PE NUMBER: 0603789F
PE TITLE: C3I Advanced Development

Exhibit R-2, RDT&E Budget Item Justification

DATE: February 2006

BUDGET ACTIVITY: 03 Advanced Technology Development (ATD)

PE NUMBER AND TITLE: 0603789F C3I Advanced Development

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	31.595	41.124	35.785	31.161	38.298	38.372	43.498	Continuing	TBD
4072	Dominant Battlespace Awareness	14.853	13.538	10.353	9.648	10.187	10.459	10.717	Continuing	TBD
4216	Battlespace Information Exchange	8.820	12.404	8.537	9.031	10.732	10.265	14.895	Continuing	TBD
4872	Aerospace Information Dominance	6.123	15.182	16.895	12.482	17.379	17.648	17.886	Continuing	TBD
4925	Collaborative Info Superiority	1.799	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	TBD

Note: Funds for the FY 2006 Congressionally-directed Massively Parallel Optical Interconnects for Battlespace Information Exchange in the amount of $1.900 million are in the process of being moved to PE 0603789F, C3I Advanced Development, from PE 0603723F, Environmental Engineering Technology, for execution. Funds for the FY 2006 Congressionally-directed Massively Parallel Optical Interconnects for Micro-Satellite Datacom in the amount of $1.000 million are in the process of being moved to PE 0603789F, C3I Advanced Development, from PE 0207423F, Advanced Communications Systems, for execution. Funds for the FY 2006 Congressionally-directed Hybrid Radio Frequency - Optical Communications Terminal in the amount of $1.000 million are in the process of being moved to PE 0603789F, C3I Advanced Development, from PE 0603211F, Aerospace Technology Development and Demonstration, for execution. Funds for the FY 2006 Congressionally-directed Air Operations Center Secured Data Access in the amount of $1.700 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 program develops and demonstrates Aerospace Command, Control, Communications, and Intelligence (C3I) technologies for the warfighter. The technologies address the ability to support the global information exchange of correlated and fused information to ensure the Air Force can plan and execute missions in a dynamic environment. The Dominant Battlespace Awareness project will provide affordable operational data capabilities for personnel to understand militarily relevant situations, on a consistent basis, with the precision and timeliness needed to accomplish the mission. The Battlespace Information Exchange project will develop the reliable, secure, jam-resistant, inter-operable worldwide global information enterprise capabilities, providing the Air Force assured communications and reach-back capability in a joint/coalition environment. The Aerospace Information Dominance project provides the technology and demonstrations needed to allow the warfighter to plan, assess, execute, monitor, and re-plan on the compressed time scales required for tomorrow's conflicts, whether they be combat or peacekeeping missions. The Collaborative Info Superiority project provides the technology and demonstrations needed to establish virtual, distributed Air Operations Centers (AOC), allowing the majority of the AOC resources to remain in the Continental United States, while only a small command element is deployed forward. The resultant products of this program will be technologies needed to build the capability to dynamically plan and replan over a secure network. Note: In FY 2006, Congress added $1.3 million for Battlespace Information Exchange, $1.6 million for Enable Network Centric Warfare, $1.0 million for Griffith Institute - Accelerated Course in Engineering, $1.2 million for Information for Global Reach, $1.0 million for Massively Parallel Optical Interconnects for Battlespace Datacom, $1.0 million for National Center for Multi-Source Information Fusion Research, $2.8 million for Net-Centric Dissimilar Data Fusion Program, $1.9 million for Massively Parallel Optical Interconnects for Battlespace Information Exchange (originally appropriated to PE 0603723F, Environmental Engineering Technology) ,$1.0 million for Massively Parallel Optical Interconnects for Micro-Satellite Datacom (originally appropriated to PE 0207423F, Advanced Communications Systems) and $1.0 million for Hybrid Radio Frequency - Optical Communications Terminal (originally appropriated to PE 0603211F, Aerospace Technology Development and Demonstration.) An additional

Exhibit R-2, RDT&E Budget Item Justification	DATE February 2006
BUDGET ACTIVITY **03 Advanced Technology Development (ATD)**	PE NUMBER AND TITLE **0603789F C3I Advanced Development**

$1.7 million was appropriated to this PE for Air Operations Center Secured Data Access, but it has been moved to PE 0603231F, Crew Systems and Personnel Protection Technology, for execution.

This program is in Budget Activity 3, Advanced Technology Development, since it develops and demonstrates technologies for existing upgrades and/or new system developments that have military utility and address warfighter needs.

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

		FY 2005	FY 2006	FY 2007
(U)	Previous President's Budget	35.774	30.125	37.365
(U)	Current PBR/President's Budget	31.595	41.124	35.785
(U)	Total Adjustments	-4.179	10.999	
(U)	Congressional Program Reductions		-0.007	
	Congressional Rescissions	-0.032	-0.594	
	Congressional Increases		11.600	
	Reprogrammings	-3.313		
	SBIR/STTR Transfer	-0.834		

(U) Significant Program Changes:

Not Applicable.

