Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Air Force											DATE: April 2013	
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*					R-1 ITEM NOMENCLATURE PE 0603788F: *Battlespace Knowledge Development and Demonstration*							
COST ($ in Millions)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	36.944	31.419	49.093	-	49.093	39.693	38.203	40.839	40.332	Continuing	Continuing
635319: *Anticipatory OPS Intent and Response*	-	8.460	4.870	6.176	-	6.176	5.729	4.530	4.840	3.893	Continuing	Continuing
635320: *Assured Worldwide Connectivity*	-	11.223	13.103	21.485	-	21.485	15.468	14.340	16.165	16.123	Continuing	Continuing
635321: *Global Battlespace Awareness*	-	9.921	7.869	14.079	-	14.079	12.175	13.754	13.085	14.469	Continuing	Continuing
635322: *Knowledge Management and Computing*	-	7.340	5.577	7.353	-	7.353	6.321	5.579	6.749	5.847	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

A. Mission Description and Budget Item Justification

This program develops and demonstrates Air Force enterprise-centric information technologies for the warfighter. 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 optical networks will be rapidly deployable, mobile, interoperable, and seamless between Air and Space Operations Centers (AOCs) and air- and space- based platforms either en route or in theater. This project also provides 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, utilization, and management of information in the enterprise. The Anticipatory Operations Intent and Response project develops the technologies for dynamic planning and execution with the accuracy, fidelity, and timeliness needed to dominate the battlespace. This program has been coordinated through the Department of Defense (DoD) Science and Technology (S&T)Executive Committee process to harmonize efforts and eliminate duplication. 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.

Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Air Force					DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*			R-1 ITEM NOMENCLATURE PE 0603788F: *Battlespace Knowledge Development and Demonstration*		
B. Program Change Summary ($ in Millions)	**FY 2012**	**FY 2013**	**FY 2014 Base**	**FY 2014 OCO**	**FY 2014 Total**
Previous President's Budget	38.628	31.419	48.093	-	48.093
Current President's Budget	36.944	31.419	49.093	-	49.093
Total Adjustments	-1.684	0.000	1.000	-	1.000
• Congressional General Reductions	-	0.000			
• Congressional Directed Reductions	-	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	-	0.000			
• Congressional Directed Transfers	-	0.000			
• Reprogrammings	-0.734	0.000			
• SBIR/STTR Transfer	-0.950	0.000			
• Other Adjustments	0.000	0.000	1.000	-	1.000

Change Summary Explanation

Increase in FY 2014 is due to higher emphasis in anti-jam airborne communications.

Exhibit R-2A, RDT&E Project Justification: PB 2014 Air Force			DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603788F: *Battlespace Knowledge Development and Demonstration*	PROJECT 635319: *Anticipatory OPS Intent and Response*	

COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
635319: *Anticipatory OPS Intent and Response*	-	8.460	4.870	6.176	-	6.176	5.729	4.530	4.840	3.893	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Distributed Information Technologies	0.956	0.000	0.000
Description: Develop and demonstrate distributed information technologies that are scalable and reconfigurable and provide seamless access to tailored multi-media and multi-spectral data. ***FY 2012 Accomplishments:*** Completed development of and demonstrated enhanced capability to conduct space command and control(C2). Completed campaign of experimentation to quantitatively measure transformational C2 concepts enabled by net centric warfare capabilities. Completed the investigation of space C2 planning and scheduling technologies to enable enhanced space operations. Completed 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. ***FY 2013 Plans:*** N/A. Effort completed in FY12. ***FY 2014 Plans:*** N/A			
Title: Adaptive Planning and Decision Tools	3.345	3.265	2.470

