoperable with other systems. These characteristics coupled with enhanced performance, such as operating at hypersonic velocities, make it increasingly more difficult and unaffordable to perform comprehensive test and evaluation without the use of constructive, virtual, and live modeling and simulation (M&S). Much work has been done to develop M&S for use in engineering design (detailed engineering models), platform analysis (one-on-one), mission analysis (many-on-many), and theater level (force-on-force) simulations. However, advancements are needed to enable reusing a model from one of these levels with other models from the same or different levels to support T&E. In order to evaluate advanced weapon systems and systems-of-systems, advanced M&S technology tools are required to provide flexibility to integrate models and simulations of varying resolution and fidelity and to maximize the reuse of validated engineering models and simulations. The M&S focus area will leverage emerging technologies to facilitate model integration and improve simulation performance to support T&E of future weapon systems.

**B. (U) ACCOMPLISHMENTS/PLANNED PROGRAM**

	FY 2004	FY 2005	FY 2006	FY 2007
Modeling and Simulation	0.000	0.000	1.304	1.986

**FY 2004 Accomplishments:** See OT&E,D (0460) appropriation.

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**FY 2005 Accomplishments:** See OT&E,D (0460) appropriation.

**FY 2006 Plans:**

The efforts selected by the FY 2006 Broad Agency Announcement (BAA) process will be awarded. The initial emphasis of this focus area will be to develop technologies that support the reuse of various levels of system models to augment T&E capabilities. Areas of potential investigation are:

- Aggregation and disaggregation among various levels of models and simulations, and the capability to interlink different levels of models to operate in real time.
- Technology supporting large data exchange among distributed simulations over large geographical distances with little to no latency.
- Techniques to provide intuitive visualization of large amounts of simulation data.

A BAA will be issued to identify efforts for FY 2007 award.

**FY 2007 Plans:**

Efforts initiated in FY 2006 will continue. Additional efforts identified by the FY 2007 BAA will be initiated. Potential areas of investigation include:

- Techniques to create realistic synthetic environments and targets for stressing systems-under-test.
- Ability to create realistic synthetic forces with improved representation of human physiological and psychological performance.
- Techniques to augment T&E events with systems-of-systems simulations of network-centric and C4ISR systems.
- Automated capability to select and assemble M&S components of various combinations into complete simulation environments to satisfy specific T&E requirements across a variety of application domains, levels of resolution, and time scales.

Additional T&E technology issues will be identified and incorporated into the M&S roadmap to support continued development in this focus area. A BAA will be initiated in FY 2007 to select efforts for FY 2008 award.

C. (U) **OTHER PROGRAM FUNDING** NA

D. (U) **ACQUISITION STRATEGY** NA

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RDT&E PROJECT JUSTIFICATION SHEET (R-2a)				February 2005				
DEFENSE WIDE RDT&E (0400) BUDGET ACTIVITY THREE, PE 0603941D				TEST RANGE/FACILITY TECHNOLOGY IMPROVEMENTS				
\$ in Millions	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Test Range/Facility Technology Improvements	0.000	0.000	0.059	1.282	2.211	2.775	3.347	3.929

**A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION**

The Department's Quadrennial Defense Review (QDR) transformation initiatives, as well as its drive to reengineer business and acquisition processes, are resulting in an increased rate of technology insertion into new and existing weapons systems. As the pace of spiral development increases, the operational tempo at ranges and facilities that support the test and evaluation of these systems will increase. The capability of T&E infrastructure to collect and archive accurate T&E data, analyze that data, and provide timely reporting of test results must be improved to support DoD transformation goals. This will require technology improvements to expedite processes, minimize the expenditure of human capital, and reduce test costs. The Test Range/Facility Technology Improvements focus area will develop technologies to enhance data collection and analysis, test management, and reporting to facilitate T&E missions and deliver near real-time analysis of results.

**B. (U) ACCOMPLISHMENTS/PLANNED PROGRAM**

	FY 2004	FY 2005	FY 2006	FY 2007
Test Range/Facility Technology Improvements	0.000	0.000	0.059	1.282

**FY 2004 Accomplishments:** NA

**FY 2005 Accomplishments:** NA

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**FY 2006 Plans:**

Although substantive efforts are planned to begin in FY 2007, the program will establish the foundation for the Test Range/Facility Technology Improvements focus area in FY 2006. This effort includes:

- Identifying subject matter experts.
- Identifying an Executing Agent.
- Establishing a working group and refining the Test Range/Facility Technology Improvements roadmap.