C. Performance Metrics

(U) Under Development.

Exhibit R-2a, RDT&E Project Justification			DATE: February 2006
BUDGET ACTIVITY: 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE: 0603789F C3I Advanced Development	PROJECT NUMBER AND TITLE: 4072 Dominant Battlespace Awareness	

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
4072 Dominant Battlespace Awareness	14.853	13.538	10.353	9.648	10.187	10.459	10.717	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, integrates, and demonstrates advanced technologies to achieve Dominant Battlespace Awareness (DBA) and Predictive Battlespace Awareness (PBA) using information from all sources, exploiting government and commercial technologies in support of the Global Strike Concept of Operations (CONOPS) and the Space and Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance CONOPS. DBA is the information required to support dynamic planning and execution with the accuracy, fidelity, and timeliness needed to dominate in battle. Technology development includes: tasking information collectors (intelligence, surveillance, and reconnaissance platforms, national intelligence sources, etc.); correlating and geo-registering the collected data; exploiting the data to extract information of military significance; fusing information from multiple sources to create a digital representation of the battlespace; assessing the situation; predicting enemy course of action; and archiving the results for ready use by decision makers. This is a dynamic process that involves technologies for information access, extraction, fusion, processing, storage, and retrieval, as well as technologies for machine reasoning, pattern recognition, and timeline analysis.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST: Develop and demonstrate advanced signal and data exploitation technologies for detection, tracking, identification, and targeting of time-critical targets, and information extraction technologies for situational awareness.	2.948	1.721	2.732

(U) In FY 2005: Completed development and demonstration of intermediate information extraction tools and initiated development of advanced text exploitation tools that automatically extract events and their relationships from free text, including human intelligence and communication intelligence sources, allowing the warfighter more time to perform analysis. Continued to develop and deliver an exploitation toolkit for advanced ISR platforms that provide the detection and tracking of air and ground targets. Delivered tools for the exploitation of High Range Resolution, Identification Friend or Foe, and Synthetic Aperture Radar sensor characteristics for feature aided tracking and targeting. Continued to develop and deliver automated sensor management tools to support collection planning for ISR platforms. Initiated development of algorithms for the dynamic tasking of ISR assets (Unmanned Air Vehicle/Manned/Space ISR collectors) based upon the exploitation and fusion of multi-source and multi-platform information, in order to provide timely dissemination of useable intelligence to allied/coalition forces.

(U) In FY 2006: Develop a baseline capability to perform advanced text exploitation of Human Intelligence (HUMINT) reports and correlate and fuse the information with information from other sources. Develop and assess the ability to

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603789F C3I Advanced Development	PROJECT NUMBER AND TITLE 4072 Dominant Battlespace Awareness

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
extract actionable information from voluminous textual data.			
(U) In FY 2007: Complete and demonstrate a baseline capability to perform advanced text exploitation of HUMINT reports and correlate and fuse the information with information from other sources. Complete development and assessment of prototype that is able to extract actionable information from voluminous textual data.			
(U)			
(U) MAJOR THRUST/CONGRESSIONAL ADD: Develop and demonstrate advanced data handling, event visualization technologies, and distributed data fusion to enable a more effective utilization of the vast amounts of data available to intelligence analysts to provide optimized situation awareness, as well as to support all phases of combat operations. This effort includes $1.0 million in FY 2006 Congressional Add funding.	3.341	5.365	4.080
(U) In FY 2005: Completed development of probabilistic approaches for accumulation of data/information to support target/activity identification and situation awareness in support of PBA. Completed development and deliver tools for timeline, event, and motion pattern recognition to support analysis, visualization, and decision aids to detect enemy activity. Continued to develop an operations-based approach for intelligent and adaptive intelligence, surveillance, and reconnaissance (ISR) management based upon quantified information deficiencies in the fused data-space. Continued to develop and deliver an initial fusion evaluation environment, providing for the analysis, evaluation, and transition of fusion products to the warfighter.			
(U) In FY 2006: Continue to develop and deliver a fusion evaluation environment, providing simulation and modeling capability, measures of performance, and operator focused transition products to support the warfighter. Develop an automated process to visualize the overlaying of disparate information domains on a single screen and provide an optimal means of fusing all source intelligence data. Develop and demonstrate advanced fusion tools to enhance the capability for PBA. Use operator focused techniques to evaluate the effectiveness of the fusion tools. Perform feature aided tracking to monitor, assess, and predict possible courses of action. Initiate development of reasoning algorithms and evidence accrual techniques for continuous knowledge development of the battlespace. Conduct Congressionally-directed effort for National Center for Multi-Source Information Fusion Research.			
(U) In FY 2007: Continue to enhance the evaluation environment for assessing the state-of-the-art and maturity of algorithms for transition to the warfighter. Demonstrate an automated process to visualize the overlaying of disparate information domains on a single screen and provide an optimal means of fusing all source intelligence data. Complete demonstration of feature aided tracking to monitor, assess, and predict possible courses of action. Complete development and demonstrate operator focused dynamic resource allocation algorithms and techniques for optimization and collaboration of information products. Initiate development of adversarial behavior prediction tools using multiple sources of intelligence (multi-INT) fusion, situational awareness, and cross cueing ISR techniques.			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603789F C3I Advanced Development	PROJECT NUMBER AND TITLE 4072 Dominant Battlespace Awareness