Exhibit R-2A, RDT&E Project Justification: PB 2014 Air Force		DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603788F: *Battlespace Knowledge Development and Demonstration*	PROJECT 635319: *Anticipatory OPS Intent and Response*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Description: Develop and demonstrate the integration of planning tools and information-based intelligent agents for adaptive replanning and decision support tools. ***FY 2012 Accomplishments:*** Completed the investigation of methods to evaluate mobility courses of action (COA) covering planning through assessment that anticipates multiple constraints and provides prioritized feasible recommendations to meet commander's intent. Initiated development of net-centric mission planning and execution capabilities to support master space plan and joint space task order production and a net enabled dynamic decision support capability for a variety of air and space missions. ***FY 2013 Plans:*** Continue development of net-centric mission planning and execution capabilities to support a net-enabled dynamic decision support capability for a variety of air and space missions in support of global operations. Initiate design and development of a set of planning tools and services that proactively build and shape the portion of cyberspace employed in support of Mission Assurance (MA) objectives. ***FY 2014 Plans:*** Complete development and demonstration of cyber defense components that support Mission Aware Cyber C2. Continue development of net-centric mission planning and execution capabilities to support a net enabled dynamic decision support capability for a variety of air, space and cyber missions in support of global operations. Continue the design and development of a set of planning tools and services that proactively build and shape the portion of cyberspace employed in support of MA objectives.			
Title: Next Generation Planning and Assessment Tools ***Description:*** Develop and demonstrate an effects-based approach for the next generation of planning and assessment techniques that enable decision makers to determine operational effects. ***FY 2012 Accomplishments:*** Integrated and tested decision support environment, within service oriented architectures, that enable the decision maker to anticipate and shape all aspects of the future battlespace. Completed development of predictive battlespace planning tools with the ability to reason over models of the "enemy as a system." Conducted simulation experiments to analyze COAs and evaluate capabilities across multiple domains. Designed and conducted limited technology experiments to investigate the technical and operational challenges associated with integrated air, space, and cyber C2 within and across multiple service oriented architectures. Developed and demonstrated real-time information technologies that enable decision makers to comprehend their current situational awareness by assessing an operation's progress against desired effects and identifying key indicators and	4.159	1.605	3.706

Exhibit R-2A, RDT&E Project Justification: PB 2014 Air Force		DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603788F: *Battlespace Knowledge Development and Demonstration*	PROJECT 635319: *Anticipatory OPS Intent and Response*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
observables to assist in anticipating future success or failure of a campaign. Initiated integration of cascading COA reasoners. Initiated development of a toolset for predictive assessment, developing insight into action, causal mechanisms, and their effects. ***FY 2013 Plans:*** Continue an integration and test decision support environment, within service oriented architectures, that enables the decision-maker to anticipate and shape all aspects of the future battlespace. Continue designing and conducting limited technology experiments to investigate the technical and operational challenges associated with integrated air, space, and cyber C2 within and across multiple service oriented architectures. Continue the development and demonstration of real-time information technologies that enable decision-makers to comprehend their current situation 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). ***FY 2014 Plans:*** Continue integration and test decision support environment, within service oriented architectures that enable the decision maker to anticipate and shape all aspects of the future battlespace. Increase efforts in the development and demonstration of real-time information technologies that enable a decision maker to comprehend their current situation 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).			
Accomplishments/Planned Programs Subtotals	8.460	4.870	6.176

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

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

Exhibit R-2A, RDT&E Project Justification: PB 2014 Air Force			DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603788F: *Battlespace Knowledge Development and Demonstration*	PROJECT 635320: *Assured Worldwide Connectivity*	

COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
635320: *Assured Worldwide Connectivity*	-	11.223	13.103	21.485	-	21.485	15.468	14.340	16.165	16.123	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 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 provides enterprise networking capabilities for agile, policy-based network management. In addition, this project develops and demonstrates flight ready systems consisting of high capacity radio frequency (RF) and optical components and architectures for next generation communications. 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 cyber attack capabilities (access, stealth and persistence, cyber intelligence, and weapons delivery), cyber defense capabilities (attack detection, attack attribution, and response automation), and cyber support capability (situational awareness and war gaming.)

