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

Exhibit R-2, RDT&E Budget Item Justification

DATE: February 2006

BUDGET ACTIVITY: 03 Advanced Technology Development (ATD)

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

	Cost ($ in Millions)	FY 2005 Actual	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	29.375	34.968	32.156	32.685	35.835	36.488	36.822	Continuing	TBD
2830	Decision Effectiveness Technology	6.290	24.921	22.200	22.963	25.282	25.727	25.868	Continuing	TBD
3257	Helmet-Mounted Sensory Technologies	4.443	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	TBD
4923	Logistics Readiness and Sustainment	8.476	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	TBD
4924	Warfighter Readiness Technology	6.611	6.381	7.009	6.703	7.225	7.376	7.516	Continuing	TBD
5020	Bioeffects & Protection Technology	3.555	3.666	2.947	3.019	3.328	3.385	3.438	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. Funds for the FY 2006 Congressionally-directed Next Generation Helmet Tracking and Display Technology in the amount of $1.0 million and Air Operations Center Secured Data Access in the amount of $1.7 million are in the process of being moved to PE 0603231F, Crew Systems and Personnel Protection Technology, from PE 0603211F, Aerospace Technology Dev/Demo, and PE 0603789F, C3I Advanced Development, respectively, for execution.

(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 2006, Congress added $1.0 million for Full Spectrum Laser Eye Protection, $1.7 million for Virtual Medical Trainer, $1.0 million for Variable Transmittance Visor, $0.5 million for Deployment Environment and Biological Surveillance, $1.5 million for Air Force Advanced Micro-Compression Sock (AFAMS). 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.

Exhibit R-2, RDT&E Budget Item Justification	DATE February 2006
BUDGET ACTIVITY 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603231F Crew Systems and Personnel Protection Technology

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

		FY 2005	FY 2006	FY 2007
(U)	Previous President's Budget	33.595	29.775	31.726
(U)	Current PBR/President's Budget	29.375	34.968	32.156
(U)	Total Adjustments	-4.220	5.193	
(U)	Congressional Program Reductions		-0.002	
	Congressional Rescissions	-0.026	-0.505	
	Congressional Increases		5.700	
	Reprogrammings	-3.410		
	SBIR/STTR Transfer	-0.784		

(U) Significant Program Changes:

Not Applicable.

C. Performance Metrics

Under Development.

Exhibit R-2a, RDT&E Project Justification			DATE: February 2006
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 2005 Actual	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	6.290	24.921	22.200	22.963	25.282	25.727	25.868	Continuing	TBD
	Quantity of RDT&E Articles	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. Funds for the FY 2006 Congressionally-directed Next Generation Helmet Tracking and Display Technology in the amount of $1.0 million are in the process of being moved to PE 0603231F, Crew Systems and Personnel Protection Technology, from PE 0603211F, Aerospace Technology Dev/Demo, for execution.

(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 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.	1.230	0.000	0.000
(U) In FY 2005: Integrated a decision-making modeling, simulation, and analysis tool into final version of previously demonstrated combat assessment tool and transitioned into joint and/or Air Force weapon systems. Developed collaborative information sharing for operation centers' information management tool. Completed and integrated 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 human-centered tools for the Air Force Information Operations (IO) and Intelligence, Surveillance and Reconnaissance (ISR) communities. Provide the IO/ISR warrior with tailored decision support systems, guidelines for effective selection of IO/ISR warriors, IO/ISR simulators and training systems, enhanced decision-making tools, and automated tools to reduce operator task load and improve data exploitation.	1.699	2.984	2.895
(U) In FY 2005: Developed and demonstrated tools, methods, and technology to gain, exploit, defend, and attack			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
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

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
	information. Identified and prioritized IO capabilities for enhancement by exemplar technologies and methods. Developed, demonstrated, and evaluated IO 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 IO capabilities for enhancement by exemplar technologies and methods. Begin research to develop tools and techniques to improve operator performance for ISR planning and analysis.			
(U)	In FY 2007: Continue development of maturing IO/ISR tools, methods, and technology to gain, exploit, defend, and attack information. Continue maturation and development of IO capabilities enhancement technology. Develop and demonstrate tools and techniques to improve operator performance for ISR planning and analysis. Begin to develop ISR optimal displays and enhanced exploitation for ISR operators. Begin to develop advanced training methodologies and tools for ISR operators.			
(U)				
(U)	MAJOR THRUST: Develop and demonstrate human effectiveness technologies to improve combat effectiveness reporting, situation assessment updates, and decision support for Combined Air and Space Operations Centers (CAOC).	1.096	2.569	2.805
(U)	In FY 2005: Developed user-tailorable visualization tools to optimize human perception of battlespace situational awareness. Demonstrated 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.	1.200	2.759	2.900
(U)	In FY 2005: Demonstrated operator-augmented vision interfaces for ground controller-specific Unmanned Aerial Vehicle (UAV) platforms. Developed intelligent UAV search patterns for improved target location. Demonstrated user independent speech recognition in high-noise environments.			
(U)	In FY 2006: Continue to develop intelligent UAV search patterns for improved target location. Begin to develop			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
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