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U)				
(U)	MAJOR THRUST/CONGRESSIONAL ADD: Develop and demonstrate advanced data and information fusion capabilities to support multi-source capabilities, new sensor types, cognitive models, and automated fusion process management. Note: The funding profile reflects the completion of multi-INT fusion efforts and shifting to fusion driven ISR management research in FY 2006. The funding profile in FY 2007 reflects demonstrations of multi-platform tracking and ISR management. This effort contains $2.8 million in FY 2006 Congressional Add funding.	3.964	4.752	3.541
(U)	In FY 2005: Developed and demonstrated multiple intelligence source data mining and reasoning techniques to locate hard to find targets within the context of a continuously changing battlefield environment. Initiated development of approaches and techniques for reasoning about enemy movements and actions from historical databases and real-time multi-source information to be able to find, identify, and track difficult targets that employ concealment, camouflage, and deception techniques. Initiated an investigation of reasoning techniques to aid the analyst in understanding the dynamics of the battlefield.			
(U)	In FY 2006: Develop interoperable exploitation technologies for real-time ISR management. Enhance ISR resource management development through incorporation of information sharing and network centric operations. Develop tools for mission/task based priority and quality of service utilization of assets and fusion focused ISR tasking, and explore the synergy between the two. Perform a multi-platform interoperability and limited tracking demonstration, which integrates resource management, information management, and communications management capability. Conduct Congressionally-directed effort for Net-Centric Dissimilar Data Fusion Program.			
(U)	In FY 2007: Complete development of interoperable exploitation technologies for real-time ISR management, which incorporates non-traditional ISR into the management algorithms for find, fix, track, target, engage, and access. Perform a multi-platform tracking demonstration utilizing airborne assets against a variety of advanced military and asymmetric threat scenarios. Demonstrate the capability to dynamically task sensors and assure timely, prioritized transport of information for purpose of tracking high value ground targets for long durations and potentially engaging them.			
(U)				
(U)	CONGRESSIONAL ADD: Collaborative Archive System.	1.000	0.000	0.000
(U)	In FY2005: Developed and demonstrated a collaboration system which applies modern collaboration tools and technologies towards the problem of information discovery and information sharing between the Air Force and other organizations. The ability to collaborate across security boundaries using instant messaging, shared whiteboard, and audio teleconferencing tools, and to quickly discover pertinent information from prior collaborative sessions was emphasized.			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603789F C3I Advanced Development	PROJECT NUMBER AND TITLE 4072 Dominant Battlespace Awareness

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U)	In FY2006: Not Applicable.			
(U)	In FY2007: Not Applicable.			
(U)				
(U)	CONGRESSIONAL ADD: Dynamic Targeting Capability.	1.500	0.000	0.000
(U)	In FY2005: Developed and demonstrated an enhanced capability for the Air Force to identify, plan, and attack emerging threats as it operates in a Network Centric architecture. This capability possesses the tools necessary to discover, translate, and share metadata and products from intelligence databases, weapons evaluation, image exploitation, and target visualization systems, as well as non-traditional ISR sources to quickly assist in identifying threats or propose a course of action.			
(U)	In FY2006: Not Applicable.			
(U)	In FY2007: Not Applicable.			
(U)				
(U)	CONGRESSIONAL ADD: Advanced Wideband Processor and High Frequency (HF) Geo-Processor (AWP/HGP) for RIVET JOINT Aircraft.	2.100	0.000	0.000
(U)	In FY2005: Completed development, integration, flight testing, and installation of an AWP/HGP on a RIVET JOINT aircraft with the AWP providing theater-wide detection and processing of high-interest signals in dense, co-channel environments typical of commercial communications, and the HGP adding direction finding and geo-location of HF signals to RIVET JOINT capabilities.			
(U)	For 2006: Not Applicable.			
(U)	For 2007: Not Applicable.			
(U)				
(U)	CONGRESSIONAL ADD: Air Operations Center Secured Data Access.	0.000	1.700	0.000
(U)	In FY 2005: Not Applicable.			
(U)	In FY 2006: Conduct Congressionally-directed effort for Air Operations Center Secured Data Access.			
(U)	In FY 2007: Not Applicable.			
(U)	Total Cost	14.853	13.538	10.353

(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 0602702F, Command,									

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY **03 Advanced Technology Development (ATD)**	PE NUMBER AND TITLE **0603789F C3I Advanced Development**	PROJECT NUMBER AND TITLE **4072 Dominant Battlespace Awareness**

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

Control, and Communications.

