PE NUMBER: 0603789F

PE TITLE: C3I Advanced Development

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)								DATE February 2003			

BUDGET ACTIVITY 03 - Advanced Technology Development (ATD)					PE NUMBER AND TITLE 0603789F C3I Advanced Development						
COST ($ in Thousands)	FY 2002 Actual	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	Cost to Complete	Total Cost	
Total Program Element (PE) Cost	32,530	45,030	31,538	28,599	30,916	38,223	30,758	33,142	Continuing	TBD	
4072 Dominant Battlespace Awareness	11,157	24,064	15,344	11,816	12,020	16,120	13,197	13,070	Continuing	TBD	
4216 Battlespace Information Exchange	11,263	9,999	6,432	6,486	6,540	6,656	6,756	6,851	Continuing	TBD	
4872 Dynamic Aerospace C2 & Execution	7,195	9,101	7,496	8,412	10,454	13,511	8,840	11,228	Continuing	TBD	
4925 Collaborative C2	2,915	1,866	2,266	1,885	1,902	1,936	1,965	1,993	Continuing	TBD	
Quantity of RDT&E Articles	0	0	0	0	0	0	0	0	Continuing	TBD	

Note: In FY 2002, efforts previously accomplished in PE 0603726F, Project 4850, moved into Project 4925, and efforts previously accomplished in PE 0603726F, Project 2810, moved into Project 4072. These actions are part of the Air Force's Science and Technology PE realignment.

(U)   **A. Mission Description**

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 Dynamic Aerospace Command, Control, and Execution 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 Command and Control (C2) project provides the technology and demonstrations needed to establish virtual, distributed C2 centers, allowing the majority of the C2 center 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 2003, Congress added $2.8 million for Fusion SIGINT Enhancements to ELINT; $3.2 million for Information Protection and Authentication; $1.75 million for Automatic Acoustic Target Recognition; and $3.9 million for Identification of Time-Critical Targets.

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(U) **B. Budget Activity Justification**

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

(U) **C. Program Change Summary ($ in Thousands)**

		FY 2002	FY 2003	FY 2004	Total Cost
(U)	Previous President's Budget	33,217	34,288	36,190	
(U)	Appropriated Value	33,544	45,938		
(U)	Adjustments to Appropriated Value				
	a. Congressional/General Reductions	-327	-525		
	b. Small Business Innovative Research	-922			
	c. Omnibus or Other Above Threshold Reprogram		-383		
	d. Below Threshold Reprogram	393			
	e. Rescissions	-158			
(U)	Adjustments to Budget Years Since FY 2003 PBR			-4,652	
(U)	Current Budget Submit/FY 2004 PBR	32,530	45,030	31,538	TBD

(U) Significant Program Changes:

The reduction in FY 2004 is due to reallocation of funding to higher priority Air Force programs.

Exhibit R-2 (PE 0603789F)

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BUDGET ACTIVITY 03 - Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603789F C3I Advanced Development	PROJECT 4072

COST ($ in Thousands)		FY 2002 Actual	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	Cost to Complete	Total Cost
4072	Dominant Battlespace Awareness	11,157	24,064	15,344	11,816	12,020	16,120	13,197	13,070	Continuing	TBD

Note: Prior to FY 2002, a portion of this effort was accomplished in PE 0603726F, Project 2810.

(U) A. Mission Description

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 / Command and Control, Intelligence, Surveillance, and Reconnaissance 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 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) FY 2002 ($ in Thousands)

(U) $0   Accomplishments/ Planned Program

(U) $3,341   Developed and demonstrated advanced signal and data exploitation technologies for detection, tracking, identification, and targeting of time-critical targets, and information extraction technologies for situational awareness. Developed tools to extract information from data derived from acoustic, image, and signal intelligence. Continued to develop and demonstrate information extraction tools that automatically extract events and their relationships from free form text, allowing the warfigther more time to perform analysis.

(U) $6,464   Developed and demonstrated advanced data and information fusion capabilities to support multi-source missions, new sensor types, cognitive models, and automated fusion process management. Continued to develop and demonstrate an all-source advanced capability for the detection and tracking of time-critical targets. Continued to develop 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. Continued to develop 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.