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Cyber Defense	2.502	0.000	0.000
Description: Proactively defend cyberspace through cyber situational awareness, detecting, and defeating cyber threats, and surviving through adaptation and self-generation.			
FY 2012 Accomplishments: Developed a capability to automatically discover large-scale network topologies to enhance cyber situation assessment and map the discovered topologies to mission essential functions. Completed the development of technologies that provide knowledge of the adversary to strengthen the quality of threat assessments. Developed a capability to integrate indications and warnings and observables into situation awareness and impact assessment capabilities. Completed assured end-to-end QoA and QoA integration to the information system enterprise during malicious and non-malicious faults.			
FY 2013 Plans: N/A. Effort completed in FY12.			
FY 2014 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Air Force		DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603788F: *Battlespace Knowledge Development and Demonstration*	**PROJECT** 635320: *Assured Worldwide Connectivity*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
N/A			
Title: Cyber Offense ***Description:*** Develop and demonstrate offensive cyber operations capabilities in a series of Experimental Cyber Craft technology demonstrations. ***FY 2012 Accomplishments:*** Conducted experiments using testbed capability for in-house investigations of cyber defense policies and offensive cyber techniques to gain a better understanding of how an adversary might attack Air Force systems. Analyzed development of additional offensive cyber operations capabilities, integrated kinetic and cyber operations planning and execution capabilities, and Cyber C2 operations functions. ***FY 2013 Plans:*** Continue conducting experiments using testbed capability for in-house investigations of cyber defense policies and offensive cyber techniques to gain a better understanding of how an adversary might attack Air Force systems. Complete analysis of the development of additional offensive cyber operations capabilities, integrated kinetic and cyber operations planning and execution capabilities, and cyber C2 operations functions. Continue to develop and demonstrate capabilities that provide integrated cyber operations. ***FY 2014 Plans:*** Continue conducting experiments using testbed capability for in-house investigations of cyber defense policies and offensive cyber techniques to gain a better understanding of how an adversary might attack Air Force systems. Continue to develop and demonstrate capabilities that provide integrated cyber operations. Initiate development of next-generation cyber technologies to support Air Force missions.	3.070	3.825	4.368
Title: Connectivity Technologies ***Description:*** Develop and demonstrate intelligent networking transport and management technology to provide assured, seamless, battlespace connectivity to the Air Force tailored to anti-access/area denial environments and contested operations. ***FY 2012 Accomplishments:*** Initiated development of cognitive radio technology that will enable mission specific adaptive optimization of communications links responsive to current conditions, situations, and priorities as each mission is executed. Initiated advanced demonstration of end-to-end quality-of-service (QoS) and quality-of-assurance (QoA) performance for various application-dependent network configuration, management, and implementation scenarios. ***FY 2013 Plans:***	0.783	0.998	5.141

Exhibit R-2A, RDT&E Project Justification: PB 2014 Air Force		DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603788F: *Battlespace Knowledge Development and Demonstration*	PROJECT 635320: *Assured Worldwide Connectivity*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Complete development of cognitive radio technology that will enable mission specific adaptive optimization of communications links responsive to current conditions, situations, and priorities as each mission is executed. Continue advanced demonstration of end-to-end QoS and QoA performance for various application-dependent network configuration, management, and implementation scenarios. ***FY 2014 Plans:*** Demonstrate and transition a set of modular, foundational technologies required to develop an aerial layer secure tactical intranet. Continue advanced demonstration of end-to-end QoS and QoA performance for various application-dependent network configuration, management, and implementation scenarios. Initiate advanced demonstration of new technologies on an airborne testbed in support of creating an air-air/air-ground secure tactical intranet.			
Title: Resiliency ***Description:*** Integrate and demonstrate a resilient and self-regenerating information enterprise that dynamically recognizes, characterizes, and understands novel cyber attacks and reconfigures and self-optimizes to resist new attacks. ***FY 2012 Accomplishments:*** Integrated technologies to recognize, characterize, and understand attacks and anomalies, aid in the creation of synthetically diverse, functionally equivalent software, and continuously monitor, reconfigure, and self-optimize. Initiated developing techniques for guaranteeing the execution of critical processes during system recovery and data reconstitution. ***FY 2013 Plans:*** Continue integration technologies to recognize, characterize, and understand attacks and anomalies, aid in the creation of synthetically diverse, functionally equivalent software, and continuously monitor, reconfigure, and self-optimize. Continue developing techniques for guaranteeing the execution of critical processes during system recovery and data reconstitution. ***FY 2014 Plans:*** Complete demonstration of cyber defense applications against relevant strategic scenarios. Continue integration technologies to recognize, characterize, and understand attacks and anomalies, aid in the creation of synthetically diverse, functionally equivalent software, and continuously monitor, reconfigure, and self-optimize. Continue developing techniques for guaranteeing the execution of critical processes during system recovery and data reconstitution.	4.041	6.399	9.246
Title: Effects-based Cyber Defense ***Description:*** Integrate technology to demonstrate an effects-based strategic approach to cyber defense that focuses on avoiding, deterring, and minimizing the threat, and rendering the adversary ineffective. ***FY 2012 Accomplishments:***	0.572	0.188	1.833

