ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

February 2005

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

COST (In Thousands)		FY 2004 Actual	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	3939	3862	3590	3705	3819	3842	3875	3903

A. Mission Description and Budget Item Justification: This program element researches and applies information and communications technology to enhance understanding and speed the decision cycle for commanders operating in the mobile dispersed environment envisioned for the Future Force. Focus is on providing widely applicable solutions that can be applied across the spectrum of command and control (C2) problems. This program investigates and matures command, control, communications (C3) software and components to increase Future Combat System (FCS) and Future Force lethality and survivability through improved commanders' decision-making and situational awareness and, where feasible, exploits opportunities to enhance Current Force capabilities. The goal of this program element is to develop technologies to automate the collaboration for decision making (planning, rehearsal and execution) so that it is synchronized, parallel and real-time, and to devise collaboration tools to support both the staff and the Commander. Challenges for this program include developing automated tools to support the flow and synchronization of secure data/information from humans to humans, from humans to computers, from computers to humans, as well as reducing dependence on mouse and keyboard versus other modes of computer interaction. Work in this PE is related to and fully coordinated with efforts in PE 0602782(Command, Control, Communications Technology), PE 0603772(Advanced Tactical Computer Science and Sensor Technology), and PE 0603008(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 2004	FY 2005	FY 2006	FY 2007
- Enhance information processing techniques necessary to improve military decision making through software agent technologies, heterogeneous collaborative agent architectures, data mining, soft computing, and advanced reasoning techniques. In FY04, provided to the Communication Electronics Research, Development and Engineering Center (CERDEC) user and situation adaptive (execution-centric) technologies to assist Commanders in the Military Decision Making Process (MDMP). In FY05, provide user-directed fusion techniques that combined with 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 FCS assessment. In FY06, will finalize user-directed mining and system architecture, based on FY05 assessment. In FY07, will finalize Knowledge Extraction system and initialize transition process to user community of technologies that provide the right information at the right time to the commander and soldier with reduced cognitive overload.	1966	1908	1728	1812
- Design secure, stealthy, energy-efficient network protocols on a miniature radio to support the 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 FY04, designed a 2nd generation radio with efficient RF front-end and optimized network security for enhanced thru-put and energy operation; field evaluated at 3 sites. In FY05, will conduct evaluations with sensor networks integrated with miniature radios using enhanced media access control to enable collaborative sensing. In FY06, will enhance radio to enable lower power, smaller size, less cost providing 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.	430	421	390	400

Accomplishments/Planned Program A(continued)	FY 2004	FY 2005	FY 2006	FY 2007
- 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 FY04, conducted experiments with miniature sensors to validate robustness of algorithms; experimented and researched robust network control by deterring network attacks in simulated setting. In FY05, will conduct 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.	657	653	612	618
- In coordination with CERDEC, conduct research into techniques for automated Course of Action (COA) evaluation incorporating "reasonable-time" battlefield information and the development of COA analysis decision tools through the extension of mathematics of war-gaming, combat modeling and statistical methods to enhance the staff's planning capability to generate manifold options for the mobile commander in an actual battlefield engagement with an emphasis on complex and urban environments. In FY04, improved techniques to generate alternate COAs automatically for analysis; matured algorithms providing insights into commander's decision making process with metrics for determining key battlefield parameters affecting outcomes. In FY05, will provide the TRADOC Battle Labs with tools to conduct simulations in the field to validate the benefits of enhanced C2 capabilities. In FY06, will reduce decision cycles, improve the tempo of operations, and reduce risk through use of automated COA analysis tools. In FY07, will deliver suite of algorithms to CERDEC providing the mounted and dismounted soldier and commanders the ability to understand and absorb the impact of various plans and aid in selecting the best plan to improve survivability and lethality based upon key parameters/predictive outcomes.	886	880	860	875
Totals	3939	3862	3590	3705

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B. Program Change Summary	FY 2005	FY 2006	FY 2007
Previous President's Budget (FY 2005)	3982	3688	3770
Current Budget (FY 2006/2007 PB)	3862	3590	3705
Total Adjustments	-120	-98	-65
Net of Program/Database Changes			
Congressional Program Reductions	-58		
Congressional Rescissions			
Congressional Increases			
Reprogrammings			
SBIR/STTR Transfer	-62		
Adjustments to Budget Years		-98	-65