Exhibit R-2, PB 2010 Air Force RDT&E Budget Item Justification									DATE: May 2009	
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)					R-1 ITEM NOMENCLATURE PE 0603231F Crew Systems and Personnel Protection Technology					
COST ($ in Millions)	**FY 2008 Actual**	**FY 2009 Estimate**	**FY 2010 Estimate**	**FY 2011 Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
Total Program Element	36.084	36.411	0.000						Continuing	Continuing
632830: Decision Effectiveness Technology	28.020	25.705	0.000						Continuing	Continuing
634924: Warfighter Readiness Technology	6.091	8.427	0.000						Continuing	Continuing
635020: Bioeffects & Protection Technology	1.973	2.279	0.000						Continuing	Continuing

Note

Note: FY 2008 funding total includes $0.276 million in supplemental funding.

In FY 2010, Decision Effectiveness Technology efforts will move from PE 0603231F, Project 2830 to PE 0603456F, Project 5324, Project 5326, and Project 5327; Warfighter Readiness Technology efforts will move from PE 0603231F, Project 4924 to PE 0603456F, Project 5325; and Bioeffects & Protection Technology efforts will move from PE 0603231F, Project 5020 to PE 0603456F, Project 5323 and Project 5326 to better align efforts. Funds for the FY 2008 Congressionally-directed Virtual Medical Trainer in the amount of $2.4 million are in the process of being moved to the Defense Health Program from PE 0603231F, Crew Systems and Personnel Protection Technology, for execution.

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 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, enhance capabilities for sustained operations in extreme environments, and deliver novel, tailored bio-taggant and identification/neutralization capabilities to meet specific AF special operations needs. 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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B. Program Change Summary ($ in Millions)

	FY 2008	FY 2009	FY 2010	FY 2011
Previous President's Budget	38.406	26.630	32.630	
Current BES/President's Budget	36.084	36.411	0.000	
Total Adjustments	-2.322	9.781	0.000	
Congressional Program Reductions	0.000	0.000		
Congressional Rescissions	0.000	-0.099		
Total Congressional Increases	0.276	7.480		
Total Reprogrammings	-1.840	2.400		
SBIR/STTR Transfer	-0.758	0.000		

Change Summary Explanation

In FY 2009, Congress added $5.0 million for Air Purification with Carbon Nanotube Nanostructured Material, $2.48 million for PhasorBIRD Helmet Tracker, and $2.4 million for Joint Theater Air Ground Simulation System.

C. Performance Metrics
Under Development.

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COST ($ in Millions)	**FY 2008 Actual**	**FY 2009 Estimate**	**FY 2010 Estimate**	**FY 2011 Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
632830: Decision Effectiveness Technology	28.020	25.705	0.000						Continuing	Continuing

Note

Note: In FY 2010, Decision Effectiveness Technology efforts will move from PE 0603231F, Project 2830 to PE 0603456F, Project 5324, Project 5326, and Project 5327 to better align efforts. Funds for the FY 2008 Congressionally-directed Virtual Medical Trainer in the amount of $2.4 million are in the process of being moved to the Defense Health Program from PE 0603231F, Crew Systems and Personnel Protection Technology, for execution.

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 aerospace and cyber operations, support development of novel, tailored bio-taggant and identification/neutralization capabilities, develop aircrew system technologies to support long duration missions, and improve the manhunt capabilities of AF special operations. The ultimate goal is to assure warfighter decision effectiveness in AF operations.