Exhibit R-2A, RDT&E Project Justification: PB 2014 Air Force		DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603788F: *Battlespace Knowledge Development and Demonstration*	PROJECT 635320: *Assured Worldwide Connectivity*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Developed technologies to simulate a diverse set of active machines to thwart an adversary by transferring the attack to specialized nodes for analysis. Developed capability to automatically generate secure system/network configuration based on policy, architectural specifications, and operational requirements. ***FY 2013 Plans:*** Continue to develop technologies to simulate a diverse set of active machines to thwart an adversary by transferring the attack to specialized nodes for analysis. Continue development of capability to automatically generate secure system/network configuration based on policy, architectural specifications, and operational requirements. ***FY 2014 Plans:*** Continue to develop technologies to simulate a diverse set of active machines to thwart an adversary by transferring the attack to specialized nodes for analysis. Continue development of capability to automatically generate secure system/network configuration based on policy, architectural specifications, and operational requirements.			
Title: Airborne Communication Technologies ***Description:*** Develop and demonstrate flight ready systems consisting of high capacity RF and optical components and architectures for next generation communications. ***FY 2012 Accomplishments:*** Developed and demonstrated a directional networking prototype for tactical data links. ***FY 2013 Plans:*** Initiate development of V/W band (50 GHz to 110 GHz) airborne communications components. Initiate flight demonstration of communications systems for use in contested environments. ***FY 2014 Plans:*** Continue development of V/W band airborne communications components. Continue flight demonstration of communications systems for use in contested environments.	0.255	1.693	0.897
Accomplishments/Planned Programs Subtotals	11.223	13.103	21.485

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2014 Air Force		DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603788F: *Battlespace Knowledge Development and Demonstration*	PROJECT 635320: *Assured Worldwide Connectivity*

E. Performance Metrics

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

Exhibit R-2A, RDT&E Project Justification: PB 2014 Air Force			DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603788F: *Battlespace Knowledge Development and Demonstration*	PROJECT 635321: *Global Battlespace Awareness*	

COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
635321: *Global Battlespace Awareness*	-	9.921	7.869	14.079	-	14.079	12.175	13.754	13.085	14.469	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 using information from all sources. Technology development includes: tasking information collectors, such as 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-and-dimensional representation of the battlespace; assessing the situation; predicting adversary 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 Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Advanced Signal and Data Exploitation Technologies	2.412	1.332	2.925
Description: Demonstrate advanced signal and data exploitation technologies for detection, tracking, identification, and targeting of time-critical targets, and information extraction.			
FY 2012 Accomplishments: Completed development of enhanced signal processing techniques to fit into existing ISR infrastructures. Completed the development of a set of algorithms that can automatically track space objects in support of space situational awareness (SSA). Conducted both the integration of developed watermarking techniques and protocols for information assurance, provenance, and pedigree leading to the integration of watermarking technologies into network-centric programs of record. Developed novel steganalysis methods for identifying and disrupting embedded information.			
FY 2013 Plans: Continue both the integration of developed watermarking techniques and protocols for information assurance, provenance, and pedigree leading to the integration of watermarking technologies into network-centric programs of record, and the development of novel steganalysis methods for identifying and disrupting embedded information.			
FY 2014 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Air Force		DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603788F: *Battlespace Knowledge Development and Demonstration*	PROJECT 635321: *Global Battlespace Awareness*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Continue both the integration of developed watermarking techniques and protocols for information assurance, provenance and pedigree leading to the integration of watermarking technologies into network-centric programs of record, and the development of novel steganalysis methods for identifying and disrupting embedded information. Deliver capabilities to increase analyst production by integrating and enhancing multi-intelligence exploitation within the Distributed Common Ground Station. Enable semi-automated data-sharing across multiple security enclaves with intelligent data tagging. Provide automated extraction of motion-derived linkages/routes and network relationships.			
Title: Advanced Data Handling, Visualization and Distributed Data Fusion ***Description:*** Develop and demonstrate advanced data handling, event visualization technologies, and distributed data fusion to enable a more effective utilization of data available. ***FY 2012 Accomplishments:*** Matured and integrated models for adversarial behavior and provided support for situation analysis utilizing a service oriented architecture. Developed algorithmic tools and techniques to analyze and exploit recorded signals intelligence data across multiple missions, to provide the capability for forensic analysis of single or multi-platform data across multiple missions for increased situational awareness and intelligence. ***FY 2013 Plans:*** Complete development to mature and integrate models for adversarial behavior and provide support for situation analysis utilizing a service oriented architecture. Complete development of algorithmic tools and techniques to analyze and exploit recorded signals intelligence data across multiple missions, to provide the capability for forensic analysis of single or multi-platform data across multiple missions for increased situational awareness and intelligence. Initiate development of a prototype for the fusion of information (temporally and geospatially) from multiple exploitation domains to create a comprehensive understanding of the battlespace. ***FY 2014 Plans:*** Continue development of a prototype for the fusion of information (temporally and geospatially) from multiple exploitation domains to create a comprehensive understanding of the battlespace. Initiate a learning and inferencing architecture that operates on raw sensor data from heterogeneous sensors in order to determine an automated situational awareness picture.	3.662	1.743	4.131
Title: Autonomous Text Exploitation ***Description:*** Develop and demonstrate capabilities for reasoning and learning, text understanding, link and group discovery, and advanced analysis for situational awareness and understanding. ***FY 2012 Accomplishments:***	0.471	0.879	0.843

