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Exhibit R-2, PB 2010 Air Force RDT&E Budget Item Justification								DATE: May 2009		
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)					R-1 ITEM NOMENCLATURE PE 0603788F Global Information Dev/Demo					
COST (\$ in Millions)	FY 2008 Actual	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	0.000	0.000	39.708						Continuing	Continuing
635319: Anticipatory OPS Intent and Response	0.000	0.000	10.613						Continuing	Continuing
635320: Assured Worldwide Connectivity	0.000	0.000	11.750						Continuing	Continuing
635321: Global Battlespace Awareness	0.000	0.000	9.870						Continuing	Continuing
635322: Knowledge Management and Computing	0.000	0.000	7.475						Continuing	Continuing

Note

Note: Prior to FY 2010, efforts in this PE were performed in PE 0603789F, C3I Advanced Development.

A. Mission Description and Budget Item Justification

This program develops and demonstrates Air Force Enterprise-Centric Information 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, complex environment. The Global Battlespace Awareness project develops, integrates, and demonstrates advanced technologies to achieve comprehensive net-centric operations and total battlespace awareness by using and exploiting information from all sources. The Assured Worldwide Connectivity project provides advanced net-enabled architectures and communications technologies in support of global military operations including a secure information grid for worldwide information exchange of near-real-time multimedia (i.e., voice, data, video, and imagery) information. In addition, this project develops and demonstrates advanced optical networking and communications for Air Force air and space-based information exchange on and between platforms. These developments implement and enable high capacity secure, assured networks for worldwide information exchange of near-real-time multimedia (i.e., voice, data, video, and imagery). These optical networks will be rapidly deployable, mobile, interoperable, and seamless between Air and Space Operations Centers (AOC) and air and space based platforms either en route or in theater. This project also provides the tools and applications leading to the development and integration of cyber deterrence technologies resulting in a strategic capability of cyber dominance within the secure information grid. The Knowledge Management and Computing project develops the technology applications that will provide for a secure, tailored, seamless exchange of information among producers, consumers and managers of information relevant to a particular community of interest (COI). The project also provides the development of interactive and real-time computing technologies that greatly improve the usability of high performance computing for the exchange,

UNCLASSIFIED

UNCLASSIFIED

Exhibit R-2, PB 2010 Air Force RDT&E Budget Item Justification	DATE: May 2009
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APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)	R-1 ITEM NOMENCLATURE PE 0603788F Global Information Dev/Demo
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utilization, and management of information in the enterprise. The Anticipatory Ops Intent and Response project develops the technologies for dynamic planning and execution with the accuracy, fidelity, and timeliness needed to dominate the battlespace. This project will develop and demonstrate technologies necessary for dynamic decision making to create, plan, and execute complex effects on compressed time scales required for tomorrow's conflicts regardless of the warfighting domain - air, space, or cyber. 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.

B. Program Change Summary (\$ in Millions)

	<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>	<u>FY 2011</u>
Previous President's Budget	0.000	0.000	0.000	
Current BES/President's Budget	0.000	0.000	39.708	
Total Adjustments	0.000	0.000	0.000	
Congressional Program Reductions	0.000	0.000		
Congressional Rescissions	0.000	0.000		
Total Congressional Increases	0.000	0.000		
Total Reprogrammings	0.000	0.000		
SBIR/STTR Transfer	0.000	0.000		

UNCLASSIFIED

UNCLASSIFIED

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COST (\$ in Millions)	FY 2008 Actual	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
635319: Anticipatory OPS Intent and Response	0.000	0.000	10.613						Continuing	Continuing

Note

Note: Prior to FY 2010, these efforts were performed in PE 0603789F, C3I Advanced Technologies, Project 4872.

A. Mission Description and Budget Item Justification

In order to achieve information dominance, the Air Force must be able to monitor, assess, plan and execute (MAPE) missions rapidly across the full spectrum of operations (air, space and cyberspace) at all levels of war (strategic, operational, and tactical) and during all phases of conflict (pre-conflict, conflict through stability operations). This project develops and integrates decision support technologies that will enhance the commander's ability to anticipate and dominate the future battlespace by more effectively forecasting the evolution of the battlespace and by more rapidly generating options to "virtually checkmate" the adversary. It develops the decision aid technologies and processes to plan the use of various assets and assess their effects in the battlespace. It provides a tailorable information environment to effectively portray complex data sets accurately in real-time.

