PE NUMBER: 0603231F
PE TITLE: Crew Systems and Personnel Protection Technology

Exhibit R-2, RDT&E Budget Item Justification

DATE: February 2005

BUDGET ACTIVITY: 03 Advanced Technology Development (ATD)

PE NUMBER AND TITLE: 0603231F Crew Systems and Personnel Protection Technology

	Cost ($ in Millions)	FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total
	Total Program Element (PE) Cost	40.873	33.595	29.775	31.726	32.246	35.284	35.926	36.237	Continuing	TBD
2830	Decision Effectiveness Technology	10.507	7.403	20.583	21.899	22.656	24.893	25.330	25.456	Continuing	TBD
3257	Helmet-Mounted Sensory Technologies	6.485	4.746	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	TBD
4923	Logistics Readiness and Sustainment	9.992	10.439	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	TBD
4924	Warfighter Readiness Technology	6.764	7.156	6.473	6.930	6.604	7.114	7.265	7.401	Continuing	TBD
5020	Bioeffects & Protection Technology	7.125	3.851	2.719	2.897	2.986	3.277	3.331	3.380	Continuing	TBD

Note: In FY 2006, Helmet-Mounted Sensory Technologies and Logistics Readiness and Sustainment efforts will move from Projects 3257 and 4923, respectively, to Project 2830.

(U) A. Mission Description and Budget Item Justification

This program develops and demonstrates technologies to enhance human performance and effectiveness and to enable the aerospace force. State-of-the-art advances are made to train personnel, protect and sustain warfighters, and improve human interfaces with weapon systems. The Decision Effectiveness Technology project develops and demonstrates warfighter capability enhancing technologies that promote effective decision-making, control, and mission execution in the emerging network-enabled operational environments. The Helmet-Mounted Sensory Technologies project develops and demonstrates advanced operator interface technologies for multifunctional helmet-mounted displays and night vision devices. The Logistics Readiness and Sustainment project develops and demonstrates technologies that will enhance logistics operations, and improve the design, deployability, performance, and support of current and future weapon systems. The Warfighter Readiness Technology project develops and demonstrates advanced training, simulation, and mission rehearsal technologies. The Bioeffects and Protection Technology project develops and demonstrates advanced technologies to provide laser eye protection, assure the safety of personnel involved with test, deployment, and operation of high-energy laser weapons, and enable detection/identification and neutralization of threat agents for counterproliferation. Note: In FY 2005, Congress added $1.1 million for Virtual Warriors. This program is in Budget Activity 3, Advanced Technology Development, since it develops and demonstrates technologies to protect and enhance the performance of Air Force personnel in operational environments.

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(U) B. Program Change Summary ($ in Millions)

		FY 2004	FY 2005	FY 2006	FY 2007
(U)	Previous President's Budget	42.822	32.794	32.525	33.129
(U)	Current PBR/President's Budget	40.873	33.595	29.775	31.726
(U)	Total Adjustments	-1.949	0.801		
(U)	Congressional Program Reductions		-0.001		
	Congressional Rescissions		-0.298		
	Congressional Increases		1.100		
	Reprogrammings	-0.826			
	SBIR/STTR Transfer	-1.123			

(U) Significant Program Changes:

Not Applicable.

C. Performance Metrics

Under Development.

Exhibit R-2a, RDT&E Project Justification

DATE: February 2005

BUDGET ACTIVITY: 03 Advanced Technology Development (ATD)

PE NUMBER AND TITLE: 0603231F Crew Systems and Personnel Protection Technology

PROJECT NUMBER AND TITLE: 2830 Decision Effectiveness Technology

Cost ($ in Millions)		FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total
2830	Decision Effectiveness Technology	10.507	7.403	20.583	21.899	22.656	24.893	25.330	25.456	Continuing	TBD
	Quantity of RDT&E Articles	0	0	0	0	0	0	0	0		

Note: In FY 2006, Helmet-Mounted Sensory Technologies and Logistics Readiness and Sustainment efforts will move from Projects 3257 and 4923, respectively, to Project 2830.

(U) A. Mission Description and Budget Item Justification

This project develops and demonstrates warfighter capability enhancing technologies and information operations technologies that promote effective decision-making, control, and mission execution in the emerging network-enabled operational environment. Included are advanced technologies that improve the ability of battlefield airmen to rapidly assimilate critical information and make timely and correct decisions, display technologies and decision aids that enhance time-critical strikes, and warfighter interface technologies that simplify and speed critical operations in air operation centers and battle management platforms. The project also develops technologies that enhance logistics functions, improve the fidelity and accuracy of large-scale military simulations, protect deployed personnel, improve human effectiveness during information operations and information warfare, and support counterproliferation. The ultimate goal is to assure warfighter decision effectiveness in Air Force operations.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2004	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST: Develop and demonstrate user-tailored information management and portrayal technologies that enhance battlespace situational awareness for global- and MAJCOM-level information warfare and air operations centers to reduce decision-making bottlenecks. Note: Effort completes in FY 2005.	3.323	1.484	0.000	0.000
(U) In FY 2004: Developed a decision-making modeling, simulation, and analysis tool to evaluate different types of adversary systems and to assess alternative ways they may be favorably influenced by allied force actions. Integrated this tool into next-generation planning and combat assessment tools to demonstrate enhanced information warfare planning. Developed dynamic user tailoring for operation centers' information management tool.				
(U) In FY 2005: Integrate a decision-making modeling, simulation, and analysis tool into final version of previously demonstrated combat assessment tool and transition into joint and/or Air Force weapon systems. Develop collaborative information sharing for operation centers' information management tool. Complete and integrate final version information management tool into joint and/or Air Force weapon systems.				
(U) In FY 2006: Not Applicable.				
(U) In FY 2007: Not Applicable.				
(U)				
(U) MAJOR THRUST: Develop and demonstrate advanced audio technologies to enhance security force	0.992	0.000	0.000	0.000