Exhibit R-2A, RDT&E Project Justification: PB 2014 Air Force		DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603788F: *Battlespace Knowledge Development and Demonstration*	PROJECT 635321: *Global Battlespace Awareness*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Developed a text extraction capability that enables users to fine-tune the extractor, based on their specialized knowledge of the domain, to achieve higher performance. Completed development of tools and services for advanced behavioral modeling techniques and advanced capabilities for analysis that integrate situation understanding, situation monitoring, and event anticipation. Initiated exploration of general purpose bridges between the corpus of electronic text and formal reasoning systems. Developed dynamic social network analysis methods to provide the analyst with the ability to identify high value targets in social networks and anticipate their role and activity. Completed 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, and continue development of techniques for analyzing and assessing activities to support situation assessment. ***FY 2013 Plans:*** Continue exploring general purpose bridges between the corpus of electronic text and formal reasoning systems. Complete development of dynamic social network analysis methods to provide the analyst with the ability to identify high value targets in social networks and anticipate their role and activity. ***FY 2014 Plans:*** Continue exploring general purpose bridges between the corpus of electronic text and formal reasoning systems. Develop capabilities enabling analysts to efficiently extract/consolidate information from massive amounts of textual data and identify enemy entity-relation. Increase the accuracy and speed of cross-document entity co-reference and consolidation. Initiate demonstration of analysis and visualization of multi-layered networks consisting of diverse data sets.			
Title: Adversary Courses of Action	3.376	3.915	6.180
Description: Develop models to provide detailed understanding of the adversary's probable intent and future strategy to identify adversary COAs, the most likely COA, and the COA most dangerous to friendly forces and mission accomplishment. ***FY 2012 Accomplishments:*** Developed a functional graphical user environment to support output analysis and conducted investigations in developing screening techniques that give the analyst/decision-maker insight into the contribution or sensitivity of various factors on a given observable/response. Used scenarios and conducted user testing and feedback of models for new regions and nations. Completed investigation of the capability to manage multiple possible future adversary COAs prioritized based on current and future (projected) impact/threat. Developed a capability to model and explore policy actions and reactions taken by the different modeled entities, and started developing the capability to allow users to perform automated generation, assessment, and visualization of traces from model results to key underlying causes. Developed and demonstrated robust support applications to enhance multi-intelligence collection requirements. ***FY 2013 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Air Force		DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603788F: *Battlespace Knowledge Development and Demonstration*	PROJECT 635321: *Global Battlespace Awareness*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Continue development of a functional graphical user environment to support output analysis and complete investigations in developing screening techniques that give the analyst/decision-maker insight into the contribution or sensitivity of various factors on a given observable/response. Use scenarios and conduct user testing and feedback of models for new regions and nations. Continue developing capability to model and explore policy actions and reactions taken by the different modeled entities, and start developing the capability to allow users to perform automated generation, assessment, and visualization of traces from model results to key underlying causes. Initiate development of tools to increase awareness of alternatives and ramifications of selecting given target sets. Initiate development of exploitation and analysis tools to automate target recognition and tracking. ***FY 2014 Plans:*** Continue development of a functional graphical user environment to support output analysis and complete investigations in developing screening techniques that give the analyst/decision-maker insight into the contribution or sensitivity of various factors on a given observable/response. Use scenarios and conduct user testing and feedback of models for new regions and nations. Initiate demonstration of advanced analytical capabilities that integrate kinetic and non-kinetic options for full spectrum targeting. Initiate development of assessment technologies that identify causal linkages of executing mission results to achievement of effects. Increase targeting capabilities to include the full range of options available to increase the depth and breadth of the analysis and reduce the overall time to perform analyses and generate targeting options. Enable assessment of kinetic/non-kinetic effects across the targeting process.			
Accomplishments/Planned Programs Subtotals	9.921	7.869	14.079

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

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

Exhibit R-2A, RDT&E Project Justification: PB 2014 Air Force			DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603788F: *Battlespace Knowledge Development and Demonstration*	PROJECT 635322: *Knowledge Management and Computing*	

COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
635322: *Knowledge Management and Computing*	-	7.340	5.577	7.353	-	7.353	6.321	5.579	6.749	5.847	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Game Changing Computing Power	1.201	0.559	0.000
Description: Develop and demonstrate computer architectures with greater capacity and sophistication to enable game changing computing power to the warfighter, anywhere, anytime.			
FY 2012 Accomplishments: Developed petaflops embedded on-demand computing, and demonstrated achieved performance and functionality. Initiated development of architectures for a compact large array of many node clusters with very low power demand for intelligent systems. Initiated development and demonstration of an autocode generation capability for software intensive systems. Completed development of comprehensive software and hardware solutions for parallel discrete event simulation on emerging multi-core architectures.			
FY 2013 Plans: Complete the development of petaflops embedded on-demand computing, and demonstrate achieved performance and functionality. Continue development of architectures for a compact large array of many node clusters with very low power demand			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Air Force		DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603788F: *Battlespace Knowledge Development and Demonstration*	PROJECT 635322: *Knowledge Management and Computing*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
for intelligent systems. Continue development and demonstration of an autocode generation capability for software intensive systems. ***FY 2014 Plans:*** Due to technology maturity, the development of architectures for a compact large array of many node clusters with very low power demand and the development of an autocode generation capability for software intensive systems has been reverted back to applied research (6.2) in PE 0602788F, Project 625316.			
Title: Advanced Information Management ***Description:*** Demonstrate how a publish, subscribe, and query information management paradigm can enable vertical and horizontal integration of Air Force information systems. ***FY 2012 Accomplishments:*** Completed development of an adaptive security policy expression and enforcement mechanism for automated information review and release among different security domains. Completed developments of secure, accreditable cross domain information sharing techniques in an operational setting and of a scalable integrated environment where information is easily and securely shared across multiple secure domains while preventing accidental or intentional information disclosure. Initiated development of attack resistant cross domain services. ***FY 2013 Plans:*** Continue development of attack resistant cross domain services. ***FY 2014 Plans:*** Continue development of attack resistant cross domain services. Deliver a suite of new U.S./coalition collaboration services, producing cross-domain capabilities including voice/video, full motion video (FMV) streaming, automated content inspection, and global trusted remote management. Create Secure Cross Domain Video Teleconference capability.	0.534	0.721	1.713
Title: Agile Information Management Services ***Description:*** Demonstrate how agile information management services enable effective information sharing in a tactical environment. ***FY 2012 Accomplishments:*** Developed tactical information management pub/sub/query mechanisms focusing on stability, performance, and reliability for assured access and isolation from malicious client applications, and assured levels of QoS. Initiated design and development of a mission oriented, highly adaptive and self-aware unified intelligent capability to provide observable, actionable insights and visibility across information management services and their deployed platforms from inside-out and provide survivability-aware	5.605	4.297	5.640

Exhibit R-2A, RDT&E Project Justification: PB 2014 Air Force		DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603788F: *Battlespace Knowledge Development and Demonstration*	PROJECT 635322: *Knowledge Management and Computing*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
information sharing capabilities to anticipate achieving the information level mission goals under any conditions. Investigated and quantifyied the network burden and quality of service requirements for service oriented architecture implementations across a variety of tactical environments. Developed survivable information management (IM) services that are highly adaptive and self-aware across the variety of IM architectures. ***FY 2013 Plans:*** Complete development of tactical information management publish/subscribe/query mechanisms focusing on stability, performance, and reliability for assured access and isolation from malicious client applications, and assured levels of QoS. Continue design and development of a mission-oriented, highly adaptive and self-aware unified intelligent capability to provide observable, actionable insights and visibility across information management services and their deployed platforms from inside-out and provide survivability-aware information sharing capabilities to anticipate achieving the information level mission goals under any conditions. Continue investigating and quantifying the network burden and QoS requirements for service oriented architecture implementations across a variety of tactical environments. Continue to develop information management capabilities in support of force protection. ***FY 2014 Plans:*** Complete development of survivability-aware information sharing capabilities. Demonstrate a capability to link information flows to missions, providing the mission context for mission-driven sense and respond IM services. Continue investigating and quantifying the network burden and quality of service requirements for service oriented architecture implementations across a variety of tactical environments. Continue to develop IM capabilities in support of force protection. Continue design, development and demonstration of mission-oriented, highly adaptive information management technologies. Demonstrate IM services embedded with sensor platforms, such as targeting pods, to quickly and affordably link pilots, remotely-piloted vehicles (RPVs), and ground personnel for improved situation awareness. Continue to develop resource-aware IM services that are responsive to the information needs of high priority missions and users, respond to resource availability changes in contested/degraded environments, minimize information overload and dissemination latency, and improve situational understanding for missions, allowing commanders to make more timely and informed decisions.			
Accomplishments/Planned Programs Subtotals	7.340	5.577	7.353

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2014 Air Force		DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603788F: *Battlespace Knowledge Development and Demonstration*	PROJECT 635322: *Knowledge Management and Computing*

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.