A Broad Agency Announcement (BAA) will be issued to identify efforts for FY 2007 award.

**FY 2007 Plans:**

The efforts selected by the FY 2007 BAA process will be awarded. The initial emphasis of this focus area will be the development of technologies to handle the vast amounts of data that each test event generates and methods to increase the operational tempo of T&E events without adversely affecting the quality of testing. Areas of potential investigation are:

- Technologies to expedite collection, handling, processing, analysis, and report generation of large quantities of data.
- Techniques to acquire and apply metadata (data about the data such as time stamps and data source) to enhance analysis capabilities.
- Methods that improve the availability, turnaround, and calibration of instrumentation and support systems for T&E events.
- Capabilities that support the ready retrieval of data and data dictionaries for reuse to minimize retesting.
- Improving the availability of T&E data to the S&T community, program offices, and warfighters.
- Replacing manpower-intensive and –dependent functions with automation.
- Techniques for conducting distributed testing with centralized test oversight. This includes technology that allows using systems in multiple locations to achieve a systems-of-systems test environment and the ability to provide remote operation of test facilities to minimize personnel and test management costs.

Additional T&E technology issues will be identified and incorporated into the Test Range/Facility Technology Improvements roadmap to support continued development in this focus area. A BAA will be initiated in FY 2007 to select efforts for FY 2008 award.

C. (U) **OTHER PROGRAM FUNDING** NA

D. (U) **ACQUISITION STRATEGY** NA

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<b>Exhibit R-2, RDT&amp;E Project Justification</b>							DATE February 2005	
APPROPRIATION0/BUDGET ACTIVITY RDT&E/Defense-Wide/BA 3					R-1 ITEM NOMENCLATURE Defense Technology Link (TechLink) 0603942D8Z			
COST (In Millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Total Program Element (PE) Cost	3.430	7.985	3.435	3.433	3.570	3.498	3.643	3.698
Technology Link, Project PXXX (TBD)	3.430	7.985	2.248	2.246	2.383	2.311	2.356	2.411
Homeland Defense First Responders Technology Transfer, Project PXXX (TBD)	0.000	0.000	1.187	1.187	1.187	1.187	1.287	1.287

**A. Mission Description and Budget Item Justification**

Defense TechLink is a critical element in the Department's technology transfer, transition, and acquisition activities. Its three-fold mission is (1) integration of advanced commercial-sector technologies into DoD systems, particularly from nontraditional defense contractors; (2) spin-off of DoD-developed technologies to the commercial sector to make these technologies more affordable for military acquisition; and (3) establishment of collaborative R&D projects with the private sector for cost-sharing of new dual-use technology development. Congress provided plus-ups for four years and the FY2003 Senate Appropriations Committee report states, "The Committee continues its support for the Defense TechLink program and strongly encourages the Department of Defense to include funding for this program in its fiscal year 2004 budget submission. Defense TechLink has been highly successful at helping the Department transfer its technologies to U.S. companies, making these technologies available for both military and commercial applications. The Department is urged to make the Defense TechLink program a permanent part of its technology transfer, transition and acquisition activities."

TechLink is highly cost-effective and has provided a return on the investment to DoD of 4:1 on funds expended to date. This efficiently run organization currently accounts for 25 percent of all DoD patent license agreements (PLAs) and has brokered over 150 Cooperative Research and Development Agreements (CRADAs) and other R&D partnerships involving innovative companies new to DoD. The Congressional Record for November 18, 2003, page S15056, has a statement from Senator Burns (R-MT) commending TechLink for its outstanding achievements.

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The Homeland Defense First Responder Technology Transfer Project will enhance efficiency and continue cost effectiveness by leveraging off existing TechLink efforts to manage equipment and technology transfers to civilian communities and eliminate duplication of effort between Department of Defense parties involved in technology and equipment transfers to first responders.