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
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/Cyber warrior with tailored decision support systems, guidelines for effective selection of IO/ISR/Cyber warriors, IO/ISR/ Cyber simulators and training systems, enhanced decision-making tools, and automated tools to reduce ever-increasing data load and improve mission accomplishment. Note: In FY 2010, this major thrust will move to PE 0603456F, Project 5324 to better align efforts. In FY 2008: Developed and demonstrated the utility and effectiveness of ISR operator planning tools. Developed and demonstrated operator-aiding technologies to exploit data from new ISR sensors and reduce data overload. Expanded IO/ISR training research and evaluated new regimens to address training for new	2.277	2.685	0.000	

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B. Accomplishments/Planned Program ($ in Millions)		**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
ISR missions. Developed Influence Operations technologies and facilitated transition into follow-on IO/ISR operator workload optimization development. In FY 2009: Design advanced IO/ISR/Cyber technologies and demonstrate next-generation IO/ISR/Cyber operator workstation capabilities to operationally integrate/normalize AF non-kinetic capabilities with kinetic operations. Continue development of operator-aiding and training tools for IO/ISR/Cyber operators. Initiate advanced Cyber influence development. In FY 2010: Not Applicable.					
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). Note: In FY 2010, this major thrust will move to PE 0603456F, Project 5324 to better align efforts. In FY 2008: Developed a predictive analysis tool based on continuous and dynamic operational effects assessment. Based on operator field test results, developed enhancements that foster command level interaction with the visualization tool for rapid and actionable decision-making. In FY 2009: Integrate visualization tools with other collaborative tools to create a seamless flow of operational assessment data into strategy planning data. Demonstrate a final visually-oriented, unified strategy planning and assessment support tool in a simulated CAOC. In FY 2010: Not Applicable.		1.938	1.891	0.000	
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		3.701	3.884	0.000	

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
errors, and increased situational awareness through positional awareness of friend and foe in combat zones. Develop technologies permitting supervisory-level interfaces between ground controllers and multiple, highly autonomous unmanned aerial vehicles (UAV). Employ real-time wargaming simulations and field tests to quantify the decision-making benefits from advanced control/display portrayal concepts that optimize net-centric information flow to system operators. Note: In FY 2010, this major thrust will move to PE 0603456F, Project 5327 to better align efforts. In FY 2008: Commenced a spiral development to extend the capabilities of the advanced interface technologies that link ground controllers with multiple machine components through unified visual and auditory displays. Demonstrated in an operational setting improved human interaction with transmission of target data, in order to improve speed and accuracy while offering a common situation display for Joint services interoperability. Provided human factors design updates to battlefield air operations kit components, providing faster setup and deployment of micro-UAV as well as integrated power management for wearable components. Demonstrated user-independent speech recognition and language translation customized for ground controller equipment and TAC earplug microphones. Began hardware and software implementation of a supervisory control station technology baseline. Began concept development for a next-generation supervisory control station, and assessed projected benefits in terms of operator mission performance and overall usability relative to the technology baseline station. In FY 2009: Continue to develop and demonstrate human systems integration concepts for ground controllers and other battlefield airmen. Demonstrate technologies for three-dimensional audio navigation in visually obscured environments while improving team situational awareness by geo-location of voice communications. Incorporate a geo-located survival guide into a wearable computer, and demonstrate its value in an operationally relevant environment. Develop and incorporate an advanced battlefield air traffic control capability in the combat controller's software suite. Incorporate intelligent agent technology to improve battlefield airmen situational awareness in a dynamic wartime scenario. Complete hardware and software implementation of a supervisory control station technology baseline and a next-generation supervisory control station. Plan a technology demonstration program using real-time system simulation and field testing in spiral demonstration phases. Establish the scope of simulation and test activities, select experimental variables, determine key performance measures and commence the assessment.				