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
	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 Terminal Attack Control (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	0.500	1.000
(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	2.150	2.412
(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 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			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
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

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
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 to enhance force protection and enable air operations commanders to maintain operations tempo. Note: In FY 2006, this increase in funding is due to greater emphasis in counterproliferation technologies.	0.000	0.478	1.188
(U) In FY 2005: Not Applicable.			
(U) In FY 2006: Define parameters of biological warfare agent identification. 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 locate biological warfare agents. Begin development of DNA-based identification technologies that will lead to affordable and reliable techniques to locate, identify, and track 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	4.050	3.999
(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 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)			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
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**

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(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	4.226	2.048
(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	0.214	2.273
(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 and the logic for automated target prioritization. Begin to develop a collaborative toolkit that provides a shared understanding of the C2 battlespace. Refine the criteria 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	0.000	0.357	0.680

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
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

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
	funding is due to greater emphasis in human protective system technologies.			
(U)	In FY 2005: Not Applicable.			
(U)	In FY 2006: Develop 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.	1.065	0.000	0.000
(U)	In FY 2005: Integrated a virtual model of 3-D human and workspace into distributed simulation of an air operations center's time-critical targeting (TCT) team, demonstrated the model's interactions with human TCT operators, and demonstrated the technical potential to revolutionize team design and team training.			
(U)	In FY 2006: Not Applicable.			
(U)	In FY 2007: Not Applicable.			
(U)				
(U)	CONGRESSIONAL ADD: Air Force Advanced Micro-Compression Sock (AFAMS).	0.000	1.479	0.000
(U)	In FY 2005: Not Applicable.			
(U)	In FY 2006: Conduct Congressionally-directed effort for AFAMS.			
(U)	In FY 2007: Not Applicable.			
(U)				
(U)	CONGRESSIONAL ADD: Deployment Environment and Biological Surveillance.	0.000	0.493	0.000
(U)	In FY 2005: Not Applicable.			
(U)	In FY 2006: Conduct Congressionally-directed effort for Deployment Environment and Biological Surveillance.			
(U)	In FY 2007: Not Applicable.			
(U)				
(U)	CONGRESSIONAL ADD: Variable Transmittance Visor.	0.000	0.986	0.000
(U)	In FY 2005: Not Applicable.			
(U)	In FY 2006: Conduct Congressionally-directed effort for Variable Transmittance Visor.			
(U)	In FY 2007: Not Applicable.			
(U)				
(U)	CONGRESSIONAL ADD: Virtual Medical Trainer.	0.000	1.676	0.000

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
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

(U) B. Accomplishments/Planned Program ($ in Millions)

	FY 2005	FY 2006	FY 2007
(U) In FY 2005: Not Applicable.			
(U) In FY 2006: Conduct Congressionally-directed effort for Virtual Medical Trainer.			
(U) In FY 2007: Not Applicable.			
(U) Total Cost	6.290	24.921	22.200

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

	FY 2005 Actual	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 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.

Exhibit R-2a, RDT&E Project Justification

DATE: February 2006

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

Cost ($ in Millions)		FY 2005 Actual	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	4.443	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		

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 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.	1.778	0.000	0.000
(U) In FY 2005: Assessed capability of integrated symbology sets and advanced head tracker to reduce target acquisition and engagement timelines at night. Demonstrated real-time target information on HMT/D to destroy time-critical ground targets. Demonstrated 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.	2.665	0.000	0.000
(U) In FY 2005: Investigated the utility of miniature digital night vision devices and head-mounted displays for providing imagery and video, both to aircrew and to Air Force combat controllers, including night vision goggles and computer displays. Assessed 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) Total Cost	4.443	0.000	0.000

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
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)

	FY 2005 Actual	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 Effectiveness Applied Research.

(U) PE 0602102F, Materials.

(U) PE 0603112F, Advanced Materials for Weapon Systems.

(U) PE 0603319F, Airborne Laser Program.

(U) PE 0604706F, Life Support Systems.

(U) PE 0604201F, Integrated Avionics Planning and Development.

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

(U) D. Acquisition Strategy

Not Applicable.

Exhibit R-2a, RDT&E Project Justification

DATE: **February 2006**

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 2005 Actual	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	8.476	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		

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 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.	1.194	0.000	0.000
(U) In FY 2005: Developed 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.	2.475	0.000	0.000
(U) In FY 2005: Developed and applied technology to automatically collect and update critical information required to effectively manage logistics resources in support of combat operations. Designed and developed very fast, easy-to-use dynamic planning/replanning capabilities for adaptive logistics. Defined 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)			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
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

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(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.	2.613	0.000	0.000
(U)	In FY 2005: Developed artificial intelligence software that can automatically draw conclusions, developed work-centered collaborative planning tools, and developed advanced decision support technologies. Demonstrated 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.	2.194	0.000	0.000
(U)	In FY 2005: Developed 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 2006: Not Applicable.			
(U)	In FY 2007: Not Applicable.			
(U)	Total Cost	8.476	0.000	0.000

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

	FY 2005 Actual	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.									