**B. Program Change Summary**

<b>PE: 0603942D8Z</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>FY 2006</b>	<b>FY 2007</b>
Previous President's Budget	3.547	1.934	2.248	2.246
Current FY 06 President's Budget	3.430	7.985	3.435	3.433
Total Adjustments:	-0.117	+6.051	+1.187	+1.187
Congressional Program Reductions				
Congressional rescissions				
Congressional increases		+6.150		
Reprogrammings				
SBIR/SSTR Transfer				
Other	-0.117	-0.099	+1.187	+1.187

**C. Other Program Funding Summary: N/A**

**D. Acquisition Strategy: N/A**

**E. Performance Metrics:**

For FY 2005, establish patent license agreements (PLAs) totalling 25% of all DOD PLAs and assist in the brokering of over 30 Cooperative Research and Development Agreements (CRADAs)  
For FY 2006, establish patent license agreements (PLAs) totalling 28% of all DOD PLAs and assist in the brokering of over 30 Cooperative Research and Development Agreements (CRADAs)  
For FY 2007, establish patent license agreements (PLAs) totalling 31% of all DOD PLAs and assist in the brokering of over 30 Cooperative Research and Development Agreements (CRADAs)  
For FY 2008, establish patent license agreements (PLAs) totalling 34% of all DOD PLAs and assist in the brokering of over 30 Cooperative Research and Development Agreements (CRADAs)  
For FY 2009, establish patent license agreements (PLAs) totalling 37% of all DOD PLAs and assist in the brokering of over 30 Cooperative Research and Development Agreements (CRADAs)  
For FY 2010, establish patent license agreements (PLAs) totalling 40% of all DOD PLAs and assist in the brokering of over 30 Cooperative Research and Development Agreements (CRADAs)  
For FY 2011, establish patent license agreements (PLAs) totalling 40% of all DOD PLAs and assist in the brokering of over 30 Cooperative Research and Development Agreements (CRADAs)

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<b>Exhibit R-2a, RDT&amp;E Project Justification</b>							<b>DATE</b> February 2005	
<b>APPROPRIATION0/BUDGET ACTIVITY</b> RDT&E/Defense-Wide/BA 3						<b>R-1 ITEM NOMENCLATURE</b> Defense Technology Link (TechLink) 0603942D8Z		
<i>COST (In Millions)</i>	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Technology Link	3.430	7.985	2.248	2.246	2.383	2.311	2.356	2.411

**A. Mission Description and Budget Item Justification**

Defense TechLink is a critical element in the Department's technology transfer, transition, and acquisition activities. Its three-fold mission is (1) integration of advanced commercial-sector technologies into DoD systems, particularly from nontraditional defense contractors; (2) spin-off of DoD-developed technologies to the commercial sector to make these technologies more affordable for military acquisition; and (3) establishment of collaborative R&D projects with the private sector for cost-sharing of new dual-use technology development. Congress provided plus-ups for four years and the FY2003 Senate Appropriations Committee report states, "The Committee continues its support for the Defense TechLink program and strongly encourages the Department of Defense to include funding for this program in its fiscal year 2004 budget submission. Defense TechLink has been highly successful at helping the Department transfer its technologies to U.S. companies, making these technologies available for both military and commercial applications. The Department is urged to make the Defense TechLink program a permanent part of its technology transfer, transition and acquisition activities."

TechLink is highly cost-effective and has provided a return on the investment to DoD of 4:1 on funds expended to date. This efficiently run organization currently accounts for 25 percent of all DoD patent license agreements (PLAs) and has brokered over 150 Cooperative Research and Development Agreements (CRADAs) and other R&D partnerships involving innovative companies new to DoD. The Congressional Record for November 18, 2003, page S15056, has a statement from Senator Burns (R-MT) commending TechLink for its outstanding achievements.

In Fiscal Year 2005, the Defense TechLink Program received several Congressional adds to address the following areas: Technology Transfer IEE (\$1.5M); Remote Presence (\$1.7M); Technology Mapping (\$1.95M), and Environmental Bioterrorism Detection (\$1M).

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Program Accomplishments and Plans:

	FY 2004	FY 2005	FY 2006	FY 2007
<b>Marketing of DoD Technologies</b>	2.510	0.975	1.388	1.386

FY 2004 Accomplishments: Undertook active marketing of DoD-developed technologies to United States 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: (1) to accelerate the transition of DoD-developed technologies to the warfighter; (2) to lower the cost of DoD technology acquisition by developing a larger commercial market for dual-use technologies; (3) to provide a return of revenue to DoD labs from commercial spin-off of DoD-developed technologies; and (4) to fulfill DoD's Congressionally mandated technology transfer directives.

The congressional add of \$1.6 million was for a Technology Venture Center in Montana and in Alaska to provide an entrepreneurial training/virtual business incubator. These funds are being used to provide specific start-up support to those companies initially licensing or taking to market technology developed in DoD and now available for commercialization. Efforts will be made to ensure the commercial products using the DoD developed technologies are made available to DoD buyers/programs.

FY 2005-2007 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.