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	situational awareness and threat response time using acoustic sensors. Note: Technology transitioned to Special Operations Forces in FY 2004 for testing.				
(U)	In FY 2004: Demonstrated a user-centered interface to improve threat level and location awareness for security force command, as well as automated acoustic threat detection, localization, and classification of foot traffic, land vehicles, air vehicles, and munitions firing. Demonstrated, during a military exercise, the operational payoff from using the combination of acoustic sensors, multimedia displays at the command center, and three-dimensional audio radios to assist mobile patrol squads.				
(U)	In FY 2005: Not Applicable.				
(U)	In FY 2006: Not Applicable.				
(U)	In FY 2007: Not Applicable.				
(U)					
(U)	MAJOR THRUST: Develop and demonstrate human-centered tools for the Air Force Information Warfare (IW) community. Provide the IW warrior with tailored decision support systems, guidelines for effective selection of information warriors, information operations simulators and training systems, improved operational shift schedules to increase personnel efficiency and effectiveness, enhanced decision-making tools, and automated tools to reduce operator task load.	1.914	2.050	3.029	2.854
(U)	In FY 2004: Developed technologies to provide human-centered alternatives to current IW architectures, systems, processes, and operations. Technologies are focused on predictive battlespace awareness and tailored decision support systems and tools to augment human operators' performance. Finalized intelligence operations center process study and developed a modernization plan for IW as well as a detailed plan to support future demonstrations of IW tools, training, and requirements.				
(U)	In FY 2005: Develop and demonstrate tools, methods, and technology to gain, exploit, defend, and attack information. Identify and prioritize IW capabilities for enhancement by exemplar technologies and methods. Develop, demonstrate, and evaluate IW support tools and technologies to assess operational impact.				
(U)	In FY 2006: Continue to develop and demonstrate tools, methods, and technology to gain, exploit, defend, and attack information. Develop IW capabilities for enhancement by exemplar technologies and methods. Begin research to develop tools and techniques to improve operator performance for Intelligence, Surveillance, and Reconnaissance planning and analysis.				
(U)	In FY 2007: Complete development of tools, methods, and technology to gain, exploit, defend, and attack information. Complete development of IW capabilities enhancement technology. Develop and demonstrate tools and techniques to improve operator performance for ISR planning and analysis. Begin research to develop ISR optimal displays and exploitation for ISR operators using all senses.				
(U)					

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(U)	MAJOR THRUST: Develop and demonstrate human effectiveness technologies to improve combat effectiveness reporting, situation assessment updates, and decision support for Combined Air Operations Centers (CAOC).	1.373	1.369	2.608	2.600
(U)	In FY 2004: Performed cognitive task analysis of key CAOC positions and developed measures of performance and effectiveness. Began to develop visualization tools promoting battlespace situational awareness.				
(U)	In FY 2005: Develop user-tailorable visualization tools to optimize human perception of battlespace situational awareness. Demonstrate enhanced collaborative capability for effective, time-critical information exchange operations between CAOC and other operational units.				
(U)	In FY 2006: Develop initial decision-centric visualization tools focused on the areas of strategy planning, assessment of operational effectiveness, and battle predictions. Integrate these visualization tools with other tools relevant to strategy planning and operational assessment.				
(U)	In FY 2007: Commence field tests of the visualization tools in an operational environment or exercise. Develop additional tools to allow more advanced collaboration within the strategy division and with other groups in the air operations center.				
(U)					
(U)	MAJOR THRUST: Develop and demonstrate technologies to interface between ground controllers and multiple machine components through unified visual and auditory displays. Technologies address ground controller-specific requirements leading to faster mission execution timelines, reduced targeting and fratricide errors, and increased situational awareness through positional awareness of friend and foe in the combat zone.	1.549	1.400	2.800	2.900
(U)	In FY 2004: Developed battlefield knowledge management concept to address specific mission requirements for operational ground controllers. Demonstrated the terminal attack communications earplug concept, including comfortable hearing protection, restoration of natural hearing via external hearing aid microphones, and in-the-ear-canal radio communications. Began to develop operator interface concepts for unmanned aerial vehicle (UAV)-augmented vision to improve ground controller awareness of UAV imagery with overlays that blend UAV imagery with cultural and targeting information. Began to develop head-mounted display concepts and sensors for ground controllers including night vision goggles and computer displays. Began to develop user independent speech recognition, using customer-specific software and terminal attack communications (TAC) earplug microphones.				
(U)	In FY 2005: Demonstrate operator-augmented vision interfaces for ground controller-specific UAV platforms. Begin to develop intelligent UAV search patterns for improved target location. Demonstrate user independent speech recognition in high-noise environments.				

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(U) In FY 2006: Continue to develop intelligent UAV search patterns for improved target location. Begin to develop UAV display tools that speed the delivery of UAV imagery integrated with cultural and targeting information to special operations forces. Continue to develop user independent speech recognition and language translation customized for ground controller equipment and TAC earplug microphones.

(U) In FY 2007: Complete development and demonstration of advanced interface technologies between ground controllers and multiple machine components through unified visual and auditory displays. Demonstrate UAV interfaces featuring intelligent agent search patterns in the ground controller operational environment. Demonstrate operator headgear incorporating basic operator status reporting and wearable displays. Demonstrate user independent speech recognition and language translation customized for ground controller equipment and TAC earplug microphones.

(U)

(U) MAJOR THRUST: Develop and demonstrate decision-aiding technologies that assist the Joint Forces Commander (JFC)/Joint Forces Air Component Commander (JFACC) to rapidly assess the battlefield situation, predict the most likely adversary behaviors, and select and prioritize the appropriate courses of action. Note: In FY 2006, this increase in funding is due to greater emphasis in commander's predictive environment (CPE).	0.000	0.000	0.500	1.000

(U) In FY 2004: Not Applicable.

(U) In FY 2005: Not Applicable.

(U) In FY 2006: Develop a scenario-based cognitive work analysis based on global strike and global persistent attack missions as a command and control knowledge base for the CPE. Begin developing an initial CPE decision aid and visually interactive simulation.

(U) In FY 2007: Begin first spiral development cycle of a decision aid that will support global military operations by providing a common global picture, fully integrating military planning, operations, and supporting intelligence, and enabling real-time reachback to operational and intelligence knowledge sources.

(U)

(U) MAJOR THRUST: Develop and demonstrate advanced visual display technologies to provide integrated day/night capability to reduce pilot workload and enhance mission performance. Note: In FY 2006, this effort moved from Project 3257.	0.000	0.000	2.182	2.412

(U) In FY 2004: Not Applicable.

(U) In FY 2005: Not Applicable.

