

**UNCLASSIFIED**

PE NUMBER: 0603789F  
 PE TITLE: C3I Advanced Development

<b>Exhibit R-2, RDT&amp;E Budget Item Justification</b>	DATE <b>February 2004</b>
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<b>BUDGET ACTIVITY</b> <b>03 Advanced Technology Development (ATD)</b>	<b>PE NUMBER AND TITLE</b> <b>0603789F C3I Advanced Development</b>
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Cost (\$ in Millions)	FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	Cost to Complete	Total
Total Program Element (PE) Cost	43.160	44.917	28.524	30.832	38.144	30.744	33.193	Continuing	TBD
4072 Dominant Battlespace Awareness	23.105	24.894	11.785	11.987	16.087	13.191	13.090	Continuing	TBD
4216 Battlespace Information Exchange	9.596	9.352	6.469	6.522	6.642	6.753	6.862	Continuing	TBD
4872 Aerospace Information Dominance	8.680	8.424	8.390	10.426	13.483	8.836	11.245	Continuing	TBD
4925 Collaborative Info Superiority	1.779	2.247	1.880	1.897	1.932	1.964	1.996	Continuing	TBD

Note: In FY 2004 Project 4872, Dynamic Aerospace C2 and Execution, changed to Aerospace Information Dominance, and Project 4925, Collaborative C2, changed to Collaborative Info Superiority.

**(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 Information 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 2004, Congress added \$3.0 million for Fusion Signals Intelligence Enhancements for Network Centric Intelligence, Surveillance and Reconnaissance, \$2.0 million for Automatic Acoustic Target Recognition, \$4.8 million for Identification of Time-Critical Targets (Targets Under Trees), \$3.0 million for Information Authentication and Protection, and \$1.0 million for Effects-Based Operations. 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.

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

	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>
(U) Previous President's Budget	45.030	31.538	28.599
(U) Current PBR/President's Budget	43.160	44.917	28.524
(U) Total Adjustments	-1.870	13.379	
(U) Congressional Program Reductions		-0.037	
Congressional Rescissions		-0.384	
Congressional Increases		13.800	
Reprogrammings	-0.626		
SBIR/STTR Transfer	-1.244		
(U) <u>Significant Program Changes:</u>			
Not Applicable.			

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<b>BUDGET ACTIVITY</b> <b>03 Advanced Technology Development (ATD)</b>				<b>PE NUMBER AND TITLE</b> <b>0603789F C3I Advanced Development</b>			<b>PROJECT NUMBER AND TITLE</b> <b>4072 Dominant Battlespace Awareness</b>		
Cost (\$ in Millions)	FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	Cost to Complete	Total
4072 Dominant Battlespace Awareness	23.105	24.894	11.785	11.987	16.087	13.191	13.090	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0		

**(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 Task Force and the Space and Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) Task Force. 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 (ISR) 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)**

	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>
(U) MAJOR THRUST: Develop and demonstrate advanced data handling and event visualization technologies.	4.411	4.135	3.391
(U) In FY 2003: Developed and demonstrated automated capabilities to access, extract, process, and display fused multi-source intelligence for in-time situational awareness. Developed tools for timeline, event, and motion pattern recognition to support analysis, visualization, and decision aids to detect enemy activity. Developed probabilistic approaches for accumulation of data/information to support target/activity identification and situational awareness. Developed a capability for precise geo-location and identification of targets exploiting multi-sensor data. Developed technologies to use multiple source correlation of sensor reports to optimize allocation of sensor resources.			
(U) In FY 2004: Develop and deliver probabilistic approaches for accumulation of data/information to support target/activity identification and situational awareness, in support of Predictive Battlespace Awareness (PBA). Complete development of the interface required to feed fused sensor information and derived higher levels of intelligence, such as enemy force structures, lines of communications, and possible courses of actions, into effects-based operations tools and decision aids. Continue development of tools for timeline, event, and motion pattern recognition to support analysis, visualization, and decision aids to detect enemy activity. Initiate development of an operations-based approach for intelligent and adaptive intelligence, surveillance, and reconnaissance (ISR) management, based upon quantified information deficiencies in the fused data-space. Initiate development of a fusion evaluation environment and provide the analysis, evaluation, and transition of fusion products to the warfighter.			
(U) In FY 2005: Complete probabilistic approaches for accumulation of data/information to support target/activity identification and situation awareness in support of PBA. Complete development and deliver tools for timeline, event			