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

	FY 2008	FY 2009	FY 2010	FY 2011
<p>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 decision makers and staff in mobile, dynamic, scalable, globally distributed command and control centers. Note: Prior to FY 2010, efforts were conducted in PE 0603789F, Project 4872.</p> <p>In FY 2008: Not Applicable.</p> <p>In FY 2009: Not Applicable.</p> <p>In FY 2010: Continue developing capabilities to allow seamless information sharing for enhanced situational awareness and understanding by the decision maker. Continue the development of an initial capability to plan and measure effectiveness of information operations synchronized with precision munitions to determine successful achievement of command intent in time and location. Continue campaign of experimentation to quantitatively measure transformational command and control concepts enabled by net centric warfare</p>	0.000	0.000	1.701	

UNCLASSIFIED

UNCLASSIFIED

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B. Accomplishments/Planned Program (\$ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
capabilities. Initiate an investigation of space C2 planning and scheduling technologies to enable enhanced space operations. Start the development of an integrated C2 tasking capability to enable seamless full spectrum options to be reasoned over and recommendations provided to the operator that will meet commander's intent. Develop capability to generate a user defined operational picture across the air, space, and cyber domains at the strategic, operational, and tactical levels.				
<p>MAJOR THRUST: Develop and demonstrate the integration of planning tools and information-base intelligent agents for adaptive preplanning and decision support tools for Air Force command and control systems. Note: Prior to FY 2010, efforts were conducted in PE 0603789F, Project 4872.</p> <p>In FY 2008: Not Applicable.</p> <p>In FY 2009: Not Applicable.</p> <p>In FY 2010: Continue development of capabilities to be more agile within a net centric enabled environment. Continue development of timely option generation, selection, and coordination capabilities that account for uncertainty and missing and erroneous information, and supports intuitive decision making processes. Continue to develop dynamic workflow and workload management capabilities to manage the command and control enterprise. Initiate development of a capability to assess adverse events that could potentially impact air and space mobility operations and suggest courses of action (COA) that could be initiated to continue operations. Investigate methods to evaluate mobility courses of action covering planning through assessment that anticipates multiple constraints and provides prioritized feasible recommendations that meets commander's intent. Develop capability to assess the impact of cyber on air and space C2 operations and suggest courses of action to be initiated to continue operations in the face of cyber threats.</p>	0.000	0.000	4.450	
MAJOR THRUST: Develop and demonstrate an effects-based approach for the next generation of planning and assessment techniques that enable decision makers to determine the desired operational effects (nth-	0.000	0.000	4.462	

UNCLASSIFIED

UNCLASSIFIED

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B. Accomplishments/Planned Program (\$ in Millions)							FY 2008	FY 2009	FY 2010	FY 2011		
<p>order) at the right place at the right time, anywhere, anytime. Note: Prior to FY 2010, efforts were conducted in PE 0603789F, Project 4872.</p> <p>In FY 2008: Not Applicable.</p> <p>In FY 2009: Not Applicable.</p> <p>In FY 2010: Initiate the development and demonstrate real-time information technologies that enable a decision maker to comprehend their current situational awareness by assessing an operation's progress against desired effects (reflective) and identifying key indicators and observables to assist in anticipating future success or failure of a campaign (predictive). Continue investigating the methods to enable a decision support environment that enables the decision maker to anticipate and shape all aspects of the future battlespace. Continue development of predictive battlespace planning tools with the ability to reason over models of the "enemy as a system." Evaluate competing approaches for the analysis of cascading effects in real-time for diverse courses of action. Initiate design of a tool suite for rapidly wargaming proposed actions against an intelligent adversary. Develop and demonstrate capability to enable integrated traditional and cyber effects based assessment for air and space operations centers. Develop capability to integrate kinetic and non-kinetic assets in an integrated tasking order to achieve desired commander's effects.</p>												
C. Other Program Funding Summary (\$ in Millions)												
	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost		
Activity Not Provided/Not applicable	0.000	0.000							Continuing	Continuing		
D. Acquisition Strategy												
Not applicable												

UNCLASSIFIED

R-1 Line Item #31

Page 5 of 19

UNCLASSIFIED

Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification		DATE: May 2009
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)	R-1 ITEM NOMENCLATURE PE 0603788F Global Information Dev/Demo	PROJECT NUMBER 635319