(U) In FY 2006: Develop lightweight, ruggedized displays that operate in demanding special operations environments. Perform a laboratory evaluation to determine the optimal configuration to present information to special operations personnel. Investigate the utility of incorporating day and night sensors

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into a single helmet-mounted display.

(U) In FY 2007: Demonstrate in an operational environment that lightweight, ruggedized displays can be successfully integrated into Air Force special operations equipment. Begin to develop an integrated helmet display prototype that includes day and night sensors and provides the operational capabilities identified by the completed utility investigation.

(U)

(U)	MAJOR THRUST: Develop and demonstrate counterproliferation technologies for large-scale threat neutralization applications. This will enhance force protection, enable air operations commanders to maintain operations tempo, and minimize weapons system attrition due to agent contamination. Note: In FY 2006, this increase in funding is due to greater emphasis in counterproliferation technologies.	0.000	0.000	0.485	1.171

(U) In FY 2004: Not Applicable.

(U) In FY 2005: Not Applicable.

(U) In FY 2006: Define parameters of biological warfare agent identification and neutralization. Design new agent identification technologies and appropriate testing methods and conditions to perform operational field evaluations.

(U) In FY 2007: Evaluate the capabilities of emerging technologies to identify and neutralize biological warfare agents. Begin development of DNA-based identification technologies that will lead to affordable and reliable techniques to locate, identify, track, and engage enemy held biological warfare agents.

(U)

(U)	MAJOR THRUST: Develop and demonstrate intelligent software agents, realistic human and organizational behavior models, and advanced job performance aiding technologies. Computer agents and models add realism and fidelity to large-scale synthetic environments and war games, and provide intelligence analysts a way to model collected data. Job aiding technologies provide command and control operators with automated access to a manageable amount of multi-source critical information to avoid operator overload and to support fast and accurate decision-making during mobility operations. Note: In FY 2006, this effort moved from Project 4923.	0.000	0.000	4.111	3.999

(U) In FY 2004: Not Applicable.

(U) In FY 2005: Not Applicable.

(U) In FY 2006: Evaluate methods to improve validating human performance models. Begin to develop a human performance model that can represent behavioral variations due to cultural differences. Begin to transition to an Air Mobility Command program office a set of work-centered collaborative planning and decision-making software tools. Begin to develop composable human computer interface elements that can be assembled via computer network into a rapidly reconfigurable command and control system.

(U) In FY 2007: Demonstrate in the laboratory a human performance model that can represent behavioral

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variations due to cultural differences. Begin a series of critical experiments toward modeling a society as a complex systems of systems. Complete the transition of work-centered collaborative planning and decision-making software to the Air Mobility Command. Continue to develop composable command and control (C2) human computer interface elements that can be assembled via computer network into a rapidly reconfigurable C2 system. Conduct initial laboratory experiments on composable C2 modules.

(U)

(U)	MAJOR THRUST: Develop and demonstrate logistics technologies for improved deployment operations and improved system supportability. These technologies will improve the efficiency and effectiveness of Air Force deployments and mobility operations in support of Agile Combat Support initiatives and Air Expeditionary Force concepts. Note: In FY 2006, this effort moved from Project 4923.	0.000	0.000	4.289	2.019

(U) In FY 2004: Not Applicable.

(U) In FY 2005: Not Applicable.

(U) In FY 2006: Continue to develop and apply technology to automatically collect and update critical information required to effectively manage logistics resources in support of combat operations. Continue to design and develop very fast, easy-to-use dynamic planning/replanning capabilities for adaptive logistics. Continue work define coalition command and control information requirements to support cross-cultural planning and coordination.

(U) In FY 2007: Complete development and application of technology to automatically collect and update critical information required to effectively manage logistics resources in support of combat operations. Complete design and development of very fast, easy-to-use dynamic planning/replanning capabilities for adaptive logistics. Continue work to define coalition command and control information requirements to support cross-cultural planning and coordination. Begin work on defining requirements for emergency response logistics needs.

(U)

(U)	MAJOR THRUST: Develop collaborative interfaces for advanced C2 aircraft that will improve human/machine shared operational understanding of the battlespace. Develop human-centered specifications for a prototype workstation and optimize the physical layout of the workstations. Note: In FY 2006, this increase in funding is due to greater emphasis in collaborative interfaces.	0.000	0.000	0.217	2.273

(U) In FY 2004: Not Applicable.

(U) In FY 2005: Not Applicable.

(U) In FY 2006: Define the concept of a collaborative toolkit for battle management C2. Establish and document requirements for an advanced C2 workstation that integrates the battle management visualization and collaborative tools.

(U) In FY 2007: Begin to develop the temporal and spatial interface. Begin to develop a collaborative

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toolkit that provides a shared understanding of the C2 battlespace. Refine the requirements and begin to develop an air battle management workstation that eliminates physical obstructions to team communication, supports team reconfiguration, supports in-place crew rest, and integrates the tools developed both to help warfighters assimilate information and to execute the sensor-shooter cycle more efficiently and effectively.

(U)

(U)	MAJOR THRUST: Develop and demonstrate human protective system technologies for extended missions. Technologies will improve aircrew comfort, resulting in increased performance. Note: In FY 2006, this increase in funding is due to greater emphasis in human protective system technologies.	0.000	0.000	0.362	0.671
(U)	In FY 2004: Not Applicable.				
(U)	In FY 2005: Not Applicable.				
(U)	In FY 2006: Begin development of aircrew safety technologies to support long duration missions. Initiate development of optimized seat system technologies to improve safety, comfort and performance.				
(U)	In FY 2007: Continue research on optimizing seat system technologies to improve safety, comfort, and performance. Develop and evaluate candidate seat system optimization technologies that reduce aircrew fatigue and discomfort, while maintaining spinal alignment. Extend design concepts to ensure accommodation of the full aircrew population.				
(U)					
(U)	CONGRESSIONAL ADD: Virtual Warriors.	1.356	1.100	0.000	0.000
(U)	In FY 2004: Integrated human modeling and simulation technologies into distributed simulation exercises to reduce manning within air operations centers and to shorten time-critical targeting cycle times.				
(U)	In FY 2005: Integrate a virtual model of 3-D human and workspace into distributed simulation of an air operations center's time critical targeting (TCT) team, demonstrate the model's interactions with human TCT operators, and demonstrate the technical potential to revolutionize team design and team training.				
(U)	In FY 2006: Not Applicable.				
(U)	In FY 2007: Not Applicable.				
(U)	Total Cost	10.507	7.403	20.583	21.899

(U) C. Other Program Funding Summary ($ in Millions)

	FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total Cost
(U) Related Activities:										
(U) PE 0602202F, Human										

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(U) C. Other Program Funding Summary ($ in Millions)

(U) Effectiveness Applied Research.