	FY 2004	FY 2005	FY 2006	FY 2007
<b>Dual Use Technology Deployment</b>	0.560	0.560	0.560	0.560

FY 2004 Accomplishments: Actively promoted and brokered Cooperative Research and Development Agreements (CRADAs) between DoD labs and industry for development of technology with both commercial and military applications. This activity focused 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.

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FY 2005-2007 Plans: 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.

	FY 2004	FY 2005	FY 2006	FY 2007
<b>Spin-On of Advanced Commercial-Sector Technologies</b>	0.360	0.300	0.300	0.300

FY 2004 Plans: Promoted the DoD Small Business Innovation Research (SBIR) (focus on Phase III contracts) and Independent Research and Development (IR&D) programs to companies in the Northwestern United States in order to help DoD identify, fund, acquire, and integrate private-sector innovations and advanced commercial technologies into DoD systems.

FY 2005-2007 Plans: Actively promote the DoD Small Business Innovation Research (SBIR) (focus on Phase III contracts) and Independent Research and Development (IR&D) programs to companies in the Northwestern United States in order to help DoD identify, fund, acquire, and integrate private-sector innovations and advanced commercial technologies into DoD systems.

	FY 2004	FY 2005	FY 2006	FY 2007
<b>Congressional Plus Up -- Technology Transfer IEE</b>	0	1.500	0	0

FY2005 Plans: This congressional plus up is to support the Technology Transfer Commercialization National Center of Excellence for First Responders (NCEFR). The NCEFR will assess user needs and priorities, collect and evaluate potential DoD technologies for first responder use, identify non-DoD technologies that address DoD and first responder needs, and create and execute a marketing plan for these technologies. Measures of success will include technologies made available for first responder use.

	FY 2004	FY 2005	FY 2006	FY 2007
<b>Congressional Plus Up -- Remote Presence</b>	0	1.700	0	0

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FY2005 Plans: This congressional plus-up is for a Remote Presence Program to extend the MCWL Dragon Eye and Dragon Runner and other emerging low cost remote presence technologies and enhances their capabilities to support multiple mission scenarios across all Services, joint operations and homeland security activities. Additionally, a model for transferring DoD-developed technologies will be developed and tested as an integral part of this effort.

	FY 2004	FY 2005	FY 2006	FY 2007
<b>Congressional Plus Up -- Technology Mapping</b>	0.000	1.950	0.000	0.000

FY 2005 Plans: This congressional plus up is to broaden DoD technology transfer management by providing seamless intellectual property (IP) workflow processes based on established benchmarks. This effort will fully integrate IP docketing, management, and advertising. Measures of success will be facilitation of 15 Cooperative Research and Development Agreements/Patent License Agreements and a direct connection to facilitating 10 other partnerships between DoD and the private sector.

	FY 2004	FY 2005	FY 2006	FY 2007
<b>Congressional Plus Up -- Environmental Bioterrorism Detection</b>	0.000	1.000	0.000	0.000

FY 2005 Plans: This congressional plus us is to develop an Environmental Bioterrorism Detection Program which establishes a wildlife disease-monitoring network to collect and analyze near real-time clinical data from wildlife hospitals, wildlife rehabilitation organizations, veterinarians and individuals. The network will be coupled to the DoD/DHS network currently being developed for humans to provide a biosurveillance tripwire system at extremely low additional cost. This effort will design a way to transfer DoD-developed medical technology to the commercial market as a way to jointly pursue common objectives.

**C. Other Program Funding Summary: N/A**

**D. Acquisition Strategy: N/A**

**E. Major Performers: N/A**

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<b>Exhibit R-2, RDT&amp;E Project Justification</b>							<b>DATE</b> February 2005	
<b>APPROPRIATION/BUDGET ACTIVITY</b> RDT&E/Defense-Wide/BA 3					<b>R-1 ITEM NOMENCLATURE</b> Defense Technology Link (TechLink) 0603942D8Z			
<i>COST (In Millions)</i>	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY2010	FY2011
Homeland Defense First Responders Technology Transfer	0.000	0.000	1.187	1.187	1.187	1.187	1.287	1.287

Leverages off existing technology transfer programs, through the Cooperative research and development agreements (CRADAs) and other R&D partnerships established under the Technology Link project, to meet the requirements of the FY2003 National Defense Authorization Act, Section 1401, that requires DoD to identify technology items and equipment developed or being developed with the potential to enhance public safety and improve homeland security; evaluation of technology items and equipment useful to first responders; facilitation of appropriate technology items and equipment to Federal, State, and local first responders; identification and elimination of redundant and unnecessary research efforts with respect to first responders; advance high priority projects; and participation of outreach programs to communicate with first responders and facilitate awareness of available technology items and equipment to support responses to crises. Monitors all DoD research and development activities to identify potential first responder applications; coordinates with other Federal Departments and Agencies to facilitate the transfer of technology from DoD to first responders; and assists private firms in the transfer of technology and equipment for first responders.