(U) $1,352   Developed and demonstrated advanced data handling and event visualization technologies. Continued to develop and demonstrate automated capabilities to access, extract, process, and display fused multi-source intelligence for near-real-time situational awareness. Developed timeline, event, and motion pattern recognition tools for analysis, visualization, and decision aids to detect enemy activity. Developed and demonstrated

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BUDGET ACTIVITY 03 - Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603789F C3I Advanced Development	PROJECT 4072

(U) **A. Mission Description Continued**

(U) <u>FY 2002 ($ in Thousands) Continued</u>

probabilistic approaches for accumulation of data/information to support target/activity identification and situational awareness. Initiated development of a capability for precise geo-location and identification of targets exploiting multi-sensor data. Continued to develop the technologies to use multiple source correlation of sensor reports to optimize allocation and tasking of sensor resources.

(U) $11,157   Total

(U) <u>FY 2003 ($ in Thousands)</u>

(U) $0   Accomplishments/ Planned Program

(U) $7,912   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. Develop tools to extract information from data derived from image, and measurement and signature intelligence. Continue to develop and demonstrate information extraction tools that automatically extract events and their relationships from free form text, allowing the warfigther more time to perform analysis.

(U) $11,558   Develop and demonstrate advanced data and information fusion capabilities to support multi-source capabilities, new sensor types, cognitive models, and automated fusion process management. Continue to develop and demonstrate an all-source advanced capability for the detection and tracking of time-critical targets. Demonstrate 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. Continue to develop 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. Initiate collaborative collection and fusion of intelligence, surveillance, and reconaissance information to improve accuracy and timeliness for situational awareness and targeting.

(U) $4,594   Develop and demonstrate advanced data handling and event visualization technologies. Continue to develop and demonstrate automated capabilities to access, extract, process, and display fused multi-source intelligence for in-time situational awareness. Continue development of tools for timeline, event, and motion pattern recognition to support analysis, visualization, and decision aids to detect enemy activity. Continue to develop probabilistic approaches for accumulation of data/information to support target/activity identification and situational awareness. Develop a capability for precise geo-location and identification of targets exploiting multi-sensor data. Continue to develop the technologies to use multiple source correlation of sensor reports to optimize allocation of sensor resources.

(U) $24,064   Total

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BUDGET ACTIVITY 03 - Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603789F C3I Advanced Development	PROJECT 4072

(U) **A. Mission Description Continued**

(U) FY 2004 ($ in Thousands)

(U) $0   Accomplishments/ Planned Program

(U) $4,666   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. Complete the development of tools to extract information from data derived from image, and measurement and signature intelligence (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 intelligence, surveillance, and reconnaissance (ISR) platforms that provide the detection and tracking of air and ground targets. Initiate investigation of tools for the exploition of High Range Resolution (HRR), Identification Friend or Foe (IFF) and Synthetic Aperture Radar (SAR) sensor characteristics for feature-aided tracking and targeting. Start development of automated sensor management tools to support collection planning for ISR platforms.

(U) $6,501   Develop and demonstrate advanced data and information fusion capabilities to support multi-source capabilities, new sensor types, cognitive models, and automated fusion process management. 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) $4,177   Develop and demonstrate advanced data handling and event visualization technologies. Develop and deliver probabilistic approaches for accumulation of data/information to support target/activity identification and situational awareness, in support of Predictive Battle Space 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 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) $15,344   Total

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BUDGET ACTIVITY 03 - Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603789F C3I Advanced Development	PROJECT 4072

(U)　**B. Project Change Summary**
　　　Not Applicable.

(U)　**C. Other Program Funding Summary ($ in Thousands)**
(U)　Related Activities:
(U)　PE 0603203F, Advanced Aerospace Sensors.
(U)　PE 0602702F, Command, Control, and Communications (C3).
(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.

(U)　**E. Schedule Profile**
(U)　Not Applicable.

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BUDGET ACTIVITY 03 - Advanced Technology Development (ATD)				PE NUMBER AND TITLE 0603789F C3I Advanced Development						PROJECT 4216

COST ($ in Thousands)	FY 2002 Actual	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	Cost to Complete	Total Cost
4216 Battlespace Information Exchange	11,263	9,999	6,432	6,486	6,540	6,656	6,756	6,851	Continuing	TBD

(U)   A. Mission Description

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 command and control (C2) centers. It will: a) provide interoperability across echelon, Service, and multi-national force boundaries; b) support mobile C2, 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, and communications transmission systems.