(U) PE 0604706F, Life Support Systems.

(U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.

(U) D. Acquisition Strategy

Not Applicable.

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BUDGET ACTIVITY: 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE: 0603231F Crew Systems and Personnel Protection Technology	PROJECT NUMBER AND TITLE: 3257 Helmet-Mounted Sensory Technologies	

Cost ($ in Millions)		FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total
3257	Helmet-Mounted Sensory Technologies	6.485	4.746	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	TBD
	Quantity of RDT&E Articles	0	0	0	0	0	0	0	0		

Note: In FY 2006, Helmet-Mounted Sensory Technologies efforts will move from Project 3257 to Project 2830.

(U) A. Mission Description and Budget Item Justification

This project develops and demonstrates advanced technologies for ejection-safe, multifunctional helmet-mounted displays and night vision devices. Development of helmet-mounted tracker and display (HMT/D) technologies will enable pilots to detect, identify, target, and launch weapons faster and more accurately. Development of improved aircrew night vision goggle technologies will enhance aerial combat capabilities at night.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2004	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST: Develop and demonstrate advanced HMT/D and subsystem technologies to improve mission effectiveness and pilot situational awareness during day and night missions in all-weather conditions. These technologies help pilots to detect, identify, target, and engage with weapons faster and more accurately.	2.313	1.858	0.000	0.000
(U) In FY 2004: Demonstrated advanced symbology sets for tactical HMT/Ds in an operational environment to assess improvements to targeting, to increase situational awareness, and to reduce spatial disorientation. Demonstrated and assessed utility of advanced head tracker that improves tracker accuracy, reduces system latency, and reduces mobility footprint.				
(U) In FY 2005: Assess capability of integrated symbology sets and advanced head tracker to reduce target acquisition and engagement timelines at night. Demonstrate real-time target information on HMT/D to destroy time-critical ground targets. Demonstrate space-stabilized head-up displays on HMT/D in laboratory.				
(U) In FY 2006: Not Applicable.				
(U) In FY 2007: Not Applicable.				
(U)				
(U) MAJOR THRUST: Develop and demonstrate advanced visual display technologies to provide integrated day/night capability for optimizing display of information, reducing pilot workload, and enhancing mission performance.	2.431	2.888	0.000	0.000
(U) In FY 2004: Assessed capabilities of emerging night vision devices and investigated head-mounted, multi-channel displays. Developed technologies to reduce bulk and head-supported weight required by existing cathode ray tube-based designs to improve aircrew safety and comfort.				
(U) In FY 2005: Investigate the utility of miniature digital night vision devices and head-mounted displays				

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for providing imagery and video, both to aircrew and to Air Force combat controllers, including night vision goggles and computer displays. Assess leading edge display technologies to support fielding of laser eye protection and laser hardening technologies with advanced HMT/Ds and night vision goggles.

(U) In FY 2006: Not Applicable.

(U) In FY 2007: Not Applicable.

(U)

(U) MAJOR THRUST: Develop and demonstrate subsystems to protect the aircrew member wearing Helmet-Mounted Displays (HMDs) during emergency ejection in current and future high-performance fighter aircraft. Aerodynamic lift-reducing helmet concepts will provide a decrease in head and neck injuries for crewmembers wearing HMDs during high-speed emergency ejections. Note: This effort completed in FY 2004.	0.094	0.000	0.000	0.000

(U) In FY 2004: Identified candidate lift-reducing concepts and integrated helmet design with emerging HMD designs.

(U) In FY 2005: Not Applicable.

(U) In FY 2006: Not Applicable.

(U) In FY 2007: Not Applicable.

(U)

(U) CONGRESSIONAL ADD: Helmet Cueing System Technology.	1.647	0.000	0.000	0.000

(U) In FY 2004: Transitioned the advanced head tracker and related helmet cueing technologies from the laboratory environment to the operational environment. Developed and packaged the advanced head tracker including integration with an operational aircraft's sensors and weapons, in preparation for a flight demonstration of the new helmet cueing capability.

(U) In FY 2005: Not Applicable.

(U) In FY 2006: Not Applicable.

(U) In FY 2007: Not Applicable.

(U) Total Cost	6.485	4.746	0.000	0.000

(U) C. Other Program Funding Summary ($ in Millions)

	FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total Cost
(U) Related Activities: PE 0602202F, Human Effectiveness Applied Research.										

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BUDGET ACTIVITY 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603231F Crew Systems and Personnel Protection Technology	PROJECT NUMBER AND TITLE 3257 Helmet-Mounted Sensory Technologies

(U) C. Other Program Funding Summary ($ in Millions)

(U) PE 0602102F, Materials.
PE 0603112F, Advanced
(U) Materials for Weapon Systems.
(U) PE 0603319F, Airborne Laser Program.
(U) PE 0604706F, Life Support Systems.
PE 0604201F, Integrated
(U) Avionics Planning and Development.
This project has been coordinated through the
(U) Reliance process to harmonize efforts and eliminate duplication.

(U) D. Acquisition Strategy

Not Applicable.

Exhibit R-2a, RDT&E Project Justification			DATE: February 2005
BUDGET ACTIVITY: 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE: 0603231F Crew Systems and Personnel Protection Technology	PROJECT NUMBER AND TITLE: 4923 Logistics Readiness and Sustainment	

Cost ($ in Millions)		FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total
4923	Logistics Readiness and Sustainment	9.992	10.439	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	TBD
	Quantity of RDT&E Articles	0	0	0	0	0	0	0	0		

Note: In FY 2006, Logistics Readiness and Sustainment efforts will move from Project 4923 to Project 2830.