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<p>and motion pattern recognition to support analysis, visualization and decision aids to detect enemy activity. Continue to develop an Operations-based approach for intelligent and adaptive ISR management, based upon quantified information deficiencies in the fused data-space. Continue to develop and deliver an initial fusion evaluation environment, providing for the analysis, evaluation, and transition of fusion products to the warfighter.</p>			
<p>(U) MAJOR THRUST/CONGRESSIONAL ADD: 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. Note: This effort includes \$2.8 million in FY 2003 Congressional Add funding for Fusion Signals Intelligence (SIGINT) Enhancements to Electronic Intelligence and \$3.0 million for FY 2004 Congressional Add funding for Fusion SIGINT Enhancements for Network Centric ISR.</p>	7.597	7.590	2.992
<p>(U) In FY 2003: Developed tools to extract information from data derived from image, and measurement and signature intelligence (MASINT). Developed and demonstrated information extraction tools that automatically extract events and their relationships from free form text, allowing the warfighter more time to perform analysis.</p>			
<p>(U) In FY 2004: Complete the development of tools to extract information from data derived from image, and measurement and MASINT. Continue to develop and demonstrate information extraction 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. Initiate development of an exploitation toolkit for advanced ISR platforms that provide the detection and tracking of air and ground targets. Initiate investigation of tools for the exploitation of High Range Resolution, Identification Friend or Foe, and Synthetic Aperture Radar sensor characteristics for feature-aided tracking and targeting. Start development of automated sensor management tools to support collection planning for ISR platforms.</p>			
<p>(U) In FY 2005: Complete development and demonstration of intermediate information extraction tools and initiate 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. Continue the development and deliver an exploitation toolkit for advanced intelligence, surveillance, and reconnaissance (ISR) platforms that provide the detection and tracking of air and ground targets. Deliver tools for the exploitation of High Range Resolution, Identification Friend or Foe, and Synthetic Aperture Radar sensor characteristics for feature aided tracking and targeting. Continue to develop and deliver automated sensor management tools to support collection planning for ISR platforms. Initiate development of algorithms for the dynamic tasking of ISR assets (Unmanned Aerial Vehicle/Manned/Space ISR collectors) based upon the exploitation and fusion of multi-source/multi-platform information, in order to provide timely dissemination of useable intelligence to allied/coalition forces.</p>			
<p>(U) MAJOR THRUST/CONGRESSIONAL ADD: Develop and demonstrate advanced data and information fusion</p>	11.097	13.169	5.402
Project 4072	R-1 Shopping List - Item No. 31-5 of 31-19	Exhibit R-2a (PE 0603789F)	

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capabilities to support multi-source capabilities, new sensor types, cognitive models, and automated fusion process management. Note: This effort includes \$1.75 million in FY 2003 and \$2.0 million in FY 2004 Congressional Add funding for Automatic Acoustic Target Recognition and \$3.9 million in FY 2003 and \$4.8 million in FY 2004 Congressional Add funding for Identification of Time-Critical Targets.