(U)   FY 2002 ($ in Thousands)

(U) $0   Accomplishments/ Planned Program

(U) $1,209   Developed, integrated, and demonstrated advanced expert system decision algorithms to prioritize and control resources for global reach in a mobility environment. Demonstrated an intelligent information manager agent that throttled and regulated mission information flow among Air Mobility Command (AMC) components based on changing system capabilities. Integrated, in an AMC airlifter, 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) $1,206   Developed, integrated, and demonstrated advanced network protocols and commercial management technologies to provide communications from deployed aircraft and ground elements to the AMC Tanker Airlift Control Center (TACC), as well as in-transit visibility at the TACC of all aircraft, personnel, and cargo. 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 situational awareness.

(U) $696   Developed and demonstrated improved global networking and resource management technologies that provide reliable, efficient, secure, interoperable, and dynamic deployable communications to Air Combat Command. Continued to develop the ability to manage and control

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BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
03 - Advanced Technology Development (ATD)	0603789F C3I Advanced Development	4216

(U)   **A. Mission Description Continued**

(U)   <u>FY 2002 ($ in Thousands) Continued</u>

adaptive communications controller system(s) and to integrate additional and emerging media types for increased bandwidth capabilities. Continued development of mechanisms that intelligently and dynamically negotiate quality of service and bandwidth between command and control (C2) applications and network transport services. Continued development of affordable multi-level secure network management capabilities and incorporate additional management mechanisms to affect commander's control of all information grid network resources.

(U) $1,312   Developed and demonstrated intelligent wireless networking technologies to provide seamless and assured connectivity to all aerospace forces while reducing the forward-deployed footprint. 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). Continued to develop and demonstrate dynamic intelligent bandwidth management concepts and militarized protocols for highly dynamic and ad-hoc wireless network topologies.

(U) $1,166   Developed and demonstrated theater battle management and time-critical air operations technologies to provide field commanders essential operational decision support and rapid response capabilities. Continued to develop space weather impact decision aid capability. Continued to develop master caution panel capability to centrally monitor and manage command and control assets within the air operations center C2 process. Developed interface methodologies for seamless integration of theater battle management applications into the joint battlespace information environment.

(U) $2,801   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. Developed data correlation and data fusion tools for detection of large-scale coordinated attacks, and provide automatic forensics analysis of attack information. Developed and demonstrated Adaptive Information Protection Technologies that will allow systems to tolerate adversary attacks and intrusions, gracefully degrade, recover, and reconstitute not only the system, but also the critical processes, programs, and data.

(U) $2,873   Developed and demonstrateed Information Hiding, Steganography, and Digital Watermarking for Information Protection and Authentications Systems.   Developed stegongraphic algroithms that detect if infomation and information systems have been tampered with and demonstrate this capability in Air Force operational systems.

(U) $11,263   Total

(U)   <u>FY 2003 ($ in Thousands)</u>

(U) $0   Accomplishments/ Planned Program

(U) $1,246   Develop, integrate, and demonstrate advanced expert system decision algorithms to prioritize and control resources for global reach in a mobility environment. Continue to demonstrate an intelligent information manager agent that will throttle and regulate mission information flow among Air Mobility Command (AMC) components based on changing system capabilities. Continue to integrate, in an AMC airlifter, the airborne

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BUDGET ACTIVITY 03 - Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603789F C3I Advanced Development	PROJECT 4216

(U)   A. Mission Description Continued

(U)   FY 2003 ($ in Thousands) Continued

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) $1,255   Develop, integrate, and demonstrate 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. Continue to demonstrate technology to dynamically reconfigure the network and communications systems to optimally match the requirements for information transfer with changing transmission path availability. Continue to integrate and demonstrate the ground-based components of the Intelligent Information Mannager, 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) $1,028   Develop and demonstrate improved global networking and resource management technologies that provide reliable efficient, secure, interoperable, and dynamic deployable communications to Air Combat Command. Complete the adaptive communications controller system(s), integrating additional and emerging media types for increased bandwidth capability. Continue 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. Complete development of affordable multi-level secure network management capabilities to provide commanders with status and control of information grid network resources.

(U) $1,358   Develop and demonstrate intelligent wireless networking technologies to provide seamless and assured connectivity to all aerospace forces while reducing the forward-deployed footprint. Continue to develop and demonstrate 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). Develop and demonstrate beyond line of sight wideband technologies between airborne platforms and ground terminals.