	<b>FY 2004</b>	<b>FY 2005</b>	<b>FY 2006</b>	<b>FY 2007</b>
<b>Homeland Defense First Responders Technology Transfer</b>	0.000	0.000	1.187	1.18

FY 2005-2007 Plans: Actively work with Federal, State, and local officials to identify and participate in outreach programs to communicate with first responders and facilitate awareness of available technology items and equipment to support homeland security and enhance public safety. Build a consolidated database to capture and manage the transfer of technology items, equipment, and capabilities from DoD to first responders.

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)						Date: February 2005		
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 3					R-1 ITEM NOMENCLATURE Counterproliferation Support, PE 0605160D8Z			
COST (In Millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Total Program Element (PE) Cost	1.793	11.813	0.000	0.000	0.000	0.000	0.000	0.000
Nuclear Matters/P476	1.793	11.813	0.000	0.000	0.000	0.000	0.000	0.000

(U) **A. Mission Description and Budget Item Justification**

(U) **BRIEF DESCRIPTION OF ELEMENT**

(U) Effective October 1, 2005, funding for this program will move from PE 0605160D8Z (Counterproliferation Support) Budget Activity 3, to PE 0605161D8Z (Nuclear Matters-Physical Security) in Budget Activity 6. The purpose of the Counterproliferation Support program, commonly called *Nuclear Matters*, is to sustain the U.S. nuclear deterrent posture. The funds for this program are used to support research, development, test and evaluation efforts, as well as studies and analyses, for nuclear weapons security, use control, nuclear weapons stockpile safety, survivability and performance. Funds are also used to develop and implement plans for stockpile transformation; infrastructure analyses and assessments; DoD-NNSA Nuclear Weapons Council activities, as mandated by Title 10 USC, section 179; radiological and nuclear emergency response efforts; and manage international programs of nuclear cooperation, particularly with respect to enhancing international nuclear safety and security. In fiscal year 2004, this program incorporated additional responsibility for policy development and implementation, and operations and oversight of nuclear weapons physical security and Personnel Reliability Programs for the protection of tactical, fixed and nuclear weapons systems, DoD personnel and DoD facilities.

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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)						Date: February 2005		
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 3					R-1 ITEM NOMENCLATURE Counterproliferation Support, PE 0605160D8Z			
COST ( <i>In Millions</i> )	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Total Program Element (PE) Cost	1.793	11.813	0.000	0.000	0.000	0.000	0.000	0.000
Nuclear Matters/P476	1.793	11.813	0.000	0.000	0.000	0.000	0.000	0.000

(U) Project Number and Title: P476 Nuclear Matters

(U) PROGRAM ACCOMPLISHMENTS AND PLANS

(U) FY 2004 Accomplishments:

(U) Nuclear Weapons Security, Use Control, and Safety (\$0.538 million)

- Conducted OSD oversight and provided directions for actions conducted under DoDD 3150.2 such as implementation of Inter-Regional Deployment Safety Rules and DoDD 3150.2-M, "DoD Nuclear Weapons Safety Program," DoDD 5210.42, "Nuclear Weapons PRP", and DoDI S-5210.82, "Protection of Nuclear Coding Equipment."
- Initiated the updating and documentation of DoD policy, responsibilities, and procedures in DoD publications. These actions included DoDD S-3150.7, "Controlling the Use of Nuclear Weapons," DoDD 3150.3, "Nuclear Forces Security & Surety" and DoDD 5210.41 and 5210.41-M, "Physical Security of Nuclear Weapons."
- Initiated actions to reflect the assumption of the additional assigned responsibilities for nuclear weapons security and personnel reliability, and for National Security Policy Decision-28 implementation.