E. Performance Metrics

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

UNCLASSIFIED

UNCLASSIFIED

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APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)				R-1 ITEM NOMENCLATURE PE 0603788F Global Information Dev/Demo					PROJECT NUMBER 635320	
COST (\$ in Millions)	FY 2008 Actual	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
635320: Assured Worldwide Connectivity	0.000	0.000	11.750						Continuing	Continuing

Note

Note: Prior to FY 2010, these efforts were performed in PE 0603789F, C3I Advanced Technologies, Project 4216.

A. Mission Description and Budget Item Justification

The Air Force requires advanced net-enabled architectures and communications technologies in support of global kinetic and non-kinetic military operations including a secure information grid for worldwide information delivery and exchange of near-real-time information including voice, data, video, and imagery. This secure environment will be rapidly deployable, mobile, interoperable, and seamless between Air and Space Operations Centers (AOC) and aircraft, either en route or in theater. This project provides secure information transmission capabilities for a persistent, global, survivable communications backbone network accessible for warfighters operating in all domains; it provides self-healing, self-configuration, anti-jam communication networking capabilities; and it provides enterprise networking capabilities for agile, policy-based network management. In addition, this project develops and demonstrates advanced optical networking and communications for Air Force air and space-based information exchange on and between platforms including development of highly integrated multi-gigabit optical and radio frequency networks, all optical data routers, optical backbone interface circuits for on board information exchange, and integrated electronic, adaptive optic systems for atmospheric mitigation. The Air Force also requires the ability to deliver sovereign options in cyberspace through the development and integration of cyber attack, cyber defense, and cyber support technologies for a strategic capability of cyber dominance. This project develops the ability to deliver: 1) Cyber attack capabilities: access, stealth and persistence, cyber intelligence, and weapons delivery, 2) Cyber defense capabilities: attack detection, attack attribution, and response automation, and 3) Cyber support capability: situational awareness and war gaming.

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

	FY 2008	FY 2009	FY 2010	FY 2011
MAJOR THRUST: Develop and demonstrate secure wideband assured networking between weapon platforms (e.g., munitions, uninhabited air systems, and aircraft), ground facilities, and Special Operations Forces personnel. Note: Prior to FY 2010, efforts were conducted in PE 0603789F, Project 4216.	0.000	0.000	1.432	
In FY 2008: Not Applicable.				
In FY 2009: Not Applicable.				

UNCLASSIFIED

UNCLASSIFIED

Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification			DATE: May 2009	
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B. Accomplishments/Planned Program (\$ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
In FY 2010: Continue development of small form-factor networking and reachback capability. Initiate design and demonstration of soldier interface, perform initial flight test.				
<p>MAJOR THRUST: Proactively defend cyberspace through cyber situational awareness, detecting and defeating cyber threats, and surviving through adaptation and self-generation. Note: Prior to FY 2010, efforts were conducted in PE 0603789F, Project 4216.</p> <p>In FY 2008: Not Applicable.</p> <p>In FY 2009: Not Applicable.</p> <p>In FY 2010: Demonstrate a fleet of 1,000 cooperative, positively controlled, trusted agents that can defend mission critical information system assets and collect actionable CybINT for cyber situation awareness. Continue assured end-to-end Quality of Service (QoS) and Quality of Assurance (QoA) integration to the information system enterprise during malicious and non-malicious faults. Develop capability to geo-locate red, blue, and non-combatant IP addresses and devices globally and locally to achieve better situational awareness to efficiently position cyber defenses. Initiate development of a complete situational awareness capability of cyber network assets, both red and blue forces, to include both virtual and physical cyber assets.</p>	0.000	0.000	4.288	
<p>MAJOR THRUST: Develop and demonstrate offensive cyber operations capabilities in a series of Experimental Cyber Craft technology demonstrations. These demonstrations will integrate capabilities developed from ongoing offensive cyber programs in the areas of gaining access to systems, performing operations in a stealthy manner, gathering intelligence from the compromised systems and launching cyber "effects" against the systems. Note: Prior to FY 2010, efforts were conducted in PE 0603789F, Project 4216.</p> <p>In FY 2008: Not Applicable.</p> <p>In FY 2009: Not Applicable.</p>	0.000	0.000	3.336	