- (U) In FY 2003: Developed and demonstrated an all-source advanced capability for the detection and tracking of time-critical targets. Demonstrated fusion systems and architectures capable of exploiting multiple sources to find, fix, identify, and track moving air and ground targets, and to detect and track targets employing camouflage, concealment, and deception techniques. Developed fusion algorithms and tools to exploit fused sensor information to provide higher levels of intelligence such as enemy force structures, lines of communication, and possible courses of action. Initiated collaborative collection and fusion of intelligence, surveillance, and reconnaissance information to improve accuracy and timeliness for situational awareness and targeting.
- (U) In FY 2004: Demonstrate and deliver an all-source advanced capability for the detection and tracking of time-critical targets that employ camouflage, concealment, and deception techniques. Complete the demonstration of fusion system architectures capable of exploiting multiple sources of data to provide situational awareness, indications and warnings, and time-critical target identification and tracking. Complete the development of fusion algorithms and tools to exploit fused sensor information to provide higher levels of intelligence, such as enemy force structures, lines of communications, and possible courses of action. Complete the collaborative collection and fusion of ISR information to improve accuracy and timeliness for situational awareness and targeting. Develop, complete, and demonstrate a capability for fusing signal intelligence, moving target indicator, foliage penetrating radar, and imagery data for the detection and tracking of time-critical targets.
- (U) In FY 2005: Develop and demonstrate multi-intelligence data mining and reasoning techniques to locate hard to find targets within the context of a continuously changing battlefield environment. Initiate 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. Initiate an investigation of reasoning techniques to aid the analyst in understanding the dynamics of the battlefield.

(U) Total Cost	23.105	24.894	11.785
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(U) **C. Other Program Funding Summary (\$ in Millions)**

	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>	<u>Cost to</u>	<u>Total Cost</u>
	<u>Actual</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Complete</u>	
(U) Related Activities:									
(U) PE 0602702F, Command,									
(U) Control, and Communications									

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**4072 Dominant Battlespace  
Awareness****(U) C. Other Program Funding Summary (\$ in Millions)**

- (U) PE 0603203F, Advanced  
Aerospace Sensors.
- (U) PE 0603742F, Combat  
Identification Technology.  
This project has been  
coordinated through the
- (U) Reliance process to harmonize  
efforts and eliminate  
duplication.
- (U) **D. Acquisition Strategy**  
Not Applicable.

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<b>BUDGET ACTIVITY</b> <b>03 Advanced Technology Development (ATD)</b>				<b>PE NUMBER AND TITLE</b> <b>0603789F C3I Advanced Development</b>			<b>PROJECT NUMBER AND TITLE</b> <b>4216 Battlespace Information Exchange</b>		
Cost (\$ in Millions)	FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	Cost to Complete	Total
4216 Battlespace Information Exchange	9.596	9.352	6.469	6.522	6.642	6.753	6.862	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0		

**(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 (i.e., 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)**

	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>
(U) MAJOR THRUST: Develop and demonstrate advanced expert system decision algorithms to prioritize and control resources for global reach in the Air Mobility Command (AMC) environment.	1.152	1.329	1.795
(U) In FY 2003: Demonstrated an Intelligent Information Manager agent that will throttle and regulate mission information flow among AMC components based on changing system capabilities. Integrated the airborne components of Intelligent Information Manager, Integrated Network Controller, and the Global Media Access Controller to produce a combined commercial/military global communications system, a dynamically switched network, and an intelligent heterogeneous database access interface to prioritize and control resources in a mobility environment.			
(U) In FY 2004: Finalize and demonstrate advanced expert system decision algorithms to prioritize and control resources for global reach in the AMC environment. Complete and demonstrate an intelligent information manager agent that will autonomously throttle and regulate mission information flow among AMC components based on changing system capabilities. Complete Phase 1 integration in an AMC airlifter (carry-on capability) of the airborne components of the Intelligent Information Manager, Integrated Network Controller, and the Global Media Access Controller to produce a combined commercial/military global communications system, a dynamically switched network, and an intelligent heterogeneous database access interface to prioritize and control resources in a mobility environment.			
(U) In FY 2005: Further develop 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			