(U) A. Mission Description and Budget Item Justification

This project develops and demonstrates technologies that will enhance logistics support functions; improve the effectiveness of logistics information systems and command and control systems; enhance the fidelity and accuracy of large-scale military simulations; and improve the protection of personnel in deployed environments. This includes technologies to model and simulate intelligent behavior; to better integrate the human with computer-based information systems; to provide near real-time status of logistics resources and aircraft status; and to perform earlier prediction of the effects of exposure to hazardous chemicals. The resulting efforts will improve warfighter decision-making in the areas of logistics management, C2, and force protection.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2004	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST: Develop and demonstrate intelligent software agents and realistic human and organizational behavior models. These computer agents and models will add realism and fidelity to large-scale synthetic environments and war games, provide intelligence analysts a way to model collected data, and improve the user interaction with logistics information systems.	2.777	2.076	0.000	0.000
(U) In FY 2004: Demonstrated software architecture for behavior modeling that can be readily tuned to different personality types. The models that were developed simulate potential enemy C2 decision-making at the air component commander level of control.				
(U) In FY 2005: Develop human behavior based computer models that enable the study of information operations on C2 echelons and that better represent logistics functions in synthetic exercises.				
(U) In FY 2006: Not Applicable.				
(U) In FY 2007: Not Applicable.				
(U)				
(U) MAJOR THRUST: Develop and demonstrate logistics technologies for improved deployment operations and improved system supportability. These technologies will maximize the efficiency and effectiveness of Air Force deployments and mobility operations in support of Agile Combat Support initiatives and Air Expeditionary Force concepts.	2.817	3.048	0.000	0.000
(U) In FY 2004: Completed development of software tool set to provide wing commanders and senior logisticians with advanced logistics information and management capabilities, including rapid access to real-time resources status information, proactive problem identification, decision support, and process tracking. Began to assess and develop technology to automatically collect and update critical information				

Exhibit R-2a, RDT&E Project Justification			DATE February 2005
BUDGET ACTIVITY 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603231F Crew Systems and Personnel Protection Technology	PROJECT NUMBER AND TITLE 4923 Logistics Readiness and Sustainment	

	required to effectively manage logistics resources in support of combat operations.				
(U)	In FY 2005: Continue to develop and apply technology to automatically collect and update critical information required to effectively manage logistics resources in support of combat operations. Begin to design and develop very fast, easy-to-use dynamic planning/replanning capabilities for adaptive logistics. Begin defining coalition and control information requirements to support cross-cultural planning and coordination.				
(U)	In FY 2006: Not Applicable.				
(U)	In FY 2007: Not Applicable.				
(U)					
(U)	MAJOR THRUST: Develop and demonstrate advanced job performance aiding technologies to enhance the utility of global air mobility C2 systems. These technologies will provide C2 operators with automated access to a manageable amount of critical information from multiple sources to avoid operator overload and thus support faster, more accurate decision-making and problem resolution during mobility operations.	1.712	2.613	0.000	0.000
(U)	In FY 2004: Developed artificial intelligence software, work-centered collaborative planning tools, and advanced decision support technologies to augment global air mobility C2 systems.				
(U)	In FY 2005: Continue to develop artificial intelligence software that can automatically draw conclusions, develop work-centered collaborative planning tools, and develop advanced decision support technologies. Demonstrate these technologies in an operational environment within the Tanker Airlift Control Center.				
(U)	In FY 2006: Not Applicable.				
(U)	In FY 2007: Not Applicable.				
(U)					
(U)	MAJOR THRUST: Develop and demonstrate technologies that will enhance and streamline aircraft maintenance processes to improve the Air Force's ability to meet Air Expeditionary Force requirements by providing faster and more accurate methods of diagnosing and predicting component failures.	1.717	2.702	0.000	0.000
(U)	In FY 2004: Began to develop cognitive decision technologies, new information fusion techniques, and algorithms to determine failure trends for improved maintenance troubleshooting. Developed revolutionary formats for presenting technical information and software tools that support collaborative problem-solving during aircraft maintenance.				
(U)	In FY 2005: Continue to develop cognitive decision technologies, new information fusion techniques, and algorithms to determine failure trends for improved maintenance troubleshooting. Continue the development of revolutionary formats for presenting technical information and software tools that support collaborative problem solving during aircraft maintenance.				

Exhibit R-2a, RDT&E Project Justification		DATE: February 2005
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(U) In FY 2006: Not Applicable.
(U) In FY 2007: Not Applicable.
(U)
(U) CONGRESSIONAL ADD: The Logistics Institute. 0.969 0.000 0.000 0.000
(U) In FY 2004: Developed and demonstrated technologies that will enhance Air Force maintenance and supply processes and improve the design, deployability, performance, and logistics support of current and future weapon systems.
(U) In FY 2005: Not Applicable.
(U) In FY 2006: Not Applicable.
(U) In FY 2007: Not Applicable.
(U) Total Cost 9.992 10.439 0.000 0.000

(U) C. Other Program Funding Summary ($ in Millions)

	FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total Cost
(U) Related Activities:										
(U) PE 0602201F, Aerospace Flight Dynamics.										
(U) PE 0602202F, Human Effectiveness Applied Research.										
(U) PE 0603721N, Environmental Protection.										
(U) PE 0604708F, Civil, Fire, Environmental, Shelter.										
(U) PE 0604740F, Integrated Command and Control Applications.										
(U) PE 0605801A, Programwide Activities.										
(U) PE 0708011F, Industrial Preparedness.										
(U) This project has been coordinated through the										

Exhibit R-2a, RDT&E Project Justification		DATE February 2005
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(U) C. Other Program Funding Summary ($ in Millions)

Reliance process to harmonize efforts and eliminate duplication.

(U) D. Acquisition Strategy

Not Applicable.

