ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

February 2006

BUDGET ACTIVITY	PE NUMBER AND TITLE
2 - Applied Research	**0602783A - COMPUTER AND SOFTWARE TECHNOLOGY**

COST (In Thousands)		FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
Total Program Element (PE) Cost		5346	4521	3844	3785	3810	3842	3872
Y10	COMPUTER/INFO SCI TECH	5346	3535	3844	3785	3810	3842	3872
Y11	COMPUTER & INFORMATION SCIENCE APPLIED RES CA	0	986	0	0	0	0	0

A. Mission Description and Budget Item Justification: This program element (PE) researches and applies information and communications technology to enhance the understanding and speed the decision cycle for mounted & dismounted commanders & leaders operating in the mobile dispersed environment envisioned for the Future Force. Focus is on a spectrum of command and control (C2) solutions for lower echelon teams. This program investigates and matures command, control, communications, computer (C4) technologies to increase Future Force lethality and survivability through improved commanders' decision-making and situational awareness and, where feasible, exploits opportunities to enhance Current Force capabilities. The goals of this program element are to develop information processing technologies to automate the delivery of local/global information for decision making (planning, rehearsal and execution) so that it is synchronized, parallel and real-time, and to devise communication/network technologies that will enable the synchronization of secure data/information from humans to humans, humans to computers, computers to humans, as well as reducing dependence on mouse and keyboard versus other modes of computer interaction. Challenges for this program include developing automated tools to support the discovery of services within an unreliable ever-changing network topology as well as providing methods for end-users to understand the tactical significance of events generated from both local and global tactical sensors. Technologies addressed in this work will enable a spatial and temporal explanation of the situation through graphical and narrative based multi-media reporting for the commander. Work in this PE is related to and fully coordinated with efforts in PE 0602782A(Command, Control, Communications Technology), PE 0603772A(Advanced Tactical Computer Science and Sensor Technology), and PE 0603008A(Command, Control, Communications Advanced Technology). The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Defense Technology Area Plan (DTAP). Work in this project is performed by the Army Research Laboratory (ARL). Project Y11 contains congressional adds only.

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2 - Applied Research	**0602783A - COMPUTER AND SOFTWARE TECHNOLOGY**

B. Program Change Summary	FY 2005	FY 2006	FY 2007
Previous President's Budget (FY 2006)	3862	3590	3705
Current BES/President's Budget (FY 2007)	5346	4521	3844
Total Adjustments	1484	931	139
Congressional Program Reductions		-23	
Congressional Rescissions		-46	
Congressional Increases		1000	
Reprogrammings	1484		
SBIR/STTR Transfer			
Adjustments to Budget Years			139

FY 05 increase of $1.5 million was reprogrammed for the Ultra-Large Scale (ULS) Software Systems Study.
FY06 Congressional Adds with no R2A:
($1000) Software Reliability and Security Improvements

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2006

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
2 - Applied Research	**0602783A - COMPUTER AND SOFTWARE TECHNOLOGY**	**Y10**

COST (In Thousands)		FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
Y10	COMPUTER/INFO SCI TECH	5346	3535	3844	3785	3810	3842	3872

A. Mission Description and Budget Item Justification: This project researches and applies information and communications technology to enhance the understanding and speed the decision cycle for mounted & dismounted commanders & leaders operating in the mobile dispersed environment envisioned for the Future Force. Focus is on a spectrum of command and control (C2) solutions for lower echelon teams. This program investigates and matures command, control, communications, computer (C4) technologies to increase Future Force lethality and survivability through improved commanders' decision-making and situational awareness and, where feasible, exploits opportunities to enhance Current Force capabilities. The goals of this program element are to develop information processing technologies to automate the delivery of local/global information for decision making (planning, rehearsal and execution) so that it is synchronized, parallel and real-time, and to devise communication/network technologies that will enable the synchronization of secure data/information from humans to humans, humans to computers, computers to humans, as well as reducing dependence on mouse and keyboard versus other modes of computer interaction. Challenges for this program include developing automated tools to support the discovery of services within an unreliable ever-changing network topology as well as providing methods for end-users to understand the tactical significance of events generated from both local and global tactical sensors. Technologies addressed in this work will enable a spatial and temporal explanation of the situation through graphical and narrative based multi-media reporting for the commander. Work in this PE is related to and fully coordinated with efforts in PE 0602782A(Command, Control, Communications Technology), PE 0603772A(Advanced Tactical Computer Science and Sensor Technology), and PE 0603008A(Command, Control, Communications Advanced Technology). The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Defense Technology Area Plan (DTAP). Work in this project is performed by the Army Research Laboratory (ARL).