(U) PE 0603203F, Advanced Aerospace Sensors.

(U) PE 0603742F, Combat Identification Technology.

(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: 0603789F C3I Advanced Development	PROJECT NUMBER AND TITLE: 4216 Battlespace Information Exchange

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
4216 Battlespace Information Exchange	8.820	12.404	8.537	9.031	10.732	10.265	14.895	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0		

Note: Funds for the FY 2006 Congressionally-directed Massively Parallel Optical Interconnects for Battlespace Information Exchange in the amount of $1.9 million are in the process of being moved to PE 0603789F, C3I Advanced Development, from PE 0603723F, Environmental Engineering Technology, for execution. Funds for the FY 2006 Congressionally-directed Massively Parallel Optical Interconnects for Micro-Satellite Datacom in the amount of $1.0 million are in the process of being moved to PE 0603789F, C3I Advanced Development, from PE 0207423F, Advanced Communications Systems, for execution. Funds for the FY 2006 Congressionally-directed Hybrid Radio Frequency - Optical Communications Terminal in the amount of $1.0 million are in the process of being moved to PE 0603789F, C3I Advanced Development, from PE 0603211F, Aerospace Technology Development and Demonstration, for execution.

(U) A. Mission Description and Budget Item Justification

This project develops and demonstrates advanced communications technologies to implement a secure information grid for the worldwide information exchange of near-real-time multimedia (i.e., voice, data, video, and imagery) information in a joint/coalition environment. This secure information grid will be rapidly deployable, mobile, interoperable, and seamless between aircraft, either en route or in theater, and Air Operations Centers. It will: a) provide interoperability across echelon, Service, and multi-national force boundaries; b) support mobile information superiority, sensor-to-shooter operations, and the battle management decision process; and c) provide in-transit visibility of en route aircraft, cargo, mission status, and reachback capabilities for aircraft to operations centers in the Continental United States (e.g., updating information and mission changes to en route aircraft). Technology developments include an information assurance decision support system, advanced information management, multi-level secure communications, secure survivable networks, mission and content-based routing, quality-of-service mechanisms, and communications transmission systems.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST: Develop and demonstrate secure wideband assured networking for munitions (e.g., Joint Direct Attack Munition, etc.) and integration with the developing airborne segment of the Global Grid.	2.264	3.299	3.878
(U) In FY 2005: Designed and brassboarded affordable high-capacity data links that were miniaturized to fit within the confines of miniature munitions. Data networking supported command and control of the munition and cooperative situational awareness and battle damage assessment with other weapon platforms.			
(U) In FY 2006: Examine and develop or adapt networked communications to support Special Operations Forces (SOF) ground elements connecting them into the Airborne Network to weapon platforms and reachback to globally located command centers.			
(U) In FY 2007: Continue to develop or adapt networked communications to support SOF ground elements connecting them into the Airborne Network to weapon platforms and reachback to globally located command centers.			
(U)			
(U) MAJOR THRUST: Develop and demonstrate an enterprise management system that collects and evaluates status	0.479	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 0603789F C3I Advanced Development	PROJECT NUMBER AND TITLE 4216 Battlespace Information Exchange