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BUDGET ACTIVITY: 03 Advanced Technology Development (ATD)

PE NUMBER AND TITLE: 0603231F Crew Systems and Personnel Protection Technology

PROJECT NUMBER AND TITLE: 4924 Warfighter Readiness Technology

Cost ($ in Millions)		FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total
4924	Warfighter Readiness Technology	6.764	7.156	6.473	6.930	6.604	7.114	7.265	7.401	Continuing	TBD
	Quantity of RDT&E Articles	0	0	0	0	0	0	0	0		

(U) A. Mission Description and Budget Item Justification

This project develops and demonstrates advanced training, simulation, and mission rehearsal technologies that will improve warfighter capabilities and mission readiness by enhancing operator and team performance skills. This effort includes the development of technologies that enable integration of computer models, live weapon systems, and weapon system simulators to portray the global battlespace, including all-weather, day/night flight operations, C2, force protection, and aerospace operations. This project develops and demonstrates advanced training and simulation technologies that will improve warfighter readiness by enhancing mission training and mission rehearsal capabilities. Development and effective use of the global battlespace requires advances in training systems and in interconnection, information, visual, and representation technologies. The resulting mission training and rehearsal capabilities will enhance the mission essential competencies of combat and combat support individuals and teams that comprise the aerospace force.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2004	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST: Advance aerospace and organizational behavior models for integrated warfighter training and rehearsal. These computer agents and models will add realism operations, C2, force protection, and air base defense warfighters. Technologies will increase training effectiveness and efficiency, and decrease time to mission qualification.	1.755	0.999	2.251	2.984

(U) In FY 2004: Developed mission essential competency analysis toolset for air superiority that identifies those critical knowledge, skills, and experiences that are important enablers of mission performance for individuals and teams. Developed specifications for virtual and live training performance assessment and measurement to enable deployed personnel to maintain mission essential skills, and developed training and simulation technologies that enabled integrated C2 training within the Distributed Mission Training environment. Demonstrated competency-based design of a simulator performance measurement and tracking system, and developed a stand-alone performance monitoring and tracking capability for live-fly instrumented range data.

(U) In FY 2005: Develop and validate capability to conduct integrated C2 and combat employment training and rehearsal. Develop specifications for a deployable Distributed Mission Operations (DMO) training and rehearsal technology suite for full combat tactical weapons employment mission planning, training, and rehearsal. Complete collaborative toolset for mission analysis and tracking. Demonstrate an integrated live-fly and virtual simulation performance measurement capability and evaluate its operational utility. Complete first DMO skills development, assessment, and decay study for combat air forces.

(U) In FY 2006: Demonstrate the Performance Evaluation and Tracking System. Integrate the current

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	Battlefield Air Operations toolkit training devices into an immersive, DMO compatible training system, capable of mission training and rehearsal. Develop a preliminary mission planning toolset for a deployable, modest fidelity environment that permits training designers to develop tactical scenarios and to employ constructive forces, live players, or other virtual players.				
(U)	In FY 2007: Develop specifications of interfaces between DMO Mission Training Centers and Live Training Ranges. Develop a proof of concept Joint Close Air Support schoolhouse simulation environment. Develop preliminary exercise planning and analysis shells to enable a robust scenario authoring capability that reduces training development time. Develop performance measurement and monitoring tools for a deployable training environment. Perform a small-footprint training demonstration in a persistent wargaming environment.				
(U)					
(U)	MAJOR THRUST: Develop and demonstrate the application of information and communications technologies for realistic mission training and mission rehearsal in a distributed simulation environment. These technologies will increase readiness training by enabling more realistic employment of weapon systems within a horizontally and vertically integrated system of sensors, C2, and weapons platforms. Note: Technology transitioned to the Distributed Mission Operations Center in FY 2004.	1.345	0.000	0.000	0.000
(U)	In FY 2004: Demonstrated a near-real-time high-level architecture (HLA) based training environment enabling aircrew and C2 training for geographically separated training audiences. Validated performance of an HLA network guard federation operating at multiple security levels and produced documentation to support certification and accreditation.				
(U)	In FY 2005: Not Applicable.				
(U)	In FY 2006: Not Applicable.				
(U)	In FY 2007: Not Applicable.				
(U)					
(U)	MAJOR THRUST: Demonstrate advances in simulator visual system technologies through the development of ultrahigh resolution projection systems and associated low-cost high-fidelity image generator, and thin-film holographic collimating display technologies. Technologies will create high-definition immersive virtual environment for aircrew readiness training and mission rehearsal, allowing improved air-to-air/ground mission rehearsal capability for the warfighter. Note: This effort completes in FY 2005.	1.865	3.280	0.000	0.000
(U)	In FY 2004: Developed and fabricated Ultra Grating Light Valve (UGLV) spatial light modulator technology capable of presenting 5120 x 4096 ultrahigh resolution projected images. Began development of a 5120 x 4096 pixel low-cost PC-based image generator.				
(U)	In FY 2005: Design and fabricate the frame and display structure and visual system controller for the				

Exhibit R-2a, RDT&E Project Justification		DATE February 2005
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	next generation, full field-of-view 20/20 visual display system. Integrate proof-of-concept ultrahigh-resolution laser projectors with open-standard external interfaces, capable of displaying over ten times the resolution currently displayed by commercial High-Definition Television projectors. Design and develop high-performance, low-cost image generator based on commodity graphics along with a high-resolution terrain database to provide visual and sensor imagery at 60 Hz. Integrate advanced visual technologies to create the 20/20 Immersive Visual Display.				
(U)	In FY 2006: Not Applicable.				
(U)	In FY 2007: Not Applicable.				
(U)					
(U)	MAJOR THRUST: Develop a low-cost, helmet-mounted, deployable simulation system with sufficient image resolution and performance capable of supporting the imaging of high-resolution fast-moving targets, high-density terrain, texture, and surround imagery, and helmet-mounted sights. This technology will provide the warfigher realistic air-to-air and air-to-ground visual simulation environments to support aircrew training during expeditionary deployments and at Mission Training Centers. Note: In FY 2006, this increase is due to greater emphasis in visual simulation environments.	0.000	0.000	0.889	0.995
(U)	In FY 2004: Not Applicable.				
(U)	In FY 2005: Not Applicable.				
(U)	In FY 2006: Design and develop off-boresight targeting simulation for DMO multifaceted simulator displays. Define display design requirements for head-mounted and deployable training devices, define next generation design configurations, and evaluate alternative display concepts.				
(U)	In FY 2007: Begin development of head-mounted and deployable display proof-of-concept training devices. Conduct engineering and human factors analyses of the proof-of-concept display training devices.				
(U)					
(U)	MAJOR THRUST: Develop and demonstrate training technologies and techniques to optimize night vision device-aided night operations. These technologies could reduce the cost of Night Vision Goggle (NVG) qualification and increase combat capability.	0.881	1.400	1.731	0.697
(U)	In FY 2004: Developed guidelines for NVG training during pilot training. Transitioned and implemented high-fidelity NVG simulation into Distributed Mission Training and Formal Training Unit facilities. Identified candidate performance metrics for NVG scan, crosscheck, and spatial orientation. Developed two-ship simulator scenarios for NVG initial and continuation training. Developed an annual NVG refresher course suitable for use in deployed status.				
(U)	In FY 2005: Develop the functional specification for a desktop NVG visualization trainer suitable for initial NVG familiarization training, mission planning/preview, and mishap investigation. Develop eye				

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position monitor for use with simulated NVG to determine spatial orientation awareness. Develop and evaluate simulator based spatial orientation scenarios for NVG use. Determine the training value of high-fidelity NVG visual simulation on mission qualification time.