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- Conducted assessment on Nuclear Force Protection in response to Presidential Memorandum and Strategic Planning Guidance (2006-2011).
- Managed the protection of classified nuclear weapons information including access to and dissemination of Restricted Data, as mandated by Enclosure 5, DoDD 5210.2, "Access to and Dissemination of Restricted Data".
- Continued as DoD Sigma 14/15 Approval Authority (Interface with DOE/NNSA).
- Actioned Freedom of Information Act and Mandatory Declassification Requests.
- As OSD sponsor, supported the operations of the Joint Advisory Committee on Nuclear Weapons Surety (JAC).

(U) Stockpile Performance and Survivability (\$0.448 million)

- Conducted life cycle activities in support of the nuclear weapons stockpile under DoDD 3150.1, "Nuclear Weapons Life Cycle" and DODI 5030.55, "DoD Procedures for Joint DoD-DOE Nuclear Weapons Life Cycle Activities."
- Managed DoD RDT&E activities for nuclear warheads to include B61, W76, W78, W62, W80 and W88 Weapons. Specifically, continued to support joint nuclear weapons feasibility and design definition and cost studies (Phase 6.2/2A) for the B61 and development and engineering projects (Phase 6.3) for the B83 and W76 warheads.
- Initiated the updating and documentation of DoD policy, responsibilities, and procedures in DoDD 3150.3. "Nuclear Weapons Security and Survivability."
- Supported the actions of the Defense Science Board (DSB) Task Force on Clandestine Nuclear Attack and the Task Force on Nuclear Weapons Effects Simulators/Simulation.

(U) Nuclear Weapons Council (\$0.305 million)

- Managed the activities of the Congressionally mandated Joint DoD-DOE Nuclear Weapons Council and its support committees to include the Nuclear Weapons Council Standing and Safety Committee, the Compartmented Advisory Committee and the Action Officer group.
- Prepared, staffed, and submitted annual reports to the President and the Congress to include the FY 2004-2012 Nuclear Weapons Stockpile Memorandum and Requirements Planning Document, FY 2004 Annual Certification Report, FY 2004 Annual Surety Report and the FY 2004 NWC Report to Congress.
- Conducted site visits to several nuclear weapons complex sites for individuals within the nuclear weapons community including senior DoD/DOE officials.

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(U) Stockpile Transformation and Infrastructure (\$0.233 million)

- Supported the transformation activities to begin movement from a nuclear only to nuclear/non-nuclear TRIAD and implementation actions like the Strategic Capabilities Assessment.
- Supported conduct of feasibility study for the Robust Nuclear Earth Penetrator (Phase 6.2) and the provision of requested information to the Congress.
- Acted as DoD focal point for Pit Manufacturing activities in the DOE weapons production complex.
- Supported the actions of the DSB Task Force on Strategic Strike Skills.
- Initiated analyses to assess the future of the nuclear weapon stockpile.
- Continued to develop and implement a Nuclear Matters knowledge system to help preserve nuclear weapons information for operational improvements and continuity.

(U) Radiological and Nuclear Emergency Response (\$0.179 million)

- Conducted DoD oversight and provided direction for DoD preparations to train for response actions in the event of a nuclear weapon accident under DoDD 3150.8, "DoD Response to Radiological Accidents.
- Prepared and participated in exercises Diligent Endeavor 2004 and Diligent Warrior 2004.
- Continued and completed actions to update DoDD 3150.8-M, "Nuclear Accident Response Procedures (NARP)."
- Conducted OSD oversight for actions conducted under DoDD 3150.5, "DoD Response to Improvised Nuclear Devices (IND) Incidents".
- Supported homeland defense initiatives to develop Interim National Response Plan (INRP) and the National Response Plan (NRP).

(U) International Programs (\$0.090 million)

- Supported and participated in NATO nuclear weapon policy and oversight groups to include the High Level Group (HLG) and the Joint Theatre Surety Management Group (JTSMG).

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- Continued to implement DoDD 5030.14, "Disclosure of Atomic Information to Foreign Governments and Regional Defense Organizations."
- Continued to support and participate with the UK under 1957 Mutual Defense Agreement.
- Continued to support US-Russia Nuclear Warhead Safety and Security bilateral activities.
- Continued to support US-France Nuclear Warhead Safety and Security bilateral activities.