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
	information from multiple systems and sources, monitors enterprise integrity, analyzes situations, and displays enterprise-wide information. Note: Effort completed in FY 2005.			
(U)	In FY 2005: Completed the demonstration of an enterprise management system that collects and evaluates status information from multiple systems in multiple security domains to display enterprise-wide information without compromising security in the individual domains.			
(U)	In FY 2006: Not Applicable.			
(U)	In FY 2007: Not Applicable.			
(U)				
(U)	MAJOR THRUST/CONGRESSIONAL ADD: Develop and demonstrate advanced expert system decision algorithms to prioritize and control resources for global reach in the Air Mobility Command (AMC) environment. This effort contains $2.8 million in FY 2006 Congressional Add funding.	1.772	3.588	0.540
(U)	In FY 2005: Continued development of the Intelligent Information Manager, Integrated Network Controller, and the Global Media Access Controller into a software application for a software defined radio in preparation for transitioning the capability to the Joint Tactical Radio System clusters.			
(U)	In FY 2006: Transition the combined Intelligent Information Manager, Integrated Network Controller, and the Global Media Access Controller to jumpstart Network Centric communications. Conduct Congressionally-directed efforts for Information for Global Reach, and Enable Network Centric Warfare.			
(U)	In FY 2007: Complete the transition of the combined Intelligent Information Manager, Integrated Network Controller, and the Global Media Access Controller to jumpstart Network Centric communications.			
(U)				
(U)	MAJOR THRUST/CONGRESSIONAL ADD: Develop and demonstrate intelligent networking transport and management technology to provide assured, seamless, battlespace connectivity to the aerospace forces with a greatly reduced footprint. Note: This effort includes $2.0 million in FY 2005 and $1.0 million in FY 2006 Congressional Add funding.	3.305	4.517	4.119
(U)	In FY 2005: Studied, defined, and developed mission and content delivery network mechanisms. Refined and enhanced intelligent networking technology, which adapts to its environment and varying demands for service, while providing mission and context-based quality-of-service (QoS) routing. Merged wideband wireless intelligent networking with context-based QoS routing and fashion for ease of implementation into, and the expansion of, the common Joint Service Network Service Layer. Developed and demonstrated an efficient on-board optical interconnectivity solution that addresses, in a uniform manner, all intra-platform communications, to include telemetry/command/control, and payload related data exchange needs of an Unmanned Air Vehicle (UAV) platform.			
(U)	In FY 2006: Develop mechanisms to enable integrated management of communications and sensor resources.			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603789F C3I Advanced Development	PROJECT NUMBER AND TITLE 4216 Battlespace Information Exchange

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U)	Assess communications needed to support ground moving target tracking, multi-intelligence exploitation and fusion, and sensor resource management systems and techniques. Establish a framework for integration and development of a common-coordinated management function for command, control, intelligence, surveillance, and reconnaissance networking. Develop mission/task based priority and quality of service utilization of communications assets to enable fusion-focused ISR tasking, feature-aided tracking, group tracking, and use of Level 3 type fusion information. Investigate the complexities of multi-intelligence exploitation and incorporate enhancements into the development. Continue to develop aand demonstrate an efficient on-board optical interconnectivity solution that addresses, in a uniform manner, all intra and inter-platform communications, to include telemetry/command/control, and payload related data exchange needs of UAV and micro satellite platforms.			
(U)	In FY 2007: Demonstrate multi-platform tracking, employing multiple ISR platforms, that show improved battle management command, control, and communications capabilities and complete assessment of the warfighter effectiveness of integrated ISR sensor management/fusion and communications capability. Continue to develop and demonstrate a survivable, mobile, deployable extension of the Global Information Grid to support rapid, decisive and sustainable air power, C2, weapons data links, and ISR assets.			
(U)				
(U)	CONGRESSIONAL ADD: Cyber Security - Advanced Course In Engineering.	1.000	0.000	0.000
(U)	In FY2005: Developed training program in cyber security through the completion of research topics covering the areas of security policy, computer security, cryptography, steganography, digital forensics, network security, network defense, network attack, wireless security, and next generation security.			
(U)	In FY2006: Not Applicable.			
(U)	In FY2007: Not Applicable.			
(U)				
(U)	CONGRESSIONAL ADD: Griffith Institute - Accelerated Course in Engineering.	0.000	1.000	0.000
(U)	In FY 2005: Not Applicable.			
(U)	In FY 2006: Conduct Congressionally-directed effort for Griffith Institute - Accelerated Course in Engineering.			
(U)	In FY 2007: Not Applicable.			
(U)	Total Cost	8.820	12.404	8.537

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603789F C3I Advanced Development	PROJECT NUMBER AND TITLE 4216 Battlespace Information Exchange

(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 0602702F, Command, Control, and Communications.

(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 0603789F C3I Advanced Development	PROJECT NUMBER AND TITLE 4872 Aerospace Information Dominance	

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
4872 Aerospace Information Dominance	6.123	15.182	16.895	12.482	17.379	17.648	17.886	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0		

Note: Increased funding in FY 2006 and out reflects increased emphasis on developing high payoff information distribution and effects-based planning technologies. In FY 2006, efforts from Project 4925 move to this Project.

(U) A. Mission Description and Budget Item Justification

In order to achieve information dominance for the Expeditionary Aerospace Force, the Air Force must be able to plan, assess, monitor, and replan missions rapidly in a dynamic environment. This project develops and demonstrates technologies necessary for dynamic decision making. It provides the technology and demonstrations needed to enable the warfighter to plan, assess, execute, monitor, and replan on the compressed time scales required for tomorrow's conflicts, whether they be combat or operations other than war. It will develop and demonstrate a new generation of planning assessment technologies that enable a new paradigm of effects-based operations, allowing the aerospace commanders to determine the desired operational effects and prosecute the mission accordingly. It will develop innovative capabilities capable of realizing a strategy to task approach to aerospace warfare exploiting a link between command, strategy, and assessment functions. It will develop and demonstrate distributed information technologies that provide the commander and staff with seamless access to tailored multi-media, multi-spectral data within a mobile, dynamic Air Operations Center (AOC). Knowledge-based intelligent information technologies will be developed to support robust, real-time, large-scale Air Force command and control (C2) systems.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST: Develop and demonstrate distributed information technologies that are scalable and reconfigurable and provide seamless access to tailored multi-media, multi-spectral data for commanders and staff in mobile, dynamic C2 centers. Note: Yearly increasing funding is due to increased emphasis in developing and demonstrating to the warfighter the baseline functionality of the Advanced Technology AOC.	1.568	4.067	5.499