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<p>capability to the Joint Tactical Radio System clusters.</p>			
(U)			
(U) MAJOR THRUST: Develop advanced network protocols and commercial management technologies to provide communications from deployed aircraft and ground elements to the Air Mobility Command (AMC) Tanker Airlift Control Center (TACC), as well as in-transit visibility at the TACC of all aircraft, personnel, and cargo.	1.160	1.654	0.000
(U) In FY 2003: Demonstrated technology to dynamically reconfigure the network and communications systems to optimally match the requirements for information transfer with changing transmission path availability. Integrated and demonstrated the ground-based components of the Intelligent Information Manager, Integrated Network Controller, and Global Media Access Controller in AMC's TACC and AMC's forward deployed unit, the Tanker Airlift Control Element, resulting in a seamless information infrastructure providing total asset visibility and enhanced situation awareness.			
(U) In FY 2004: Complete the demonstration of technology to dynamically reconfigure the network and communications systems to optimally match the requirements for information transfer with changing transmission path availability. Complete development and integration of mechanisms that intelligently and dynamically negotiate quality of service and bandwidth between applications and network transport services based on mission priorities. Continue to integrate and demonstrate additional capabilities for ground-based components of the Intelligent Information Manager, Intelligent Network Controller, and Global Media Access Controller into AMC, Air Combat Command, and other DoD users' communications architecture, resulting in a seamless information infrastructure, providing total asset visibility and enhanced situational awareness.			
(U) In FY 2005: Not Applicable. Effort will be completed in FY 2004.			
(U)			
(U) MAJOR THRUST: Develop and demonstrate improved global networking and resource management technologies that provide reliable efficient, secure, interoperable, and dynamic deployable communications.	0.950	1.809	0.000
(U) In FY 2003: Completed the adaptive communications controller system(s), integrating additional and emerging media types for increased bandwidth capability. Developed and integrated mechanisms that intelligently and dynamically negotiate quality of service and bandwidth between applications and network transport services based on mission priorities. Completed development of affordable multi-level secure network management capabilities to provide commanders with status and control of information grid network resources.			
(U) In FY 2004: Complete the development and integration of mechanisms that intelligently and dynamically negotiate quality of service and bandwidth between applications and network transport services, based on mission priorities. Develop and demonstrate advanced cross-domain network management technology for enabling the exchange of network management, command and control applications status, and information assurance events, across security domains. Develop and demonstrate a highly flexible real-time controlled interface that parses and filters protocol level information with a fine degree of granularity. This advanced cross domain technology will enable the eventual			
Project 4216	R-1 Shopping List - Item No. 31-9 of 31-19	Exhibit R-2a (PE 0603789F)	



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development of a Network Common Operational Picture for situational awareness to assist in gauging the overall security and health of the multi-level information infrastructure.			
(U) In FY 2005: Not Applicable. Effort will be completed in FY 2004.			
(U)			
(U) MAJOR THRUST: Develop and demonstrate intelligent networking transport and management technology to provide assured, seamless, battlespace connectivity to the aerospace forces with a greatly reduced footprint.	1.255	1.123	1.895
(U) In FY 2003: Developed and demonstrated technology to support an en route and in-theater information grid for the worldwide exchange of near-real-time multimedia (i.e., voice, data, video, and imagery). Developed and demonstrated beyond line of sight wideband technologies between airborne platforms and ground terminals.			
(U) In FY 2004: Develop and demonstrate user-friendly, assured wideband wireless intelligent networking capability that automatically senses and adapts to its environment and service demands. Conduct preliminary lab demonstration of a self-organizing wideband network among simulated airborne platforms.			
(U) In FY 2005: Study, define, and develop mission and content delivery network mechanisms. Refine and enhance intelligent networking technology, which will adapt to its environment and varying demands for service, while providing mission and context-based quality-of-service (QoS) routing. Merge 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.			
(U)			
(U) MAJOR THRUST: Develop and demonstrate secure wideband assured networking for small cavity munitions (e.g. Joint Direct Attack Munition, etc.) and integration with the developing airborne segment of the Global Grid. Note: This effort started in FY 2004 in Project 4925.	0.000	0.000	2.294
(U) In FY 2003: Not Applicable.			
(U) In FY 2004: Not Applicable.			
(U) In FY 2005: Design and brassboard affordable high-capacity data links that are miniaturized to fit within the confines of miniature munitions. Data networking will support command and control of the munition and cooperative situational awareness and battle-damage-assessment with other weapon platforms.			
(U)			
(U) MAJOR THRUST: Develop and demonstrate an enterprise management system that collects and evaluates status information from multiple systems and sources, monitors enterprise integrity, analyzes situations, and displays enterprise-wide information.	0.958	0.437	0.485
(U) In FY 2003: Completed development and demonstrated technologies that integrate, illuminate, and manage command and control (C2) assets within the air operations center C2 process. Developed and demonstrated advanced application and network technologies that provide the capability to monitor, understand, and maintain the status of distributed C2 weapon systems. Development of interface methodologies for seamless integration of theater battle			
Project 4216	R-1 Shopping List - Item No. 31-10 of 31-19	Exhibit R-2a (PE 0603789F)	

