ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2 Exhibit)

February 2003

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

COST (In Thousands)		FY 2002 Actual	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
Y10	COMPUTER/INFO SCI TECH	3895	4001	4142	4102	3788	3878	3947	4027

A. Mission Description and Budget Item Justification: This program investigates and matures command, control, communications (C3) software and components to increase Future Combat System (FCS) and Objective Force lethality and survivability through improved commanders decision making and situational awareness. The goal of this program element is two-fold: 1) To automate the collaboration for decision making (planning and execution) so that it is synchronized, parallel and real time, and 2) to develop collaboration tools to support both the staff and the Commander. Challenges for this program include automated tools to support the flow and synchronization of 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. 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 Objective Force. Focus is on providing widely applicable solutions that can be applied across the spectrum of command and control (C2) problems. 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). Work in this project is conducted by the U.S. Army Research Laboratory, and is consistent with the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and Project Reliance. This program supports the Objective Force transition path of the Transformation Campaign Plan.
No Defense Emergency Response Funds have been provided to this program.

Accomplishments/Planned Program	FY 2002	FY 2003	FY 2004	FY 2005
- 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 FY02, evaluated and refined collaborative planning tools in support of evolving Objective Force command and control process; conducted experiments and documented the usability of the tools at Training and Doctrine Command (TRADOC) Futures Battle Lab and Agile Commander Advanced Technology Demonstration (ATD). In FY03, provide technologies to facilitate concurrent Command and Control (C2) decision-making in a multi-echelon operation. In FY04, provide execution-centric technologies to assist Commanders in the Military Decision Making Process (MDMP). In FY05, provide technologies that ensure completeness and timeliness of decision-making in C2 operations.	1070	1297	2092	2078
- Design secure, stealthy, energy-efficient network protocols on a miniature radio to support the Networked Sensors, a key element of the internetted 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 FY02, identified low energy network technologies for a miniature radio that can be integrated in a miniature sensor to create a secure network in support of forward-deployed unattended munitions, sensors, and small robotic platforms; and determined technical requirements for a common network architecture for unattended sensor arrays and candidate protocols for very short duty cycle networks that use low power radios to control and transmit data from sensors, smart munitions and robots. In FY03, conduct experiments and test the protocols for miniature radios. In FY04, improve the range and energy efficacy of the network protocols for miniature radios. In FY05, conduct tests on sensor networks equipped with miniature radios.	877	584	457	451

Accomplishments/Planned Program (continued)	FY 2002	FY 2003	FY 2004	FY 2005
- 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 Objective Force (which consists of a heterogeneous mixture of individual soldiers, ground vehicles, airborne platforms, unmanned Aerial Vehicles (UAVs), robotics and unattended microsensor networks) will operate in a complex wireless environment where survivability must be maintained in spite of inherent vulnerabilities of standardized protocols and commercial technologies. In FY02, tested a laboratory version of mobile code for protecting tactical wireless networks, allowing Commanders to operate in a dynamically configurable environment. Identified and performed preliminary analysis of encryption algorithms and protection techniques for microsensors to reduce the vulnerability of unattended sensors arrays on the tactical battlefield. In FY03, devise encryption algorithms and deployment techniques. In FY04, conduct experiments with miniature sensors to validate robustness of algorithms. In FY05, provide suites of information protection codes to miniature sensor developers and deployers.	973	1060	682	673
- 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 wargaming, 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. In FY02, identified techniques to merge real time battlespace data for the simulation of selected courses of action and to determine their advantages and disadvantages. The simulations were tested using both force-on-force simulations and statistical models. In FY03, Improve combat models by applying statistical techniques into wargaming. In FY04, improve techniques to generate alternate COAs automatically for analysis. In FY05, provide the TRADOC Battle Labs with tools to conduct simulations in the field.	975	1060	911	900
Totals	3895	4001	4142	4102

B. Program Change Summary	FY 2002	FY 2003	FY 2004	FY 2005
Previous President's Budget (FY 2003)	4113	4354	4406	4465
Current Budget (FY 2004/2005 PB)	3895	4001	4142	4102
Total Adjustments	-218	-353	-264	-363
Congressional program reductions				
Congressional rescissions		-264		
Congressional increases				
Reprogrammings	-139	-23		
SBIR/STTR Transfer	-79	-66		
Adjustments to Budget Years			-264	-363