UNCLASSIFIED

R-1 Line Item #31

Page 8 of 19

UNCLASSIFIED

Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification			DATE: May 2009	
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)	R-1 ITEM NOMENCLATURE PE 0603788F Global Information Dev/Demo		PROJECT NUMBER 635320	
B. Accomplishments/Planned Program (\$ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
In FY 2010: Continue to analyze development of additional offensive cyber operations capabilities, integrated kinetic and cyber operations planning and execution capabilities, and cyber command and control (Cyber C2) operations functions. Complete selected offensive cyber capabilities to access, remain stealthy, gather intelligence, and affect adversary information and information systems. Finalize technology demonstration plans.				
<p>MAJOR THRUST: Develop and demonstrate intelligent networking transport and management technology to provide assured, seamless, battlespace connectivity to the Air Force with a greatly reduced footprint. Note: Prior to FY 2010, efforts were conducted in PE 0603789F, Project 4216.</p> <p>In FY 2008: Not Applicable.</p> <p>In FY 2009: Not Applicable.</p> <p>In FY 2010: Initiate advanced demonstration of high capacity assured access (anti-jam) communications for global spectrum dominance. Develop Quality of Service (QoS) enabled information management and dissemination combined with network policy language for efficient, prioritized information exchange.</p>	0.000	0.000	0.230	
<p>MAJOR THRUST: Integrate and demonstrate a resilient and self-regenerating information enterprise that dynamically recognizes, characterizes, and understands novel cyber attacks and service anomalies, aids in the creation of synthetically diverse, functionally equivalent software, and continuously monitors, reconfigures, and self optimizes the mission critical enterprise to resist new attacks, and possesses robust anti-tamper and software protection features. Note: Prior to FY 2010, efforts were conducted in PE 0603789F, Project 4216.</p> <p>In FY 2008: Not Applicable.</p> <p>In FY 2009: Not Applicable.</p>	0.000	0.000	1.176	

UNCLASSIFIED

UNCLASSIFIED

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B. Accomplishments/Planned Program (\$ in Millions)							FY 2008	FY 2009	FY 2010	FY 2011		
In FY 2010: Begin integration of technologies to introduce synthetic diversity into friendly information systems. Initiate integration of anti-tamper software protection technology with enterprise information systems.												
<p>MAJOR THRUST: Design, develop, and demonstrate flight ready systems consisting of high capacity radio frequency (RF) and optical components and architectures for next generation platform communications for avionics and satellite systems, and also for wireless in-flight communications systems. These RF and optical communications components are very compact, highly integrated and tolerant to avionics and space environments. Flight test systems will be developed and installed in suitable aircraft and satellite systems and demonstrated in an in-flight environment. Note: Prior to FY 2010, efforts were conducted in PE 0603789F, Project 4216.</p> <p>In FY 2008: Not Applicable.</p> <p>In FY 2009: Not Applicable.</p> <p>In FY 2010: Complete the design of higher throughput RF waveform data link for operation under adverse weather conditions. Begin fabrication of several flight test ready RF waveform data link systems.</p>							0.000	0.000	1.288			
C. Other Program Funding Summary (\$ in Millions)												
	<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>	<u>FY 2011</u>	<u>FY 2012</u>	<u>FY 2013</u>	<u>FY 2014</u>	<u>FY 2015</u>	<u>Cost To Complete</u>	<u>Total Cost</u>		
Activity Not Provided/Not applicable	0.000	0.000							Continuing	Continuing		
D. Acquisition Strategy												
Not applicable												

UNCLASSIFIED

UNCLASSIFIED

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APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)	R-1 ITEM NOMENCLATURE PE 0603788F Global Information Dev/Demo	PROJECT NUMBER 635320

E. Performance Metrics

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

UNCLASSIFIED

UNCLASSIFIED

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COST (\$ in Millions)	FY 2008 Actual	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
635321: Global Battlespace Awareness	0.000	0.000	9.870						Continuing	Continuing

Note

Note: Prior to FY 2010, these efforts were performed in PE 0603789F, C3I Advanced Technologies, Project 4072.