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B. Accomplishments/Planned Program ($ in Millions)		**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
In FY 2010: Not Applicable.					
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 2010, this major thrust will move to PE 0603456F, Project 5324 to better align efforts. In FY 2008: Completed the first spiral development of CPE decision aids and simulation based on global strike and global persistent attack missions. Planned a technology demonstration program to evaluate benefits and utility of tools. Expanded the scope of the scenario-based cognitive work to include non-traditional warfare such as humanitarian relief and global war on terrorism. Began a cognitive work analysis with this expanded scope. In FY 2009: Integrate tools developed in first spiral into identified technology demonstration program. Evaluate the CPE decision aids and simulation tools in the technology demonstration environment. Refine tools and begin the second spiral development cycle informed by the results of the technology demonstration with humanitarian relief and global war on terrorism emphases. Identify exercise to evaluate the expanded benefits and utility of the decision aid tools and simulation. Plan a technology demonstration program. In FY 2010: Not Applicable.		2.043	2.225	0.000	
MAJOR THRUST: Develop and demonstrate novel, tailored bio-taggant and identification/neutralization capabilities to meet specific AF needs to enhance force protection and enable air operations commanders to maintain operations tempo. Note: In FY 2010, this major thrust will move to PE 0603456F, Project 5326 to better align efforts. In FY 2008: Selected the best emerging technologies for bio-taggant and threat neutralization applications and developed those technologies into fieldable counterproliferation capabilities. Used aptamer-based technology		1.493	1.552	0.000	

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
to enhance the effectiveness of the cold plasma and directed energy technologies. Developed the capability to attach quantum dots and mixed-metal nanoparticles to aptamers to serve as taggants for biological agents. In FY 2009: Further develop the selected technologies and refine application to mission need to include incorporation of quantum dot and mixed-metal nanoparticle technologies. Develop models of optimal insertion/ distribution of bio-taggants in target areas. In FY 2010: Not Applicable.				
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 (C2) 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: Decreased emphasis in FY 2009 reflects completion of advanced demonstration effort in FY 2008. In FY 2010, this major thrust will move to PE 0603456F, Project 5324 to better align efforts. In FY 2008: Developed and experimented with system-of-systems societal modeling, increasing the complexity and degree of dynamic change. Expanded development of work-centered collaborative planning, analysis, and decision-making software tools into the unstructured C2 work environment of dynamic mission re-synchronization. Investigated the value of implementing human-computer interfaces as services or as service layers of an enterprise architecture. In FY 2009: Continue to develop human behavior modeling of individuals and groups in highly dynamic situations. Continue to experiment with system-of-systems societal modeling, using increasingly complex scenarios. Demonstrate how information flows through and is modified by a society. Develop design reference scenarios to be used as standards for evaluating different modeling approaches. Continue to evaluate promising models and modeling approaches.	4.490	1.166	0.000	

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B. Accomplishments/Planned Program ($ in Millions)		**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
In FY 2010: Not Applicable.					
MAJOR THRUST: Develop and demonstrate logistics technologies for improved deployment operations and improved system supportability. These technologies will improve the efficiency and effectiveness of AF deployments and mobility operations in support of Agile Combat Support initiatives and Air Expeditionary Force concepts. Note: In FY 2009, this effort terminates due to higher AF priorities. In FY 2008: Evaluated methods for organizational impact analysis of new information and network-based tools to support collaborative logistics. Collected human-centric performance data from critical experiments and joint exercises to benchmark improvements in maintenance, transportation, and supply functions in contingency support. In FY 2009: Develop organizational-level change templates for effective applications of net-based logistics operations. Validate these change templates in operational settings (e.g., airlift control centers, logistics readiness centers) for effective implementation of advanced automation technologies. In FY 2010: Not Applicable.		1.221	0.895	0.000	
MAJOR THRUST: Develop and demonstrate cognitive-based analytic and design methods and computer software tools for C2 operations to synchronize personnel in distributed locations with a shared understanding of the C2 battlespace. Increasingly, C2 personnel operate in a complex information environment that inhibits situation understanding and complicates operational decision-making. This decision support technology exploits an emerging work-centered user interface concept having the potential to rapidly configure common visualizations of C2 operations and streamline decision-making. Note: In FY 2010, this major thrust will move to PE 0603456F, Project 5327 to better align efforts.		1.726	1.933	0.000	