(U) In FY 2005: Continued to design and develop a baseline of critical functionality and supporting infrastructure that will support the evolving Advanced Technology AOC weapon system and its split operations concept. Initiated and developed a capability for the commander to monitor, and repair where necessary, the health of the information superiority function within the AOC weapon system. Investigated the demonstration of a core set of functionality and supporting infrastructure of an Advanced Technology AOC weapon system enabling the ability to plan, direct, coordinate, and control air forces and operations across security boundaries. Initiated and developed an automatic options generation capability for correcting failures and degradations within the C2 system of the Advanced Technology AOC weapon system. Initiated and developed highly efficient business processes and tools to support information exchange between the AOC and other C2 centers in the Theater Air Control Structure.

(U) In FY 2006: Continue to investigate a core set of functionality and supporting infrastructure of the next generation AOC weapon system enabling the ability to plan, direct, coordinate, and control air forces and operations across

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603789F C3I Advanced Development	PROJECT NUMBER AND TITLE 4872 Aerospace Information Dominance

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
security boundaries in a coalition environment. Develop joint Service collaborative planning of mission packages with tailorable and exportable information reports/briefings associated with air space management and deconfliction. Continue developing highly efficient business processes and tools to support information exchange between the AOC and other C2 centers in the Theater Air Control Structure. Explore the integration of intelligent agents that use physics-based modeling to provide accurate, detailed advice necessary to make correct decisions. Apply appropriate system of systems and federation of systems engineering principles to create joint C2 decision-support capabilities.			
(U) In FY 2007: Continue to investigate a core set of functionality and supporting infrastructure, including multi-level security repositories, of the next generation AOC weapon system enabling the ability to plan, direct, coordinate, and control air forces and operations across security boundaries in a coalition environment. Develop execution of the airspace plan and re-planning options with faster than real-time fly out of Air Tasking Orders that can be performed in less time than it takes the aircraft to reach the airspace in question so that it can be dynamically de-conflicted; thus avoiding a possible hazardous condition. Continue developing highly efficient business processes and tools to support information exchange between the AOC and other C2 centers in the Theater Air Control Structure. Prototype and demonstrate intelligent agents that use physics-based modeling to provide accurate, detailed advice necessary to make correct decisions. Continue to develop and apply system of systems and federation of systems engineering principles to create joint C2 decision-support capabilities.			
(U)			
(U) MAJOR THRUST: Develop and demonstrate the integration of planning tools and information-based intelligent agents for adaptive replanning and decision support tools for aerospace C2 systems.	0.299	2.358	4.003
(U) In FY 2005: Began developing tools and technologies to revolutionize air mobility information superiority to respond swiftly and effectively to global demands across all spectrums of operations from humanitarian relief to a major conflict. Enabled the capability to rapidly synchronize theater information superiority capabilities between combat and mobility forces to support time-critical mobility and the seamless interoperability of DoD, civil, and coalition units for air traffic control. Initiated development of advanced reasoning techniques for mobility courses-of-action development. Explored the use of advanced computer mark-up languages and initiated the development of common mobility ontology to improve automation of the decision support tools for increased situational awareness, planning, and execution management.			
(U) In FY 2006: Continue developing tools and technologies to revolutionize air mobility information superiority to respond swiftly and effectively to global demands across all spectrums of operations from humanitarian relief to a major conflict. Continue development of advanced reasoning techniques for mobility courses-of-action development. Apply the use of advanced computer mark-up languages and continue the development of common mobility ontology to improve automation of the decision support tools for increased situational awareness, planning,			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603789F C3I Advanced Development	PROJECT NUMBER AND TITLE 4872 Aerospace Information Dominance