A. Mission Description and Budget Item Justification

In order to achieve information dominance, the Air Force must be able to monitor, assess, plan and execute (MAPE) missions rapidly across the full spectrum of operations (air, space and cyberspace) at all levels of war (strategic, operational, and tactical) and during all phases of conflict (pre-conflict, conflict through stability operations). This project develops, integrates, and demonstrates advanced technologies to achieve comprehensive net-centric operations and Predictive Battlespace Awareness (PBA) using information from all sources. 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 n-dimensional representation of the battlespace; assessing the situation; predicting adversary courses of action (COA); and archiving the results for ready use by decision makers. This is a dynamic, complex process that involves technologies for information exploitation, fusion, processing, storage, and retrieval, as well as technologies for machine reasoning, pattern recognition, and timeline analysis.

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

	FY 2008	FY 2009	FY 2010	FY 2011
<p>MAJOR THRUST: Develop and demonstrate advanced signal and data exploitation technologies for detection, tracking, identification, and targeting of time-critical targets, and information extraction technologies for situational awareness. Note: Prior to FY 2010, efforts were conducted in PE 0603789F, Project 4072.</p> <p>In FY 2008: Not Applicable.</p> <p>In FY 2009: Not Applicable.</p> <p>In FY 2010: Initiate the development of a set of algorithms that can automatically develop, reason, dynamically update various sub-sets of the existing intelligence preparation of the battlespace products (e.g., named areas, target areas, COA, units, infrastructure areas, lines of communication). Initiate development of techniques for analyzing and assessing activities to support situation assessment. Complete demonstration of integrated</p>	0.000	0.000	2.973	

UNCLASSIFIED

UNCLASSIFIED

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B. Accomplishments/Planned Program (\$ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
intelligence data and analysis products to produce anticipatory ground to space awareness picture. Complete development of multi-sensor exploitation tools to enable characterization and assessment of adversary satellites. Expand previous signal processing developments to a range of progressive RF threats and hardware including communications systems and radar. Initiate research and demonstrate the performance gains with active distributed sensing and processing and identify the limitations for further research. Missions include detection, discrimination, location, tracking and targeting of advanced Low Probability of Intercept (LPI) enemy threats.				
<p>MAJOR THRUST: Develop and demonstrate advanced data handling, event visualization technologies, and distributed data fusion to enable a more effective utilization of the vast amounts of data available to intelligence analysts to provide optimized situation awareness, as well as to support all phases of combat operations. (OLD 4072)</p> <p>FY 2008: Not Applicable.</p> <p>FY 2009: Not Applicable.</p> <p>In FY 2010: Finalize evaluation and support toolsets for advanced fusion algorithms and provide community accepted measures of performance across all efforts. Develop capability to integrate a variety of user definable display technologies to visualize individual data set contexts for better situational awareness.</p>	0.000	0.000	0.646	
<p>MAJOR THRUST: Develop and demonstrate capabilities for reasoning and learning, text understanding, link and group discovery, and advanced analysis for situational awareness and understanding. Note: Prior to FY 2010, efforts were conducted in PE 0603789F, Project 4072.</p> <p>FY 2008: Not Applicable.</p> <p>FY 2009: Not Applicable.</p>	0.000	0.000	2.215	

UNCLASSIFIED

UNCLASSIFIED

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B. Accomplishments/Planned Program (\$ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
In FY 2010: Initiate development of a text extraction capability that enables users to fine-tune the extractor, based on their specialized knowledge of the domain, to achieve higher performance. Initiate development of techniques for abnormality detection in evidence of connections and paths of different types to find unusual circumstances. Initiate development of tools and services for Advanced Behavioral Modeling Techniques and advanced capabilities for analysis that integrate situation understanding, situation monitoring, and event anticipation.				
<p>MAJOR THRUST: Develop models to provide detailed understanding of the adversary's probable intent and future strategy in order to identify adversary COAs, determine the most likely COA, and determine the COA most dangerous to friendly forces or mission accomplishment. Note: Prior to FY 2010, efforts were conducted in PE 0603789F, Project 4872.</p> <p>FY 2008: Not Applicable.</p> <p>FY 2009: Not Applicable.</p> <p>In FY 2010: Continue research to forecast actionable futures to support a decision maker's ability to appraise and plan the "best" blue course of action for Rapid, Decide, Act and Adapt (RDAA). Continue investigation of ability to forecast potential adversaries and events based on indications of known evidence and projected known and/or anticipated threat(s). Initiate investigation in the capability to manage multiple possible future adversary courses of actions prioritized based on current and future (projected) impact/threat. Initiate investigation in developing screening techniques that give the analyst/decision maker insight into the contribution or sensitivity of various factors on a given observable/response. Initiate investigation of techniques that will allow model adaptation to new regions and nations.</p>	0.000	0.000	3.390	
MAJOR THRUST: Develop and demonstrate the mechanisms required to achieve robust, tamperproof, self-authenticating data codes and executables for trusted/optimized computing as part of net centric operations	0.000	0.000	0.646	