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B. Accomplishments/Planned Program ($ in Millions)		**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
In FY 2008: Analyzed the work aiding requirements for specific distributed C2 users such as for rapid course of action development teams supporting global operations, to include coverage both for planning and execution. Conducted experiments to test and evaluate the ability of the work-centered user interface services approach to provide effective visualizations and decision support for global C2 operations. In FY 2009: Refine the methods and techniques to decrease the analysis, design, and development time of providing work-centered support services for global C2 operations. Demonstrate in a simulation of global C2 operations that geographically distributed personnel can develop a shared situation understanding of the C2 battlespace. In FY 2010: Not Applicable.					
MAJOR THRUST: Develop and demonstrate human protective system technologies for extended missions. Technologies will improve aircrew comfort, resulting in increased performance. Note: In FY 2008, this effort was discontinued to align work with higher AF priorities. In FY 2008: Validated system specification through testing of candidate seat system designs. Researched and developed seat system technologies to improve performance, safety, and comfort. Demonstrated performance of candidate seat system optimization technologies. In FY 2009: Not Applicable. In FY 2010: Not Applicable.		0.751	0.000	0.000	
MAJOR THRUST: Develop and demonstrate technologies for improved force protection, the maintenance of peak warfighter performance in known toxic environments, and the identification of difficult-to-detect enemy threats. Develop capabilities for real-time human monitoring in the field and the identification of toxic substance exposure before the warfighters' health and combat effectiveness are compromised. Develop model-based		0.892	2.015	0.000	

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B. Accomplishments/Planned Program ($ in Millions)		**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
threat awareness, health status, visualization, risk assessment technologies, and intent of human adversaries. Note: In FY 2010, this major thrust will move to PE 0603456F, Project 5326 to better align efforts. In FY 2008: Developed detection technologies to identify kidney and liver organ selective degradation using streamlined, yet robust, assay procedures and biomarkers. Generated selection criteria and integration algorithms that fuse varied biomarker data. Multiple specific biomarkers will allow for early detection of low level toxic exposure of deployed forces. In FY 2009: Continue development of biomarker based detection technologies. Develop methods for collecting human biosample input in the field. Develop new concepts for lightweight monitoring devices that are operable by non-medical personnel for demonstration of the analysis and detection techniques. These technologies will identify potentially threatening toxic exposures to warfighters to protect AF personnel. Develop predictive human models for threat detection and exposure. Develop enhanced anthropometric visualization techniques that integrate heterogeneous sensor data of potential adversaries. In FY 2010: Not Applicable.					
CONGRESSIONAL ADD: Variable Transmittance Visor. In FY 2008: Conducted Congressionally-directed effort for Variable Transmittance Visor. In FY 2009: Not Applicable. In FY 2010: Not Applicable.		0.972	0.000	0.000	
CONGRESSIONAL ADD: Low Cost/Improved Performance for Helmet Display and Life Support Technologies.		2.626	0.000	0.000	

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B. Accomplishments/Planned Program ($ in Millions)		**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
In FY 2008: Conducted Congressionally-directed effort for Low Cost/Improved Performance for Helmet Display and Life Support Technologies. In FY 2009: Not Applicable. In FY 2010: Not Applicable.					
CONGRESSIONAL ADD: Battlefield Automatic Life Status Monitor (BALSM). In FY 2008: Conducted Congressionally-directed effort for BALSM. In FY 2009: Not Applicable. In FY 2010: Not Applicable.		1.556	0.000	0.000	
CONGRESSIONAL ADD: Water Purification with Fused Carbon Nanotube Nanostructured Material. In FY 2008: Conducted Congressionally-directed effort for Water Purification with Fused Carbon Nanotube Nanostructured Material. In FY 2009: Not Applicable. In FY 2010: Not Applicable.		2.334	0.000	0.000	
CONGRESSIONAL ADD: Air Purification with Carbon Nanotube Nanostructured Material.		0.000	4.986	0.000	