(U) $1,036   Develop and demonstrate theater battle management and time-critical air operations technologies to provide field commanders essential operational decision support and rapid response capabilities. Complete development and demonstrate technologies that integrate, illuminate, and manage command and control (C2) assets within the air operations center C2 process. Develop and demonstrate advanced application and network technologies that provide the capability to monitor, understand, and maintain the status of distributed C2 weapon systems. Continue development of interface methodologies for seamless integration of theater battle management applications into the joint battlespace infosphere.

(U) $997   Develop and demonstrate an information assurance decision support system to provide real-time defensive courses-of-action relating to intrusion detection, intrusion response, and information system recovery. Demonstrate data correlation and data fusion tools for detection of large-scale coordinated attacks, and provide automatic forensics analysis of attack information. Develop the capability to assess attacks and sophistication

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BUDGET ACTIVITY 03 - Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603789F C3I Advanced Development	PROJECT 4216

(U) **A. Mission Description Continued**

(U) FY 2003 ($ in Thousands) Continued

of the threat level against the mission. Initiate development and demonstration of automated deployment of defensive counter measures.

(U) $3,079 — 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. Begin investigation of new generation methods for digital security using steganographic techniques, and for detection of digital forgeries without watermarks.

(U) $9,999 — Total

(U) FY 2004 ($ in Thousands)

(U) $0 — Accomplishments/ Planned Program

(U) $1,346 — Finalize and demonstrate advanced expert system decision algorithms to prioritize and control resources for global reach in the Air Mobility Command (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) $1,675 — Finalize development and integration of advanced network protocols and commercial management technologies to provide communications from deployed aircraft and ground elements to the AMC Tanker Airlift Control Center (TACC), as well as, in-transit visibility at the TACC of all aircraft, personnel, and cargo. 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) $1,832 — Develop secure cross-domain technology in support of managing fixed and deployed networks. 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. Initiate 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 a highly flexible

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(U)   **A. Mission Description Continued**

(U)   FY 2004 ($ in Thousands) Continued

      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 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) $1,137   Develop and demonstrate intelligent networking technology to provide assured, seamless, battlespace connectivity to the aerospace forces with a greatly reduced footprint. Develop and demonstrate user-friendly, assured wideband wireless intelligent networking capability that automatically senses and adapts to its environment and service demands. Conduct preliminary demonstration of a self-organizing wideband network among airborne platforms.

(U) $442   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. 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) $6,432   Total

(U)   B. Project Change Summary
    Not Applicable.

(U)   C. Other Program Funding Summary ($ in Thousands)
(U)   Related Activities:
(U)   PE 0602702F, Command, Control, and Communications (C3).
(U)   This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.

(U)   D. Acquisition Strategy
    Not Applicable.

(U)   E. Schedule Profile
(U)   Not Applicable.

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BUDGET ACTIVITY **03 - Advanced Technology Development (ATD)**	PE NUMBER AND TITLE **0603789F C3I Advanced Development**	PROJECT **4872**

COST ($ in Thousands)	FY 2002 Actual	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	Cost to Complete	Total Cost
4872 Dynamic Aerospace C2 & Execution	7,195	9,101	7,496	8,412	10,454	13,511	8,840	11,228	Continuing	TBD

(U) A. Mission Description

In order to perform command, control, and execution for the Expeditionary Aerospace Force (EAF), 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 command and control (C2) 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 C2 technologies that provide the commander and staff with seamless access to tailored multi-media, multi-spectral data within a mobile, dynamic C2 center. Knowledge-based intelligent information technologies will be developed to support robust, real-time, large-scale Air Force C2 systems.

(U) FY 2002 ($ in Thousands)

(U) $0   Accomplishments/Planned Program

(U) $1,928   Developed and demonstrated 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. Continued to develop 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. Continued to develop and demonstrate model abstraction to replicate/replay military exercises, provide near-real-time dynamic situation assessment, and identify preferred courses of action for decision making, while predicting likely outcomes. Developed 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 air campaign.