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management applications into the joint battlespace infosphere.			
(U) In FY 2004: Initiate the development of an integrated command and control Enterprise Management System tool suite, comprised of common, scalable, and tailorable visualizations and management-control capabilities to support various fixed and deployed operations of command, control, and communications centers.			
(U) In FY 2005: Complete 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)			
(U) MAJOR THRUST: Develop and demonstrate an information assurance decision support system to provide real-time defensive courses-of-action.	0.921	0.000	0.000
(U) In FY 2003: Developed and demonstrated an information assurance decision support system to provide real-time defensive courses-of-action relating to intrusion detection, intrusion response, and information system recovery. Demonstrated data correlation and data fusion tools for detection of large-scale coordinated attacks and provided automatic forensics analysis of attack information. Developed the capability to assess attacks and sophistication of the threat level against the mission. Initiated development and demonstration of automated deployment of defensive counter measures.			
(U) In FY 2004: Not Applicable. Effort was discontinued due to higher Air Force priorities.			
(U) In FY 2005: Not Applicable.			
(U)			
(U) CONGRESSIONAL ADD: Information Protection and Authentication.	3.200	3.000	0.000
(U) In FY 2003: Developed and demonstrated information hiding, steganography, and digital watermarking for information protection and authentication systems. Developed steganographic techniques for data embedding, tamper detection and proofing, image and video content authentication, and secure information dissemination. Began investigation of new generation methods for digital security using steganographic techniques and for detection of digital forgeries without watermarks.			
(U) In FY 2004: Continue development and demonstration of information hiding, steganography, and digital watermarking for information protection and authentication systems. Continue development of steganographic techniques for data embedding, tamper detection and proofing, image and video content authentication, and secure information dissemination. Continue investigation of new generation methods for digital security using steganographic techniques and for detection of digital forgeries without watermarks.			
(U) In FY 2005: Not Applicable.			
(U) Total Cost	9.596	9.352	6.469

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4216 Battlespace Information  
Exchange(U) C. Other Program Funding Summary (\$ in Millions)(U) D. Acquisition Strategy

Not Applicable.

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BUDGET ACTIVITY <b>03 Advanced Technology Development (ATD)</b>				PE NUMBER AND TITLE <b>0603789F C3I Advanced Development</b>			PROJECT NUMBER AND TITLE <b>4872 Aerospace Information Dominance</b>		
Cost (\$ in Millions)	FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	Cost to Complete	Total
4872 Aerospace Information Dominance	8.680	8.424	8.390	10.426	13.483	8.836	11.245	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0		