Accomplishments/Planned Program	FY 2005	FY 2006	FY 2007
- Enhance information processing techniques through the interactive and automated fusion of distributed local and global information sources in order to inform and protect the force from imminent threats. In FY05, provided user directed fusion techniques that combined with the Communications-Electronics Research, Development and Engineering Center (CERDEC)'s techniques will enable automated fusion techniques to improve the completeness and timeliness of decision-making in C2 operations. The integrated technology will be matured for Distributed Common Ground Station-Army and Future Combat Systems (FCS) assessment. In FY06, will investigate Resource Description Framework (RDF) and Ontology Web Language (OWL) for marking up current Command and Control Information Exchange Data Model and future data-stores to include discovering content through published meta-data. In FY07, mine marked-up RDF and OWL based data-stores for events/associations across disparate data sources.	1139	1012	1113
- Design secure, stealthy, energy-efficient network protocols on a miniature radio to support networked sensors, a key element of the inter-netted Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) in providing situational awareness, and to provide enhanced communications capabilities for unattended sensor arrays, smart munitions, and robotics platforms. In FY05, conducted evaluations of networked sensor systems in real environments performing collaborative sensing, using the miniature radios with enhanced media access control. In FY06, will enhance the radio and protocols to provide higher throughput and lower power consumption, while reducing size, and decreasing cost, for more ubiquitous military use and improved force protection/survivability. In FY07, will optimize sensor and communications integration with optimal energy utilization to extend battery life and thus increase the safety of soldiers during military operations.	514	522	522

- Conduct applied research on tactical information protection technologies for agent-based vulnerability assessment over wireless bandwidth constrained links and security infrastructures for sensor networks. The Future Force will operate in a complex wireless environment where survivability must be maintained in spite of inherent vulnerabilities of standardized protocols and commercial technologies. In FY05, conducted advanced network assurance experiments in a laboratory environment with a view toward increasing the security of critical military data and information. In FY06, will begin validation of advanced network assurance using at least 20 nodes in a relevant environment. In FY07, will complete validation and demonstrate prototype with access control and tactical Public Key Infrastructure (PKI) across warfighter information network to enable interoperability with sustaining base.	493	443	466
- Investigates techniques to enable autonomous local sensing assets to cooperatively share sensed events within a wireless distributed fusion environment in order to inform the force of relevant local events. In FY05, developed an interface between a dismounted interactive semi-automated force (DISAF) simulation and a surrogate sensor simulation server in order to generate the volume activity for low level event detection to include terrain based entity prediction. In FY06, will develop a suite of cooperative distributed low level correlation and tracking agents that tip and cue one another through a end-user directed sequence list of spatial/temporal linked objectives. In FY07, evaluate, using a DISAF simulation, the ability of the distributed agent infrastructure to provide a tactically relevant picture of the local operational environment through a series of time sequenced events.	1159	1054	1213
- Conduct research into techniques for developing the underlying computational multilingual software framework to enable commanders and troops to bridge language barriers in order to anticipate adversaries and collaborate with allies. In FY06, define the underlying framework for document exploitation, indexing and search across archived translated documents. Evaluate current state-of-the-art in two-way speech-to-speech translation technologies to include microphones that can operate in noisy environments. In FY07, enhance the underlying framework to include the ability to extract the metrics required for evaluation of text based machine translation engines. Develop the underlying software framework to integrate the best microphone and two-way speech technologies.	541	504	530
- Documented an initial technology roadmap for Ultra Large-Scale Software (ULS) Systems development and prepared a ULS research program proposed plan.	1500	0	0
Total	5346	3535	3844