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
and execution management. Investigate the feasibility of a capability-centric versus system/program-centric global warfighting response by "bridging the seams" between disparate processes and systems in the Combat Air Force (CAF), Mobility Air Force (MAF), and Civil Air Traffic Management (ATM) domains. Develop improved synchronization among Global Strike and Global Mobility Force participants within multiple theaters and global Civil ATM. Develop the capability to support collaborative C2, including dynamic and intermittent participation of players possibly in a coalition setting. Develop innovative automated machine-to-machine exchange of selected information between CAF aircraft, MAF aircraft, their respective C2 elements, and civil ATM agencies. Explore the feasibility of virtual staff members to maintain a vision of C2 processes during human absences providing a 24/7 coverage.			
(U) In FY 2007: Continue development of tools and technologies to revolutionize air mobility information superiority to respond swiftly and effectively to global demands across all spectrums of operations from humanitarian relief to a major conflict. Complete development of advanced reasoning techniques for mobility courses-of-action development. Demonstrate the use of advanced computer mark-up languages and continue the development of common mobility ontology to improve automation of the decision support tools for increased situational awareness, planning, and execution management. Develop and demonstrate a CAF, MAF, civilian shared situational awareness/synchronization to achieve desired "effects" and ensure mission success in a global environment. Continue to develop improved synchronization among Global Strike and Global Mobility Force participants within multiple theaters and global Civil ATM. Demonstrate the capability to support collaborative C2, including dynamic and intermittent participation of players, possibly in a coalition setting. Continue to develop innovative automated machine-to-machine exchange of selected information between CAF aircraft, MAF aircraft, their respective C2 elements, and civil ATM agencies, and demonstrate improved information sharing and interoperability between CAF and MAF mission planning and execution systems for improved velocity, efficiency, safety, and mission success. Develop appropriate virtual staff members to maintain a vision of C2 processes during human absences providing a 24/7 coverage.			
(U)			
(U) MAJOR THRUST: Develop, demonstrate, and integrate a broad range of technologies that have application within embedded information architecture applicable to manned and unmanned vehicles. Note: In FY 2005, this effort was performed in Project 4925, first Major Thrust. In FY 2006, this effort completes.	0.000	0.830	0.000
(U) In FY 2005: Not Applicable.			
(U) In FY 2006: Develop a Time Sensitive Target automated decision-aiding capability for an Advanced Technology Aerospace Operations Center type of facility in a spiral fashion. Demonstrate in a real-time scenario such as Joint Expiditionary Force Experiment-2006.			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603789F C3I Advanced Development	PROJECT NUMBER AND TITLE 4872 Aerospace Information Dominance

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U)	In FY 2007: Not Applicable.			
(U)				
(U)	MAJOR THRUST: Develop and demonstrate an effects-based approach for the next generation of planning and assessment techniques that enable aerospace commanders to determine the desired operational effects at the right place at the right time.	1.489	3.835	4.488
(U)	In FY 2005: Initiated the design of new concepts and technologies supporting effects-based planning, execution, and assessment by enabling the generation, tasking, and assessment of effects-based Dynamic Air Execution Orders. Investigated various capabilities to support AOC personnel in developing and assessing, in near-real-time, various course of action options based upon commander's intent and knowledge gained from predictive battlespace awareness tools and processes. Initiated the investigation of advanced information technologies to shorten the current execution timelines, while also allowing significant reductions in the number of personnel required in an AOC.			
(U)	FY 2006: Continue to develop new concepts and technologies supporting effects-based planning, execution, and assessment by enabling the generation, tasking, and assessment of effects-based Dynamic Air Execution Orders. Continue investigating various capabilities to support AOC personnel in developing and assessing, in near-real-time, various course of action options based upon commander's intent, predictive battlespace awareness tools, and an ability to reason over models of the enemy as a system. Continue to develop technologies to capture, assess, and integrate cause-and-effect (first, second, and third order) relationships endemic to this "enemy as a system." Continue investigation of advanced information technologies to shorten the current execution timelines, while also allowing significant reductions in the number of personnel required in an AOC. Develop warfighter-accepted operational concepts and architecture views for a Streaming Air Tasking Order (ATO) generator and dynamic effects-based assessment capability. Begin spiral developments of concept demonstrations of a Streaming ATO generation capability. This will enable more responsive and continuous planning, execution, and assessment within the AOC.			
(U)	FY 2007: Continue to develop new concepts, to include cyber operations concepts, and technologies supporting effects-based planning, execution, and assessment by enabling the generation, tasking, and assessment of effects-based Dynamic Air Execution Orders. Continue investigating various capabilities to support AOC personnel in developing and assessing, in near-real-time, various course of action options based upon commander's intent, predictive battlespace awareness tools, and an ability to reason over models of the enemy as a system. Continue to develop technologies to capture, assess, and integrate cause-and-effect (first, second, and third order) relationships endemic to this "enemy as a system." Complete investigation of advanced information technologies to shorten the current execution timelines, while also allowing significant reductions in the number of personnel required in an			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603789F C3I Advanced Development	PROJECT NUMBER AND TITLE 4872 Aerospace Information Dominance