(U) $1,474   Developed and demonstrated distributed C2 technologies that are scalable and reconfigurable and provide seamless access to tailored multi-media, multi-spectral data for commanders and staff within mobile, dynamic command and control centers. Continued to develop and integrate 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. Continued to develop technology that integrates offensive, defensive, and support elements into an aerospace command center that provides the Expeditionary Aerospace Force (EAF) a cohesive environment for planning, execution, and assessment. Developed and demonstrated the techniques to produce and manage

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BUDGET ACTIVITY 03 - Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603789F C3I Advanced Development	PROJECT 4872

(U)   A. Mission Description Continued

(U)   FY 2002 ($ in Thousands) Continued

information objects within the battlespace infosphere from numerous web-enabled information sources, to customize information products, and to deliver decision-quality information to any warfighter.

(U) $3,793   Developed and demonstrated knowledge-based intelligent information tools to support robust, real-time, large-scale aerospace command and control (C2) systems. Demonstrated knowledge-based C2 technologies in support of network intrusion detection. Continued to develop and integrate planning and information-based intelligent agents for adaptive replanning.   Continued to develop and demonstrate the initial improved integrated flight management capability that will enhance decisions by providing commanders and decision makers a totally integrated perspective of available forces and employment options, including both operational and supporting element capabilities and limitations, within Air Mobility Command's info-centric environment.

(U) $7,195   Total

(U)   FY 2003 ($ in Thousands)

(U) $0   Accomplishments/ Planned Program

(U) $2,025   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. Demonstrate 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. Continue to develop and demonstrate 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. Develop a dynamic tasking toolkit that enables the warfighter to develop a comprehensive, coherent, and integrated joint aerospace operations plan.

(U) $2,167   Develop and demonstrate distributed C2 technologies that are scalable and reconfigurable and provide seamless access to tailored multi-media, multi-spectral data for commanders and staff in mobile, dynamic command and control centers. Continue to develop and 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. Continue to develop technology that integrates offensive, defensive, and support elements into an aerospace command center that provides the EAF a cohesive environment for planning, execution, and assessment. Develop embedded training technologies to provide rapid mission readiness for the warfighter.

(U) $2,209   Develop and demonstrate knowledge-based intelligent information tools to support robust, real-time, large-scale aerospace C2 systems. Continue to develop and integrate planning and information-based intelligent agents for adaptive replanning. Continue to develop and demonstrate improved integrated flight management capabilities for mobility operations such as an improved search, retrieval, and handling of

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(U)   A. Mission Description Continued

(U)   FY 2003 ($ in Thousands) Continued

data and information required for optimal use of available mobility resources. Develop and demonstrate continuous updating of the type, location, and status of DoD transportation assets to improve situational awareness

(U) $2,700   Continue to develop and demonstrate the techniques to produce and manage information objects within the Joint Battlespace Infosphere (JBI) from numerous web-enabled information sources, to customize information products, and to deliver decision-quality information to any warfighter. Develop and demonstrate data system wrapper technologies to dynamically integrate disparate command and control, intelligence, surveillance, and reconnaissance information systems into the JBI. Evaluate and integrate core JBI information management services that enable information exchange among disparate information systems.

(U) $9,101   Total

(U)   FY 2004 ($ in Thousands)
(U) $0   Accomplishments/ Planned Program
(U) $1,762   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, and at the right time. 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 managers in time to achieve mission objectives. Complete demonstration of combat air forces' and mobility air forces' command and control (C2) 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) $1,791   Develop and demonstrate distributed C2 technologies that are scalable and reconfigurable and provide seamless access to tailored multi-media, multi-spectral data for commanders and staff within mobile, dynamic C2 centers. 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 Air and Space Operations Center weapon system, allowing them to monitor the status of the command and control (C2) system. Initiate the design and development of a baseline of critical functionality and supporting infrastructure that will support the evolving Advanced Technology Air and Space Operations Center weapon

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(U)   **A. Mission Description Continued**

(U)   FY 2004 ($ in Thousands) Continued

           system and its split-operations concept. Define essential elements of information for the Advanced Technology Air Operations Center and develop methodologies and information representations that can be seamlessly exchanged across security boundaries.

(U) $1,566   Develop and demonstrate the integration of planning tools and information-based intelligent agents for adaptive replanning and decision support tools for aerospace C2 systems. 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) $2,377   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 publish, subscribe, and query information management capabilities to aggregate, share, and tailor information products, enabling horizontal integration of Air Force command, control, intelligence, surveillance and reconnaissance (C2ISR) information management systems. Develop and demonstrate data system wrapper technologies to dynamically integrate disparate and legacy C2ISR information systems into the JBI. Continue to evaluate and integrate core JBI information management services to enable information exchange among disparate information systems.