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
In FY 2008: Not Applicable. In FY 2009: Conduct Congressionally-directed effort for Air Purification with Carbon Nanotube Nanostructured Material. In FY 2010: Not Applicable.				
CONGRESSIONAL ADD: PhasorBIRD Helmet Tracker. In FY 2008: Not Applicable. In FY 2009: Conduct Congressionally-directed effort for PhasorBIRD Helmet Tracker. In FY 2010: Not Applicable.	0.000	2.473	0.000	

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C. Other Program Funding Summary ($ in Millions)

	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
Activity Not Provided/ Related Activities:	0.000	0.000							Continuing	Continuing
PE 0602202F/ Human Effectiveness Applied Research.	0.000	0.000							Continuing	Continuing
PE 0603456F/ Human Effectiveness Adv Tech Dev.	0.000	0.000							Continuing	Continuing
PE 0604706F/ Life Support Systems.	0.000	0.000							Continuing	Continuing
Activity Not Provided/ This project has been coordinated through the Reliance 21 process to harmonize efforts and eliminate	0.000	0.000							Continuing	Continuing

D. Acquisition Strategy

Not Applicable.

E. Performance Metrics

Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.

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COST ($ in Millions)	**FY 2008 Actual**	**FY 2009 Estimate**	**FY 2010 Estimate**	**FY 2011 Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
634924: Warfighter Readiness Technology	6.091	8.427	0.000						Continuing	Continuing

Note

Note: In FY 2010, Warfighter Readiness Technology efforts will move from PE 0603231F, Project 4924 to PE 0603456F, Project 5325 to better align efforts.

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.

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
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. In FY 2008: Developed integrated methods for assessing and tracking performance in live, virtual, and constructive environments. Developed and demonstrated integrated readiness assessment for air-to-air, air-to-ground, close air support, and C2. Demonstrated interface and training capability between DMO and live range exercises. Developed scenario authoring shells amenable for guiding training and learning in virtual and live contexts. Developed integrated methods for evaluating the impact of different levels of fidelity in simulation environments on performance and readiness. Finalized the development of functional requirements for managing learning in distributed training contexts.	2.970	2.692	0.000	

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B. Accomplishments/Planned Program ($ in Millions)		**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
In FY 2009: Demonstrate adaptive training within DMO using embedded knowledge and skills assessment. Develop common tools for mission planning, briefing, and after action review that function across air combat, ground operations, and combat operations and planning in an AOC. Complete integration and evaluation of joint close air support (JCAS) environment for schoolhouse training. Demonstrate and validate technology alternatives for in-garrison and field deployable JCAS training and rehearsal system. Initiate development of specifications for integrating forward deployed battlefield coordination and command simulation with JCAS schoolhouse training. Demonstrate embedded training and performance assessment in a deployed combat training environment. Demonstrate integrated deployed DMO capability in large scale Live, Virtual, and Constructive (LVC) event. Demonstrate quantitative methods for certifying simulation fidelity and readiness training capabilities. In FY 2010: Not Applicable.					
MAJOR THRUST: Develop a low-cost, deployable visual simulation system with sufficient image resolution and performance capable of supporting the imaging of high-resolution fast-moving targets, high-density terrain, texture, surround imagery, and helmet-mounted sights. This technology will provide the warfighter realistic air-to-air and air-to-ground visual simulation environments to support aircrew training during expeditionary deployments and at mission training centers. In FY 2008: Performed engineering and human factors analyses of the Combat Immersive Visual Environments for Distributed Mission Operations (CIVE) display and image generation components to assess feasibility of new scanning architectures, image fidelity and stability, portability, resolution, size, weight, transport delay, and user acceptance. In FY 2009: Develop CIVE head-mounted and compact off-the-head display/image generation proof of concept component demonstrations. Begin human factors analyses and technology performance evaluations of the concept demonstrations. In FY 2010: Not Applicable.		1.276	1.192	0.000	