(U) FY 2005 Plans:

(U) Nuclear Weapons Security, Use Control, and Safety (\$9.450 million)

- Initiate a physical security equipment RDT&E program that supports the protection of tactical and fixed nuclear weapons systems, DoD personnel and their facilities.
- Develop physical security equipment/systems that meet Service's nuclear security requirements in the areas of Interior and Exterior Detection/Surveillance, Delay/Denial, Entry Control, Common Operating Picture, Tactical Systems and Airborne Intrusion.
- Conduct OSD oversight and provide directions for actions conducted under DoDD 3150.2 , DoDD 3150.2-M, "DoD Nuclear Weapons Safety Program, and DoDI S-5210.82, "Protection of Nuclear Coding Equipment," DoDD 5210.41 and 5210.41-M, "Physical Security of Nuclear Weapons.
- Initiate or continue the updating and documentation of DoD policy, responsibilities, and procedures in DoD publications to include DoDD S-3150.7, "Controlling the Use of Nuclear Weapons", DoDD 3150.3, "Nuclear Forces Security & Surety" and "DoDD 5210.42, "Nuclear Weapons PRP."
- Continue actions for nuclear weapons security and personnel reliability, and for National Security Policy Decision-28 implementation.
- Conduct implementation activities stemming from approved recommendations of the assessment on Nuclear Force Protection.
- Continue to manage the protection of classified nuclear weapons information including access to and dissemination of Restricted Data, as mandated by Enclosure 5, DoDD 5210.2, "Access to and Dissemination of Restricted Data."
- Continue as DoD Sigma 14/15 Approval Authority (Interface with DOE/NNSA).
- Action Freedom of Information Act and Mandatory Declassification Requests.
- As OSD sponsor, support the operations of the Joint Advisory Committee on Nuclear Weapons Surety (JAC).

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(U) Stockpile Performance and Survivability (\$0.709 million)

- Conduct life cycle activities in support of the nuclear weapons stockpile under DoDD 3150.1, “Nuclear Weapons Life Cycle” and DODI 5030.55, "DoD Procedures for Joint DoD-DOE Nuclear Weapons Life Cycle Activities."
- Continue to manage DoD RDT&E activities for nuclear warheads to include B61, W76, W78, W62, W80 (0,1), and W88 Weapons.
- Complete the updating and documentation of DoD policy, responsibilities, and procedures in DoDD 3150.3. “Nuclear Weapons Security and Survivability”.
- Support the actions and follow-up of the Defense Science Board (DSB) Task Force on Clandestine Nuclear Attack and the Task Force on Nuclear Weapons Effects Simulators/Simulation.
- Support the recommended executive agency of the DoD for nuclear detectors for the Department of Homeland Security.

(U) Nuclear Weapons Council (\$0.354 million)

- Manage the activities on the Congressionally mandated Joint DoD-DOE Nuclear Weapons Council and its support committees to include the Nuclear Weapons Council Standing and Safety Committee, the Compartmented Advisory Committee and the Action Officer group.
- Prepare, staff, and submit annual reports to the President and the Congress to include the FY 2005-2013 Nuclear Weapons Stockpile Memorandum and Requirements Planning Document, FY 2005 report on Stockpile Assessment, FY 2005 Joint Surety Report and the FY 2005 NWC Report to Congress
- Conduct a week-long trip to several nuclear weapons complex sites for over sixty individuals within the nuclear weapons community including senior DoD/DOE officials.

(U) Stockpile Transformation and Infrastructure (\$0.709 million)

- Continue to support the transformation from a nuclear only to nuclear/non-nuclear TRIAD and implementation actions like the Strategic Capabilities Assessment.
- Supports the conduct of the next nuclear posture review in FY 2005.
- Continue to support the actions and follow-on actions of the DSB Task Force on Strategic Strike Skills.
- Continue program to assess the future of the nuclear weapon stockpile.

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- Continue to develop and implement a Nuclear Matters knowledge system to help preserve nuclear weapons information for operational improvements and continuity.

(U) Radiological and Nuclear Emergency Response (\$0.473 million)

- Conduct DoD oversight and provided direction for DoD preparations to train for response actions in the event of a nuclear weapon accident under DoDD 3150.8, “DoD Response to Radiological Accidents.
- Prepare and participate in exercise Dingo King 05.
- Initiate actions to update DoDD 3150.8, “DoD Response to Radiological Accidents”; DoD3150.8-M, Nuclear Accident Response Procedures” and DoDD 5110.63, "Security of Nuclear Reactors and Special Nuclear Material” to make them consistent with the National Response Plan.

(U) International Programs (\$0.118 million)

- Support and participated in NATO nuclear weapon policy and oversight groups to include the High Level Group (HLG) and the Joint Theatre Surety Management Group (JTSMG).
- Continue to implement DoDD 5030.14, "Disclosure of Atomic Information to Foreign Governments and Regional Defense Organizations."
- Continue to support and participate with the UK under 1957 Mutual Defense Agreement.
- Continue to support US-Russia Nuclear Warhead Safety and Security bilateral activities.
- Continued to support US-France Nuclear Warhead Safety and Security bilateral activities.