UNCLASSIFIED

UNCLASSIFIED

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B. Accomplishments/Planned Program (\$ in Millions)							FY 2008	FY 2009	FY 2010	FY 2011
<p>and situational awareness in the battlespace environment. Note: Prior to FY 2010, efforts were conducted in PE 0603789F, Project 4216.</p> <p>FY 2008: Not Applicable.</p> <p>FY 2009: Not Applicable.</p> <p>In FY 2010: Initiate the application of developed watermarking technologies to development programs of record, targeting intelligence applications. Integrate audio watermarking technologies into a development program, providing information assurance and provenance to the data. Begin development of protocols for the application of watermarking in specific provenance, pedigree and information assurance scenarios.</p>										
C. Other Program Funding Summary (\$ in Millions)										
	<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>	<u>FY 2011</u>	<u>FY 2012</u>	<u>FY 2013</u>	<u>FY 2014</u>	<u>FY 2015</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
Activity Not Provided/Not applicable	0.000	0.000							Continuing	Continuing
D. Acquisition Strategy										
Not applicable										
E. Performance Metrics										
Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.										

UNCLASSIFIED

R-1 Line Item #31

Page 15 of 19

UNCLASSIFIED

Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification								DATE: May 2009		
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COST (\$ in Millions)	FY 2008 Actual	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
635322: Knowledge Management and Computing	0.000	0.000	7.475						Continuing	Continuing

Note

Note: Prior to FY 2010, these efforts were performed in PE 0603789F, C3I Advanced Technologies, Project 4872.

A. Mission Description and Budget Item Justification

The Air Force requires technologies that will provide the decision maker and staff with seamless access to tailored information within a mobile, dynamic, and scalable, globally distributed Air and Space Operations Center (AOC) as well as among other producers, consumers, and managers of information relevant to other particular communities of interest (COI). This project demonstrates the enterprise management capabilities needed for the rapid distribution of actionable information as well as the needed advances in high performance computing to ensure this complex capability. This project develops an agile information environment that focuses on quality of service, transformation and brokering, a federated information environment focusing the relationship among the members of the environment, a secure cross-domain information sharing capability that focuses on the security layer and inter-COI information exchange in different security domains, and a collaboration environment focusing on the information workflow layer of the enterprise. This project will also develop: 1) a computational science and engineering capability demonstrating new models of computation, 2) novel approaches for high performance, interactive, net-centric, distributed and embedded computing systems, and 3) the technological tools enabling affordable, large scale, complex, software intensive systems.

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

	FY 2008	FY 2009	FY 2010	FY 2011
<p>MAJOR THRUST: Develop and demonstrate computer architectures with greater capacity and sophistication to enable game changing computing power to the warfighter, anywhere, anytime. Note: Prior to FY 2010, efforts were conducted in PE 0603789F, Project 4872.</p> <p>In FY 2008: Not Applicable.</p> <p>In FY 2009: Not Applicable.</p> <p>In FY 2010: Initiate development of petaflops embedded on-demand computing. Evaluate options for on-board processing of common sensor algorithms. Complete design of a fungible node for autonomous systems.</p>	0.000	0.000	0.493	