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
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. Develop and demonstrate high-fidelity, interactive Electronic Warfare (EW) training technologies for use with live-virtual-constructive training networks for future threat systems/capabilities and advanced sensor platforms and weapons systems. These technologies provide AF, Joint, and coalition warfighters with more realistic EW mission training and rehearsal environments that accurately represent 21st century threats, thereby increasing operational readiness and capability. In FY 2008: Developed competency-based training requirements for team and functional areas within strategy and plans divisions including IO and ISR teams. Developed optimum training and mission rehearsal strategies to employ information simulation into AOC weapon systems planning tools. Surveyed instructional methods for employment in targeted training of mission-essential knowledge and skills and developed most capable method(s) for integration. Designed and developed architectures and hardware that integrate live EW range data into shared networked simulations. Developed a simulation of an advanced fighter-specific EW sensor suite for DMO application. Demonstrated guiding a single EW training illuminator on a live electronic combat range with fully integrated, computer-generated, and live forces. In FY 2009: Develop integrated strategy and plans division trainer based on competency-based training requirements and optimum mission rehearsal strategies. Develop integration methods for fielded and emerging systems and applications. Develop team, inter-team and division-level event specifications for mission qualification training and continuation training scenarios. Validate environment approaches through exercise simulations, data capture, and analysis to define quality of experience, spectrum of training capability, and performance assessment capabilities. Complete live EW range integration into DMO. Develop a simulation of an advanced platform-specific EW sensor suite for DMO. Develop a proof-of-concept desktop system integrating multiple EW suite simulations with a synthetic threat environment featuring advanced missile fly out models and basic directed energy threats. Begin measuring and validating improvements in EW training using these technologies and techniques. Begin the development of methods for improved, embedded EW	1.845	2.150	0.000	

Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification		DATE: May 2009			
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)	R-1 ITEM NOMENCLATURE PE 0603231F Crew Systems and Personnel Protection Technology			PROJECT NUMBER 634924	
B. Accomplishments/Planned Program ($ in Millions)		**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
training capability on airborne aircraft and design systems and demonstrate these technologies during a live-fly exercise at an EW training range. In FY 2010: Not Applicable.					
CONGRESSIONAL ADD: Joint Theater Air Ground Simulation System. In FY 2008: Not Applicable. In FY 2009: Conduct Congressionally-directed effort for Joint Theater Air Ground Simulation System. In FY 2010: Not Applicable.		0.000	2.393	0.000	

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C. Other Program Funding Summary ($ in Millions)

	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
Activity Not Provided/ Related Activities:	0.000	0.000							Continuing	Continuing
PE 0602202F/ Human Effectiveness Applied Research.	0.000	0.000							Continuing	Continuing
PE 0603456F/ Human Effectiveness Adv Tech Dev.	0.000	0.000							Continuing	Continuing
PE 0604227F/ Distributed Mission Training.	0.000	0.000							Continuing	Continuing
Activity Not Provided/ This project has been coordinated through the Reliance 21 process to harmonize efforts and eliminate	0.000	0.000							Continuing	Continuing

D. Acquisition Strategy

Not Applicable.

E. Performance Metrics

Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.

Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification								DATE: May 2009		
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)				R-1 ITEM NOMENCLATURE PE 0603231F Crew Systems and Personnel Protection Technology					PROJECT NUMBER 635020	
COST ($ in Millions)	**FY 2008 Actual**	**FY 2009 Estimate**	**FY 2010 Estimate**	**FY 2011 Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
635020: Bioeffects & Protection Technology	1.973	2.279	0.000						Continuing	Continuing

Note

Note: In FY 2010, Bioeffects & Protection Technology efforts will move from PE 0603231F, Project 5020 to PE 0603456F, Project 5323 and Project 5326 to better align efforts.

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 man-portable technologies for the neutralization of threats. 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. Biobehavioral performance capabilities are developed and demonstrated to enable sustained and enhanced operations in extreme environments to include surge, night, global, information warfare, C2, and other operations.