(U) In FY 2006: Develop desk-top NVG visualization trainer for mission preview and mishap investigation applications. Develop NVG mission brief/debrief technologies. Develop NVG spatial orientation training protocols. Develop and evaluate performance metrics for NVG instrument scan, cross-check, and spatial orientation. Develop formats for reusable and interoperable material properties-coded datasets suitable for NVG and other sensor simulation. Develop and evaluate physics-based simulation approach in a variety of visual displays. Develop virtual terrain board instructional module for introductory NVG academic training.

(U) In FY 2007: Develop NVG simulator scenarios and related performance metrics for advanced NVG employment training. Develop geo-specific databases and database modification tools for desk-top NVG visualization training. Test simulated panoramic NVG in DMO test bed. Develop untethered NVG simulation for NVG video and head position by application of broadband wireless technology. Demonstrate head position driven simulated NVG imagery viewable by multiple viewers in an open space.

(U)

(U) MAJOR THRUST: Develop and demonstrate a high-fidelity DMO training and rehearsal capability for operators in an air operations center (AOC). Link AOC operational mission requirements and principles of instruction to enable effective and efficient training at both the AOC Formal Training Unit and the operational units.	0.918	1.477	1.602	2.254

(U) In FY 2004: Developed specifications, strategies, and methods for individual-, team-, and division-level training and rehearsal within an AOC. Developed preliminary guidelines and metrics for assessing mission readiness levels for AOC members. Explored individual-level simulation-based training capabilities.

(U) In FY 2005: Develop preliminary competency-based requirements for use at the operational units and evaluate alternative content development and delivery methods. Develop tools and authoring shells for courseware development. Explore alternative local and DMO training and rehearsal technologies in operational exercises and experiments.

(U) In FY 2006: Develop performance indicators to enable performance measurement capability for team- and individual-level AOC operators. Develop initial functional specifications for computer-assisted training scenario for AOC operators. Evaluate and enhance training syllabi and methods for team- and individual-level AOC operators. Develop AOC training and rehearsal capabilities within the larger DMO training and rehearsal environment.

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(U) In FY 2007: Evaluate multi-level AOC trainers for specific AOC training needs. Utilize performance indicators for progression toward performance measurement capability. Continue incorporation of performance measurement into the AOC Command, Control, Communications, Computers Intelligence, Surveillance and Reconnaissance (C4ISR) Training and Rehearsal Testbed. Continue development of functional specifications for computer-assisted training scenario operators. Continue evaluation of AOC mission and continuation training syllabi and scenarios. Develop training aids for specific training AOC needs.

(U) Total Cost	6.764	7.156	6.473	6.930

(U) C. Other Program Funding Summary ($ in Millions)

	FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total Cost
(U) Related Activities: PE 0602202F, Human Effectiveness Applied Research.										
(U) PE 0604227F, Distributed Mission Training. This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.										

(U) D. Acquisition Strategy

Not Applicable.

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BUDGET ACTIVITY: 03 Advanced Technology Development (ATD)

PE NUMBER AND TITLE: 0603231F Crew Systems and Personnel Protection Technology

PROJECT NUMBER AND TITLE: 5020 Bioeffects & Protection Technology

Cost ($ in Millions)		FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total
5020	Bioeffects & Protection Technology	7.125	3.851	2.719	2.897	2.986	3.277	3.331	3.380	Continuing	TBD
	Quantity of RDT&E Articles	0	0	0	0	0	0	0	0		

(U) A. Mission Description and Budget Item Justification

This project integrates and demonstrates technologies to provide protection against directed energy threats and hazards, without compromising performance, vigilance, or mission effectiveness, and counterproliferation technologies for the detection and neutralization of threat agents. Development and demonstration efforts focus on advanced technologies for laser eye protection (LEP), preventing injurious exposures of personnel involved with test and evaluation of high power microwave or high-energy laser weapons, and enabling operational employment of these systems. It also develops tools and guidelines for testing and deploying high power microwave and high-energy laser systems and technologies to enhance personnel safety and effectiveness in aerospace operations. Fatigue prediction and management capabilities are developed and demonstrated to enable risk management of the effects of sleep loss, circadian disruption, and shiftwork on cognitive readiness in surge, night, global, information warfare, C2, and other operations.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2004	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST: Develop and demonstrate multiwavelength LEP technologies for aircrew and ground personnel to provide protection against any laser hazard or threat in a single device.	1.720	1.935	0.819	0.859

(U) In FY 2004: Began evaluation and integration of optical limiters, tunable liquid crystals, photochromic and electrochromic materials, reflective technologies, and advanced dyes toward demonstration of agile LEP. Continued development, integration, and evaluation of LEP spectacles with laser-hardened NVGs. Continued supporting development and evaluation of a Laser Detector and Warning system toward integration into aircraft cockpits and agile LEP. Completed evaluation of human performance of second mini-band clip-on device to provide selected, multi-wavelength LEP.

(U) In FY 2005: Initiate development of direct-view LEP technologies for improved detection of targets. Continue development of next generation LEP goggles for Air Force Special Operations Command (AFSOC) air and ground forces for use in night operations with visible laser designators and illuminators. Complete development of LEP mini-band lenses for use with the Improved Aircrew Spectacle. Complete support for development and evaluation of a Laser Detector and Warning system for integration into aircraft cockpits and agile LEP. Complete demonstration and aircrew evaluations of peripheral LEP protection for wear with laser-hardened NVGs.