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Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification			DATE: May 2009	
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)	R-1 ITEM NOMENCLATURE PE 0603788F Global Information Dev/Demo		PROJECT NUMBER 635322	
B. Accomplishments/Planned Program (\$ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
Initiate development of a stacked chip architecture for cognitive and autonomous systems. Develop scalable stacked chip architecture for highly modular computing system for cognitive and autonomous systems.				
<p>MAJOR THRUST: Demonstrate how a publish, subscribe, and query information management paradigm can enable vertical and horizontal integration of Air Force information systems through brokered federated information spaces. Develop advanced prototypes of a Community of Interest (COI) infosphere that support information management requirements of various Air Force net-centric COI's. Demonstrate how such an infosphere can interact with and enhance the current net-centric operations infrastructure. Note: Prior to FY 2010, efforts were conducted in PE 0603789F, Project 4872.</p> <p>In FY 2008: Not Applicable.</p> <p>In FY 2009: Not Applicable.</p> <p>In FY 2010: Develop secure, accreditable services to assist in information sharing between two or more independent security domains while preventing information disclosure to untrustworthy users. Develop a single multi-level repository which can securely store information containing multiple security levels but can be accessed from multiple security domains. This capability will promote IT consolidation and reduce the duplicate information storage within each security domain. Develop a common security labeling methodology that promotes the automatic flow of time-sensitive information among different security domains. Provide for security labeling assurance & pedigree to enforce information access policies. Develop approaches for applying secure information sharing concepts to mobile ad-hoc networks which are often characterized by low-bandwidth and intermittent connectivity. Initiate development of a method to securely link data and metadata. Initiate development of an adaptive security policy expression and enforcement mechanism for automated information review and release among different security domains. Develop and perform field demonstrations of cross domain sharing mechanisms in an operational setting to support a prototype installation command system. Demonstrate content-based dissemination mechanisms. Begin development of a mature open-systems based implementation of Distributed Mission Operations (DMO) infrastructure that leverages context-aware information management technologies to enable the rapid incorporation and interaction of live, virtual</p>	0.000	0.000	5.376	

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Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification			DATE: May 2009	
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)	R-1 ITEM NOMENCLATURE PE 0603788F Global Information Dev/Demo		PROJECT NUMBER 635322	
B. Accomplishments/Planned Program (\$ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
and constructive entities and systems. Develop and demonstrate capability to intelligently collect, correlate, and analyze multi-source threat data across multiple security domains to assist cyber operators determine minimum impact of detected threat events.				
<p>MAJOR THRUST: Demonstrate expertise in applied math and algorithms, optimization for modern architectures including multi-tiered memory hierarchies, multi-core processors and heterogeneous architectures as well as secure web interfacing to rapidly accelerate AFRL computational science and engineering applications at least 100x. Develop and demonstrate predictable software system execution, i.e; the software behaves as expected - nothing more, nothing less, and predictable software acquisition, i.e;. technologies based on modeling, libraries, formal methods and analysis techniques enabling development of software intensive systems. Note: Prior to FY 2010, efforts were conducted in PE 0603789F, Project 4872.</p> <p>In FY 2008: Not Applicable.</p> <p>In FY 2009: Not Applicable.</p> <p>In FY 2010: Initiate rapid reaction identifying and optimizing codes demonstrating at least 100x improvement through the techniques applied. Initiate predictable software testing. Create tools for exploiting mechanisms in emerging technology to ease the complexity, understanding and managing software in embedded and software-intensive systems and enabling rapid construction/modernization of provably correct systems and guaranteed interoperability providing trusted components and systems.</p>	0.000	0.000	0.447	
<p>MAJOR THRUST: Demonstrate how agile information management services enable effective information sharing in a tactical environment. Efforts focus on efficient bandwidth utilization, quality of service, fault tolerance and scalability. Note: Prior to FY 2010, efforts were conducted in PE 0603789F, Project 4872.</p> <p>In FY 2008: Not Applicable.</p>	0.000	0.000	1.159	

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Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification							DATE: May 2009			
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)			R-1 ITEM NOMENCLATURE PE 0603788F Global Information Dev/Demo				PROJECT NUMBER 635322			
B. Accomplishments/Planned Program (\$ in Millions)							FY 2008	FY 2009	FY 2010	FY 2011
<p>In FY 2009: Not Applicable.</p> <p>In FY 2010: Develop and demonstrate Pub/Sub/Query mechanisms for tactical airborne platforms such as Global Hawk and Joint STARS. These tactical sharing mechanisms will be evaluated against operational concepts of employment and the ability to perform the operational objectives.</p>										
C. Other Program Funding Summary (\$ in Millions)										
	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
Activity Not Provided/Not applicable	0.000	0.000							Continuing	Continuing
D. Acquisition Strategy										
Not applicable										
E. Performance Metrics										
Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.										

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