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
MAJOR THRUST: Develop and demonstrate technologies that permit safe testing, deployment, and use of high energy laser weapons and systems. Note: In FY 2010, this major thrust will move to PE 0603456F, Project 5323 to better align efforts. In FY 2008: Released laser range safety software tool including dynamic bi-directional reflectivity distribution function to support live fire test of major systems. Initiated validation, verification, and accreditation package for new software package. Assessed probabilistic risk assessment for use with laser hazard assessment. In FY 2009: Complete validation, verification, and accreditation package for laser range safety tool. Release collateral hazard assessment software tool to enable analysis of tactical uses for high-energy laser systems. In FY 2010: Not Applicable.	0.769	0.875	0.000	

Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification		DATE: May 2009
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)	R-1 ITEM NOMENCLATURE PE 0603231F Crew Systems and Personnel Protection Technology	PROJECT NUMBER 635020

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
MAJOR THRUST: Develop and demonstrate technologies to assess bioeffects and protection from radio frequency (RF) systems, including terahertz technologies. Note: In FY 2010, this major thrust will move to PE 0603456F, Project 5323 to better align efforts. In FY 2008: Initiated program to develop solutions for both laser and other non-ionizing radiation to personnel. Integrated laser solutions into solutions for RF, microwave, terahertz, and other regimes of electromagnetic radiation for personnel protection. In FY 2009: Continue to develop laser and RF and other non-ionizing protective solutions for personnel protection. Develop bioeffects-based fire-control algorithms for directed energy weapons. Continue integration of laser protective technologies with those for RF, microwave, terahertz, and other regimes of electromagnetic radiation for personnel protection. Establish preliminary design specifications for directed energy protective equipment. Continue long-term studies of RF weapon systems effects. In FY 2010: Not Applicable.	0.798	1.136	0.000	
MAJOR THRUST: Develop and demonstrate ability to support testing of counterforce technologies and to enable man-portable threat neutralization capabilities. Note: In FY 2010, this major thrust will move to PE 0603456F, Project 5326 to better align efforts. In FY 2008: Developed technologies that will provide the capability to neutralize threats without leaving evidence for special applications. Developed technologies to enable safe return and avoid contaminating aircraft or other equipment. In FY 2009: Continue development of technologies that will provide the capability to neutralize threats without evidence for special applications. Improve technologies to enable safe return and avoid contaminating aircraft or other equipment.	0.235	0.268	0.000	

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
In FY 2010: Not Applicable.				
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: This effort completed in FY 2008. In FY 2008: Completed development and demonstrated quantitative biobehavioral performance management tools to provide scheduling solutions and operational risk management calculations to extend and enhance human performance in sustained and continuous (24/7) military operations. In FY 2009: Not Applicable. In FY 2010: Not Applicable.	0.171	0.000	0.000	

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C. Other Program Funding Summary ($ in Millions)

	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
Activity Not Provided/ Related Activities:	0.000	0.000							Continuing	Continuing
PE 0602102F/ Materials.	0.000	0.000							Continuing	Continuing
PE 0602202F/ Human Effectiveness Applied Research.	0.000	0.000							Continuing	Continuing
PE 0603112F/ Advanced Materials for Weapon Systems.	0.000	0.000							Continuing	Continuing
PE 0603319F/ Airborne Laser Program.	0.000	0.000							Continuing	Continuing
PE 0603456F/ Human Effectiveness Adv Tech Dev.	0.000	0.000							Continuing	Continuing
PE 0604706F/ Life Support Systems.	0.000	0.000							Continuing	Continuing
Activity Not Provided/ This project has been coordinated through the Reliance 21 process to harmonize efforts and eliminate	0.000	0.000							Continuing	Continuing

D. Acquisition Strategy

Not Applicable.

Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification		DATE: May 2009
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)	R-1 ITEM NOMENCLATURE PE 0603231F Crew Systems and Personnel Protection Technology	PROJECT NUMBER 635020

E. Performance Metrics

Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.

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