(U) In FY 2006: Begin developing an integrated LEP and hypervision (visual acuity better than 20/20) demonstration system to provide full-spectrum laser protection while restoring vision degraded by the LEP to better than normal. Begin development of wrap-around laser eye protection (LEP) spectacle technology with prescription capabilities.

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(U)	In FY 2007: Continue development of integrated eye protection technologies with hypervision technologies. Demonstrate and deliver second-generation LEP goggles for AFSOC air and ground forces.				
(U)					
(U)	MAJOR THRUST: Develop and demonstrate technologies that permit safe testing, deployment, and use of high energy laser weapons and systems.	0.950	1.429	0.399	0.544
(U)	In FY 2004: Released version 2.0 of Laser Range Safety Tool (LRST) and completed integration with laser test range personnel to permit rapid analysis of high energy laser test operations. Integrated laser bioeffects data to refine laser safety parameters for computer code supporting LRST. Refined software damage models for high energy laser weapons based on bioeffects studies and field test measurements.				
(U)	In FY 2005: Begin development effort for real-time LRST permitting commanders and range personnel immediate response on laser safety predictions arising from use of airborne lasers. Demonstrate Probabilistic Risk Assessment as an approach to high energy laser range safety. Present initial recommendations for revisions to national consensus standards for near infrared wavelengths.				
(U)	In FY 2006: Integrate existing models of airborne laser wavelength-specific dose-response curves to the initial Probabilistic Risk Assessment software library.				
(U)	In FY 2007: Combine modeling and experimental measurement of additional multiple-wavelength exposures to airborne laser wavelength and other near-infrared laser beams to define the relative damage thresholds of the combined exposures when compared to their single-wavelength counterparts.				
(U)					
(U)	MAJOR THRUST: Develop and demonstrate technologies to support testing of counterforce technologies and to enable neutralization of threat agents during military operations. These technologies will enhance agent defeat capabilities while minimizing collateral damage. Note: Technology from PE 0602202F will transition to this major thrust in FY 2005.	0.000	0.487	0.499	0.509
(U)	In FY 2004: Not Applicable.				
(U)	In FY 2005: Define performance parameters and develop technologies for threat neutralization, focusing on special operations needs. Conduct testing of breadboard man-portable neutralization technologies for counterproliferation.				
(U)	In FY 2006: Enhance neutralization technologies to optimize performance for specific operational conditions. Conduct laboratory tests to assess performance under simulated operational conditions.				
(U)	In FY 2007: Continue enhancement/assessment of agent neutralization devices and integrate with threat detection technologies. Demonstrate most promising man-portable threat neutralization technologies in simulated environments. Begin development of technologies to identify sources of biological warfare agents and ability to track, capture or destroy agents.				

Exhibit R-2a, RDT&E Project Justification			DATE February 2005
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(U)					
(U)	MAJOR THRUST: Develop a fatigue management capability to alleviate the negative effects of fatigue on human performance in aerospace operations. Results will extend and enhance human performance and survivability in sustained and continuous (24/7) mission environments for all aviation, C2, special operations, maintenance, and space operators. Note: In FY 2006, this increase is due to greater emphasis in fatigue management technologies.	0.000	0.000	1.002	0.985
(U)	In FY 2004: Not Applicable.				
(U)	In FY 2005: Not Applicable.				
(U)	In FY 2006: Integrate modeling of specific fatigue effects and interventions into model-based fatigue management capability. Improve and demonstrate operational usability of fatigue management capability. Expand fatigue model capability to predict operational task performance and address shiftwork applications.				
(U)	In FY 2007: Integrate fatigue model for selected military tasks into force simulations and wargaming exercises, thereby eliminating erroneous simulation outcomes based on current human performance models. Demonstrate operational counter-fatigue strategies and associated delivery mechanisms to improve human performance in specific operational military environments.				
(U)					
(U)	CONGRESSIONAL ADD: Laser Eye Protection (LEP) Research.	1.356	0.000	0.000	0.000
(U)	In FY 2004: Began design and development of a laser protective visor compatible with NVGs. Continued demonstration and evaluation of LEP for air-based platforms. Transitioned technology for vision corrective prescription LEP, and for wide-band, near-infrared, and two visible laser line protection. Demonstrated and delivered LEP in each of three formats to Air Force Special Operations Command for Special Tactics Teams. Demonstrated LEP spectacles for airborne laser and advanced tactical laser wavelengths ahead of baseline schedule. Transitioned technology for vision corrective prescription LEP, and for wide-band, near-infrared, and two visible laser line protection.				
(U)	In FY 2005: Not Applicable.				
(U)	In FY 2006: Not Applicable.				
(U)	In FY 2007: Not Applicable.				
(U)					
(U)	CONGRESSIONAL ADD: Total Atmospheric Liquefaction for Oxygen and Nitrogen (TALON).	1.356	0.000	0.000	0.000
(U)	In FY 2004: Continued development of component technologies for the palletized TALON technology demonstrator. Technology increased the availability of high-purity nitrogen gas for fuel tank inserting; provided high-purity oxygen for aircrew, paratrooper, and patient life support; and reduced aircraft dependency on the costly and extensive deployment footprint of liquid oxygen. Fabricated full-scale				

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oxygen and nitrogen distillation columns and integrated columns with cryocooling technologies. Refined aircraft integration plans for flight-testing the palletized technology demonstrator on-board a heavy aircraft.

(U) In FY 2005: Not Applicable.
(U) In FY 2006: Not Applicable.
(U) In FY 2007: Not Applicable.
(U)

(U)	CONGRESSIONAL ADD: Crew Systems Personnel Protection.	1.743	0.000	0.000	0.000
(U)	In FY 2004: Developed and demonstrated technologies and tailored guidelines to improve warfighter performance for Special Operations Forces.				
(U)	In FY 2005: Not Applicable.				
(U)	In FY 2006: Not Applicable.				
(U)	In FY 2007: Not Applicable.				
(U)	Total Cost	7.125	3.851	2.719	2.897

(U) C. Other Program Funding Summary ($ in Millions)

	FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total Cost
(U) PE 0602102F, Materials.										
(U) PE 0602202F, Human Effectiveness Applied Research.										
(U) PE 0603112F, Advanced Materials for Weapon Systems.										
(U) PE 0603319F, Airborne Laser Program.										
(U) PE 0604706F, Life Support Systems.										

(U) D. Acquisition Strategy

Not Applicable.