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
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**

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

(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 Reliance process to harmonize efforts and eliminate duplication.

(U) D. Acquisition Strategy

Not Applicable.

Exhibit R-2a, RDT&E Project Justification		DATE: February 2006
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 2005 Actual	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	6.611	6.381	7.009	6.703	7.225	7.376	7.516	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0		

Note: Funds for the FY 2006 Congressionally-directed Air Operations Center Secured Data Access in the amount of $1.7 million are in the process of being moved to PE 0603231F, Crew Systems and Personnel Protection Technology, from PE 0603789F, C3I Advanced Development, for execution.

(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 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.	0.923	2.219	2.984

(U) In FY 2005: Developed and validated capability to conduct integrated C2 and combat employment training and rehearsal. Developed specifications for a deployable Distributed Mission Operations (DMO) training and rehearsal technology suite for full combat tactical weapons employment mission planning, training, and rehearsal. Completed collaborative toolset for mission analysis and tracking. Demonstrated an integrated live-fly and virtual simulation performance measurement capability and evaluate its operational utility. Completed 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 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

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
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

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
	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. Initiate development of specifications for managing learning in distributed training contexts.			
(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.	3.030	0.000	0.000
(U)	In FY 2005: Designed and fabricated the frame and display structure and visual system controller for the next generation, full field-of-view 20/20 visual display system. Integrated 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. Designed and developed 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. Integrated 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	0.876	1.074
(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.			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
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

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(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.	1.293	1.706	0.697
(U)	In FY 2005: Developed the functional specification for a desktop NVG visualization trainer suitable for initial NVG familiarization training, mission planning/preview, and mishap investigation. Developed eye position monitor for use with simulated NVG to determine spatial orientation awareness. Developed and evaluated simulator based spatial orientation scenarios for NVG use. Determined 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 and space operations center (AOC). Link AOC operational mission requirements and performance metrics to develop team learning environments for AOC units.	1.365	1.580	2.254
(U)	In FY 2005: Developed preliminary competency-based requirements for use at the operational units and evaluated alternative content development and delivery methods. Developed tools and authoring shells for courseware development. Explored 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.			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
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

(U) B. Accomplishments/Planned Program ($ in Millions)

		FY 2005	FY 2006	FY 2007
(U)	In FY 2007: Develop a proof-of-concept multi-team competency-based training package with performance assessment system capability for the AOC. Develop initial competency-based scenario selection guidelines and conduct a proof-of-concept test of competency-based scenario training capability for operational planners.			
(U)	Total Cost	6.611	6.381	7.009

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

	FY 2005 Actual	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 Effectiveness Applied Research.

(U) PE 0604227F, Distributed Mission Training.

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

(U) D. Acquisition Strategy

Not Applicable.

Exhibit R-2a, RDT&E Project Justification			DATE: February 2006
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 2005 Actual	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	3.555	3.666	2.947	3.019	3.328	3.385	3.438	Continuing	TBD
Quantity of RDT&E Articles	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 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.	1.786	0.808	0.859
(U) In FY 2005: Initiated development of direct-view LEP technologies for improved detection of targets. Continued 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. Completed development of LEP mini-band lenses for use with the Improved Aircrew Spectacle. Completed support for development and evaluation of a Laser Detector and Warning system for integration into aircraft cockpits and agile LEP. Completed 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 LEP spectacle technology with prescription capabilities.			
(U) In FY 2007: Continue development of integrated eye protection 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.	1.319	0.393	0.568
(U) In FY 2005: Developed real-time laser range safety tool permitting commanders and range personnel immediate response on laser safety predictions arising from use of airborne lasers. Demonstrated Probabilistic Risk Assessment as an approach to high energy laser range safety. Presented initial recommendations for revisions to national			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
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**

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
	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 of threat agents during military operations.	0.450	0.492	0.869
(U)	In FY 2005: Defined performance parameters and developed technologies for threat neutralization, focusing on special operations needs. Conducted 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.			
(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 biologically-based performance enhancement technologies.	0.000	0.987	0.651
(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 biobehavorial performance model for selected military tasks into force simulations and wargaming exercises, thereby eliminating erroneous simulation outcomes based on current human performance models. Demonstrate operational strategies and associated delivery mechanisms to improve human performance in specific operational military environments.			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
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

(U) B. Accomplishments/Planned Program ($ in Millions)

	FY 2005	FY 2006	FY 2007
(U)			
(U) CONGRESSIONAL ADD: Full Spectrum Laser Eye Protection.	0.000	0.986	0.000
(U) In FY 2005: Not Applicable.			
(U) In FY 2006: Initiate Congressionally-directed effort for Full Spectrum Laser Eye Protection.			
(U) In FY 2007: Not Applicable.			
(U) Total Cost	3.555	3.666	2.947

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

	FY 2005 Actual	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.