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U)	AOC. Develop a streaming ATO prototype capability. Develop real-time operational assessment demonstration in a streaming ATO environment that will enable an effects-based approach to operational assessment, which will allow greater visibility into whether or not desired effects are being achieved.			
(U)				
(U)	MAJOR THRUST/CONGRESSIONAL ADD : Demonstrate how a publish, subscribe, and query information management paradigm can enable horizontal integration of Air Force command, control, communication, computers, intelligence, surveillance, and reconnaissance information systems. Develop more advanced prototypes of a Community Of Interest (COI) infosphere that support information management requirements of various Air Force net-centric COI's. Demonstrate how such an infosphere can interact with and enhance the current net-centric infrastructure. This effort includes$1.3 million in FY 2006 Congressional Add funding.	2.767	4.092	2.905
(U)	In FY 2005: Demonstrated techniques to manage thousands of information objects from diverse information sources and data environments within a command and control information space. Completed the integration and demonstration of information management services that enable information exchange among disparate information systems. Evaluated and demonstrated technologies that enable the selective dissemination of information objects across multiple security level boundaries. Developed and demonstrated an advanced COI infosphere prototype, with non-real-time pub/sub/query capability, as well as Role-based Access Control and persistence management.			
(U)	In FY 2006: Initiate development of new next generation COI infosphere prototype to provide real-time performance, security to Air Force standards, and high levels of scalability to meet Air Force net-centric operational needs. Support information engineering efforts allowing various existing and new Air Force systems to utilize these COI infosphere prototypes. Conduct Congressionally-directed efforts for Battlespace Information Exchange.			
(U)	In FY 2007: Continue development of new next generation COI infosphere prototype to provide real-time performance, security to Air Force standards, and high levels of scalability. Continue to support information engineering efforts allowing various existing and new Air Force systems to utilize these COI infosphere prototypes. Initiate study of power efficient processing to enhance the publish/subscribe methodology to legacy systems.			
(U)	Total Cost	6.123	15.182	16.895

(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 0602702F, Command, Control, and Communications.									

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY **03 Advanced Technology Development (ATD)**	PE NUMBER AND TITLE **0603789F C3I Advanced Development**	PROJECT NUMBER AND TITLE **4872 Aerospace Information Dominance**

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

(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: 0603789F C3I Advanced Development

PROJECT NUMBER AND TITLE: 4925 Collaborative Info Superiority

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
4925 Collaborative Info Superiority	1.799	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 2005, an effort in this Project moved to Project 4216. In FY 2006, efforts in this Project move to Project 4872 in this PE.

(U) A. Mission Description and Budget Item Justification

This project develops and demonstrates technologies for the next generation of distributed collaborative environments, which will provide cross-disciplinary information to a decision-maker when, where, and how it is needed. Technologies developed will demonstrate advanced integrated information architectures for the near-real-time transfer of large volumes of information over existing and future Air Force Information Superiority systems. The application of these new technologies will allow reconfiguration and adaptation of existing operational aerospace systems to support seamless integrated operations.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST: Develop, demonstrate, and integrate a broad range of technologies that have application within an embedded information architecture applicable to manned and unmanned vehicles.	0.574	0.000	0.000
(U) In FY 2005: Continued the development of a TCT automated decision-aiding capability for an Advanced Technology AOC type of facility to deny the enemy the sanctuary of time. Continued development of airborne platform capabilities to engage in this environment either as information sources or sinks (on- and off-board resources) toward the end of assuring maximum exploitation of fielded assets in accomplishing the maximum strike responsiveness of the shooting elements for completing the TCT kill chain. Initiated the development of distributive collaborative environments for C2 warfighter decision making for a broad range of operations other than war, including modeling of non-combatant, neutral, and adversarial forces with social, economic, political, and cultural influences.			
(U) In FY 2006: Not Applicable.			
(U) In FY 2007: Not Applicable.			
(U)			
(U) MAJOR THRUST: Develop communication technologies to increase aerospace platform information transfer capacity.	0.625	0.000	0.000
(U) In FY 2005: Completed development and demonstration of an increased aerospace platform information transfer capacity exchange of time-critical threat, sensor, and C2 information between aircraft and cooperating space, airborne, and surface communication assets. Note: In FY 2005, the development of an initial munitions data link capability moved to Project 4216.			
(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: 0603789F C3I Advanced Development	PROJECT NUMBER AND TITLE: 4925 Collaborative Info Superiority

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U)	MAJOR THRUST: Develop and demonstrate embedded information system technologies to support a transparent framework for seamless, rapid insertion of battlespace infosphere technology.	0.600	0.000	0.000
(U)	In FY 2005: Continued development of embedded information technology to support the AOC management of unmanned and autonomous systems.			
(U)	In FY 2006: Not Applicable.			
(U)	In FY 2007: Not Applicable.			
(U)	Total Cost	1.799	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 0602702F, Command, Control, and Communications.									
(U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.									

(U) D. Acquisition Strategy

Not Applicable.