**(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. 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)**

	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>
(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.	2.067	1.776	2.693
(U) In FY 2003: Developed and demonstrated multi-user collaborative interaction technology for adaptive visualization and presentation to enhance joint force battle plan simulation, assessment, and implementation focused on aerospace operations within the battlespace infosphere. Developed technology that integrates offensive, defensive, and support elements into an aerospace command center that provides the Expeditionary Aerospace Force a cohesive environment for planning, execution, and assessment. Developed embedded training technologies to provide rapid mission readiness for the warfighter.			
(U) In FY 2004: Demonstrate multi-user collaborative interaction technology for adaptive visualization and presentation to enhance joint force battle plan simulation, assessment, and implementation, focused on aerospace operations within the battlespace infosphere. Deliver and demonstrate technology that integrates offensive, defensive, and support elements into an aerospace command center that provides the Expeditionary Air Force a cohesive environment for planning, execution and assessment. Complete and transition to the Theater Battle Management Core System Program Office an integrated C2 system capability spiral that provides seamless access to tailored multi-media, multi-spectral data for commanders and staff within the AOC weapon system, allowing them to monitor the status of the C2 system. Initiate the design and development of a baseline of critical functionality and supporting infrastructure			

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<b>BUDGET ACTIVITY</b> <b>03 Advanced Technology Development (ATD)</b>	<b>PE NUMBER AND TITLE</b> <b>0603789F C3I Advanced Development</b>	<b>PROJECT NUMBER AND TITLE</b> <b>4872 Aerospace Information Dominance</b>

that will support the evolving Advanced Technology AOC weapon system and its split-operations concept. Define essential elements of information for the Advanced Technology AOC and develop methodologies and information representations that can be seamlessly exchanged across security boundaries.

(U) In FY 2005: Continue 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. Initiate and develop a capability for the commander to monitor, and repair where necessary, the health of the information superiority function within the AOC weapon system. Investigate 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. Initiate and develop an automatic options generation capability for correcting failures and degradations within the command and control (C2) system of the Advanced Technology AOC weapon system. Initiate and develop highly efficient business processes and tools to support information exchange between the Aerospace Operations Center and other C2 centers in the Theater Air Control Structure.

(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.	2.107	1.553	0.399
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(U) In FY 2003: Developed and integrated planning and information-based intelligent agents for adaptive replanning. Developed and demonstrated improved integrated flight management capabilities for mobility operations such as an improved search, retrieval, and handling of data and information required for optimal use of available mobility resources. Developed and demonstrated continuous updating of the type, location, and status of DoD transportation assets to improve situational awareness.

(U) In FY 2004: Demonstrate improved integrated flight management capabilities for mobility operations, such as improved search, retrieval, and handling of data and information required for optimal use of available mobility resources. Complete the development of tools to continuously update type, location, and status of DoD transportation assets to improve situational awareness. Demonstrate decision support tools and technologies to better manage and define the defense transportation system, accomplish mission viability and conflict analyses, and course of action assessment and evaluation.

(U) In FY 2005: Begin 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. Enable 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. Initiate development of advanced reasoning techniques for mobility courses-of-action development. Explore the use of advanced computer mark-up languages and initiate the development of common mobility ontology to improve automation of the decision support tools for increased situational awareness, planning,