(U) FY 2006 Plans:

Not applicable. Funds transfer to BA-6, PE 0605161D8Z

(U) FY 2007 Plans

Not applicable. Funds transferred to BA-6, PE 0605161D8Z

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**(U) B. Program Change Summary**

	<b><u>FY 2004</u></b>	<b><u>FY 2005</u></b>	<b><u>FY 2006</u></b>	<b><u>FY 2007</u></b>
Previous President's Budget	1.851	1.958	2.018	2.052
Current President's Budget	1.793	11.813	0.000	0.000
Total Adjustments	-.058			
Congressional program reductions		-.045		
Congressional rescissions				
Congressional increases				
Reprogrammings	-.005	9.900		
SBIR/STTR Transfer	-.053			
Programmatic Transfer to BA6			-2.018	-2.052

Change Summary Explanation: \$9.9 million reprogrammed from service R&D to address critical nuclear weapons security issues.

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(U) Funding

Effective October 1, 2006, funding for this program will move from PE 0605160D8Z (Counterproliferation Support) Budget Activity 3 to PE 0605161D8Z (Nuclear Matters) in Budget Activity 6.

(U) **C. Other Program Funding Summary**

FY 2006 funding transferred to BA-6 PE 0605161D8Z (Nuclear Matters).

(U) **D. Acquisition Strategy**

Not applicable

(U) **E. Performance Metrics**

Not applicable

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Exhibit R-2a, RDT&E Project Justification							Date: February 2005	
Appropriation/Budget Activity RDT&E. BA 3				Project Name and Number Counterproliferation Support/P476				
Cost (\$ in millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Nuclear Matters/P476	1.793	11.813	0.000	0.000	0.000	0.000	0.000	0.000
RDT&E Articles Quantity N/A								

**A. Mission Description and Budget Item Justification:**

(U) Effective October 1, 2006, funding for this program will move from PE 0605160D8Z (Counterproliferation Support) in Budget Activity 3, to PE 605161D8Z (Nuclear Matters-Physical Security) in Budget Activity 6. The purpose of the Counterproliferation Support program, commonly referred to as *Nuclear Matters*, is to sustain the U.S. nuclear deterrent posture. The funds for this program are used to support research, development, test and evaluation efforts, as well as studies and analyses, for nuclear weapons security, use control, nuclear weapons stockpile safety, survivability and performance. Funds are also used for stockpile transformation and infrastructure analyses and assessments; DoD-NNSA Nuclear Weapons Council activities, as mandated by Title 10 USC, section 179; radiological and nuclear emergency response efforts; and international programs of nuclear cooperation, particularly with respect to enhancing international nuclear safety and security. In fiscal year 2004, this program incorporated additional responsibility for policy development and implementation, and operations and oversight of nuclear weapons physical security and Personnel Reliability Programs for the protection of nuclear weapons systems, DoD personnel and DoD facilities.

**B. Accomplishments/Planned Program**

	FY 2004	FY 2005	FY 2006	FY 2007
Nuclear Weapons Security, Use Control, and Safety	.538	9.450	0.000	0.000

It is DoD policy that nuclear weapon systems require special consideration because of their political and military importance, their destructive power, and the potential consequences of an accident or unauthorized act. *Nuclear weapons security, use control and safety* support actions to maintain and improve our nuclear weapon protections. As such, a full suite of DoD directives which spell out policies, procedures, and responsibilities are continually reviewed and updated. In FY 2004, an assessment was conducted on Nuclear Force Protection in response to a Presidential Memorandum and Strategic Planning Guidance (2006-2011). In 2004, the program was assigned responsibility, and has initiated efforts, to implement National Security Policy Decision-28 and to exercise OSD proponentcy for nuclear weapon physical security and personnel reliability programs and will continue activities in future years. The continuing protection of classified nuclear weapons information including access to and dissemination of Restricted Data is addressed here. As OSD sponsor, it supports the continuing operations of the Joint Advisory Committee on Nuclear Weapons Surety

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(JAC). Output goals include; continuous reviewing, and updating when needed, all DoD security, use control and safety directives; supporting research and development of assured denial technologies, no OSD security violations regarding classified nuclear weapons information; support at least two JAC meetings per year.

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