(U) $7,496   Total

(U)   **B. Project Change Summary**
      Not Applicable.

(U)   **C. Other Program Funding Summary ($ in Thousands)**
(U)   Related Activities:
(U)   PE 0602702F, Command, Control,and Communications (C3).
(U)   This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.

(U)   **D. Acquisition Strategy**
      Not Applicable.

(U)   **E. Schedule Profile**
(U)   Not Applicable.

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BUDGET ACTIVITY **03 - Advanced Technology Development (ATD)**	PE NUMBER AND TITLE **0603789F C3I Advanced Development**	PROJECT **4925**

COST ($ in Thousands)	FY 2002 Actual	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	Cost to Complete	Total Cost
4925 Collaborative C2	2,915	1,866	2,266	1,885	1,902	1,936	1,965	1,993	Continuing	TBD

(U)   **A. Mission Description**

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 command, control, and communications systems. The application of these new technologies will allow reconfiguration and adaptation of existing operational aerospace systems to support seamless integrated operations.

(U)   FY 2002 ($ in Thousands)

(U) $0   Accomplishments/ Planned Program

(U) $966   Developed and demonstrated next generation distributed collaborative environments and integrated aerospace information architectures. Continued to develop collaborative technologies for split aerospace operations; coalition warfare; simulation-based acquisition; platform information mining; blended air/ground decision aiding; and information migration.

(U) $982   Developed communications technology to increase aerospace platform information transfer capacity. Continued to develop the technology to increase aerospace platform information transfer capacity for exchange of time-critical threat, sensor, and command and control (C2) information between aircraft and cooperating space, airborne, and surface communication assets. Developed the design of a high capacity, bandwidth efficient, modulation/network and phased array antenna control technology for point-to-point and multiple platform connectivity.

(U) $967   Developed and demonstrated embedded information system technologies to support a transparent framework for seamless, rapid insertion of battlespace infosphere technology. 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.

(U) $2,915   Total

(U)   FY 2003 ($ in Thousands)

(U) $0   Accomplishments/ Planned Program

(U) $256   Develop and demonstrate next generation distributed collaborative environments and integrated aerospace information architectures. Continue to develop next generation collaborative environments and integrated aerospace information architectures for advanced Air Force enterprises. Demonstrate technology to perform platform information mining and collaborative environments for simulation-based acquisition.

(U) $881   Develop communications technology to increase aerospace platform information transfer capacity. Continue to develop technology to increase

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(U)   **A. Mission Description Continued**

(U)   <u>FY 2003 ($ in Thousands) Continued</u>

                aerospace platform information transfer capacity for exchange of time-critical threat, sensor, and command and control (C2) information between aircraft and cooperating space, airborne, and surface communication assets. Complete the design and begin the fabrication of high capacity, bandwidth efficient, modem technology for point-to-point and multiple platform connectivity.

(U) $729   Develop and demonstrate embedded information system technologies to support a transparent framework for seamless, rapid insertion of battlespace infosphere technology. Continue to develop techniques for inserting battlespace infosphere technology that do not require a comprehensive re-test of the entire C2 system. Continue to develop capability for modernization of aerospace and C2 platforms to support system-of-systems interoperability within the battlespace infosphere.

(U) $1,866   Total

(U)   <u>FY 2004 ($ in Thousands)</u>

(U) $0   Accomplishments/ Planned Program

(U) $461   Develop, demonstrate, and integrate a broad range of technologies that have potential applications within an embedded information architecture applicable to manned and unmanned vehicles. 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 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) $1,198   Develop communication technologies to increase aerospace platform information transfer capacity. Continue to develop technology to increase aerospace platform information transfer capacity for the exchange of time-critical threat, sensor, and 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) $607   Develop and demonstrate embedded information system technologies to support a transparent framework for seamless, rapid insertion of battlespace infosphere technology. 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

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(U)   **A. Mission Description Continued**

(U)   FY 2004 ($ in Thousands) Continued

      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) $2,266   Total

(U)   **B. Project Change Summary**
    Not Applicable.

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

(U)   **E. Schedule Profile**
(U)   Not Applicable.