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Exhibit R-2a, RDT&E Project Justification		DATE <b>February 2004</b>	
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<p>and execution management.</p>			
(U)			
<p>(U) MAJOR THRUST: Develop and demonstrate publish, subscribe, and query information management services that aggregate, share, and tailor information products, enabling horizontal integration of Air Force command, control, communication, computers, intelligence, surveillance, and reconnaissance information management systems.</p> <p>(U) In FY 2003: Developed and demonstrated the techniques to produce and manage information objects within the Joint Battlespace Infosphere from numerous web-enabled information sources, to customize information products, and to deliver decision-quality information to any warfighter. Developed and demonstrated data system wrapper technologies to dynamically integrate disparate command and control, intelligence, surveillance, and reconnaissance information systems into the Joint Battlespace Infosphere (JBI). Evaluated and integrated core JBI information management services that enable information exchange among disparate information systems.</p> <p>(U) In FY 2004: Continue to develop and demonstrate the techniques to manage information objects within the Joint Battlespace Infosphere (JBI), from diverse information sources and data environments. Develop and demonstrate data system wrapper technologies to dynamically integrate disparate and legacy command and control, intelligence, surveillance, and reconnaissance information systems into the JBI. Continue to evaluate and integrate core JBI information management services to enable information exchange among disparate information systems.</p> <p>(U) In FY 2005: Demonstrate the techniques to manage thousands of information objects from diverse information sources and data environments within a command and control information space. Complete the integration and demonstrate information management services that enable information exchange among disparate information systems. Evaluate and demonstrate technologies that enable the selective dissemination of information objects across multiple security level boundaries.</p>	<p>2.575</p>	<p>2.357</p>	<p>2.793</p>
(U)			
<p>(U) MAJOR THRUST/CONGRESSIONAL ADD: 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. Note: This effort includes \$1.0 million of FY 2004 Congressional Add funds for Effects-Based Operations.</p> <p>(U) In FY 2003: Demonstrated the effects-based operations capability through active template technologies to provide recommended priorities, resource availability, and provide the information to the battle managers in time to achieve mission objectives. Developed and demonstrated effects-based tools to operate in the battlespace infosphere that will allow the commander and his/her staff to make decisions with uncertain, ambiguous, or vague information during the course of an aerospace campaign. Developed a dynamic tasking toolkit that enables the warfighter to develop a comprehensive, coherent, and integrated joint aerospace operations plan.</p>	<p>1.931</p>	<p>2.738</p>	<p>2.505</p>
<p>(U) In FY 2004: Complete the demonstration of effects-based operational capability, using planning and decision-aid technologies that provide recommended priorities, resource availability, tasking, and scheduling to the battle</p>			
Project 4872	R-1 Shopping List - Item No. 31-15 of 31-19	Exhibit R-2a (PE 0603789F)	

<b>Exhibit R-2a, RDT&amp;E Project Justification</b>	DATE <b>February 2004</b>
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<b>BUDGET ACTIVITY</b> <b>03 Advanced Technology Development (ATD)</b>	<b>PE NUMBER AND TITLE</b> <b>0603789F C3I Advanced Development</b>	<b>PROJECT NUMBER AND TITLE</b> <b>4872 Aerospace Information Dominance</b>
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managers in time to achieve mission objectives. Complete demonstration of combat air forces' and mobility air forces' command and control tools to operate in the battlespace infosphere, which will allow the commander and his/her staff to quickly obtain relevant information, and make timely decisions during the course of a global aerospace campaign. Develop and complete a dynamic tasking process architecture that enables the warfighter to develop a comprehensive, coherent, and integrated joint aerospace operations plan, which can be dynamically executed.

(U) In FY 2005: Initiate 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. Investigate various capabilities to support Aerospace Operation Center (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. Initiate 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) Total Cost	8.680	8.424	8.390
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(U) **C. Other Program Funding Summary (\$ in Millions)**

	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>	<u>Cost to</u>	<u>Total Cost</u>
	<u>Actual</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Complete</u>	
(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) <b><u>D. Acquisition Strategy</u></b>									
(U) Not Applicable.									

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

DATE  
**February 2004**

BUDGET ACTIVITY <b>03 Advanced Technology Development (ATD)</b>				PE NUMBER AND TITLE <b>0603789F C3I Advanced Development</b>			PROJECT NUMBER AND TITLE <b>4925 Collaborative Info Superiority</b>			
Cost (\$ in Millions)	FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	Cost to Complete	Total	
4925 Collaborative Info Superiority	1.779	2.247	1.880	1.897	1.932	1.964	1.996	Continuing	TBD	
Quantity of RDT&E Articles	0	0	0	0	0	0	0			

**(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)**

	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>
(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.	0.244	0.457	0.598
(U) In FY 2003: Developed next generation collaborative environments and integrated aerospace information architectures for advanced Air Force enterprises. Demonstrated technology to perform platform information mining and collaborative environments for simulation-based acquisition.			
(U) In FY 2004: Develop, demonstrate, and integrate technologies to address a broad range of sensor-to-decision maker-to-shooter functions and concepts of operations. Initiate development of a time-critical target (TCT) automated decision-aiding capability to deny the enemy the sanctuary of time, for use in a command and control (C2) facility. Initiate development of airborne platform capabilities to engage in the TCT environment either as information sources or information sinks (using both on-board and off-board resources) to maximize exploitation of fielded assets to reduce the timeline of the TCT kill chain. Complete and demonstrate technology to perform platform information mining and collaborative environments for simulation-based acquisition.			
(U) In FY 2005: Continue the development of a TCT automated decision-aiding capability for an Advanced Technology Aerospace Operations Center type of facility to deny the enemy the sanctuary of time. Continue 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. Initiate 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) MAJOR THRUST: Develop communication technologies to increase aerospace platform information transfer capacity.	0.840	1.188	0.659



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BUDGET ACTIVITY <b>03 Advanced Technology Development (ATD)</b>	PE NUMBER AND TITLE <b>0603789F C3I Advanced Development</b>	PROJECT NUMBER AND TITLE <b>4925 Collaborative Info Superiority</b>	
(U) In FY 2003: Developed technology to increase aerospace platform information transfer capacity for exchange of time-critical threat, sensor, and C2 information between aircraft and cooperating space, airborne, and surface communication assets. Completed the design and begin the fabrication of high-capacity, bandwidth efficient, modem technology for point-to-point and multiple platform connectivity.			
(U) In FY 2004: Continue to develop technology to increase aerospace platform information transfer capacity for the exchange of time-critical threat, sensor, and command and control (C2) information between aircraft and cooperating space, airborne, and surface communication assets. Complete the fabrication of high-capacity, bandwidth efficient, modem technology for point-to-point and multiple platform connectivity. Initiate development of an initial weapon data link capability for modernization of aerospace and C2 platforms to support the system-of-systems interoperability within the Global Strike Task Force concept. Start investigations of the interface of weapon systems to the C2 structure that will implement a high tempo, weapons on target capability. Begin definition of munitions data link capabilities and munitions-to-weapon platform pairing.			
(U) In FY 2005: Complete 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 will move to Project 4216.			
(U)			
(U) MAJOR THRUST: Develop and demonstrate embedded information system technologies to support a transparent framework for seamless, rapid insertion of battlespace infosphere technology.		0.695	0.602
(U) In FY 2003: Developed techniques for inserting battlespace infosphere technology that do not require a comprehensive re-test of the entire C2 system. Developed capability for modernization of aerospace and C2 platforms to support system-of-systems interoperability within the battlespace infosphere.			0.623
(U) In FY 2004: Complete development techniques for inserting battlespace infosphere technology that do not require a comprehensive re-test of the entire C2 system. Complete the demonstration of capability for modernization of aerospace and C2 platforms to support system-of-systems interoperability within the battlespace infosphere. Initiate development of embedded information technology to support command and control of autonomous unmanned systems.			
(U) In FY 2005: Continue development of embedded information technology to support the Aerospace Operations Center management of unmanned and autonomous systems.			
(U) Total Cost		1.779	2.247
		1.880	

Exhibit R-2a, RDT&E Project Justification

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BUDGET ACTIVITY

03 Advanced Technology Development (ATD)

PE NUMBER AND TITLE

0603789F C3I Advanced Development

PROJECT NUMBER AND TITLE

4925 Collaborative Info Superiority

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

	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>	<u>Cost to</u>	<u>Total Cost</u>
	<u>Actual</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Complete</u>	

- (U) Related Activities:  
PE 0602702F, Command,  
(U) Control, and Communications  
This project has been  
coordinated through the  
(U) Reliance process to harmonize  
efforts and eliminate  
duplication.

(U) **D. Acquisition Strategy**

Not Applicable.