ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

February 2005

BUDGET ACTIVITY	PE NUMBER AND TITLE
3 - Advanced technology development	**0603772A - Advanced Tactical Computer Science and Sensor Tech**

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
Total Program Element (PE) Cost		24458	46313	42475	49279	35181	29688	29966	30212
101	TACTICAL AUTOMATION	14923	14401	13038	17950	20124	21226	18759	18895
1AA	TACTICAL COMPUTER SCIENCE DEMONSTRATIONS (CA)	2724	1917	0	0	0	0	0	0
1AB	SENSOR DEMONSTRATIONS (CA)	1946	13516	0	0	0	0	0	0
243	SENSORS & SIGNALS PROC	4865	16479	29437	31329	15057	8462	11207	11317

A. Mission Description and Budget Item Justification: This Program Element (PE) supports information dominance for the Army's Future Combat Systems (FCS), Future Force, and where feasible to enhance the Current Force capabilities. To gain and maintain battlefield dominance, the Warfighter needs to understand, decide and act more rapidly than his adversaries. Project 101, Tactical Automation, matures and demonstrates technologies that will allow forces to more effectively collect, transfer and display digital information around the battlefield. It provides architectures and technologies to enable Command and Control (C2) during rapid, mobile, dispersed operations. It demonstrates technologies necessary for integrated battlefield situational awareness (SA), force synchronization, split-based, and On-the-Move (OTM) C2 operations. Project 243, Sensors & Signal Processing, matures signal processing and fusion technologies for Army sensors; matures and demonstrates ground based radar systems to track and identify enemy forces and personnel; matures and demonstrates multi-sensor control and correlation for improving reconnaissance, surveillance and target acquisition. Projects 1AA and 1AB fund Congressional special interest efforts.

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 PE contains no duplication with any effort within the Military Departments and is fully coordinated with PE 0602270A (EW Technology), PE 0602782A (Command, Control, Communications Technology), and PE 0603008A (Electronic Warfare Advanced Technology). Work in this PE is performed by the Army Research, Development and Engineering Command, Communications-Electronics Research, Development, and Engineering Center (CERDEC), Fort Monmouth, NJ.

B. Program Change Summary	FY 2005	FY 2006	FY 2007
Previous President's Budget (FY 2005)	31951	52647	53762
Current Budget (FY 2006/2007 PB)	46313	42475	49279
Total Adjustments	14362	-10172	-4483
Net of Program/Database Changes			
Congressional Program Reductions	-648		
Congressional Rescissions	-38		
Congressional Increases	16100		
Reprogrammings			
SBIR/STTR Transfer	-1052		
Adjustments to Budget Years		-10172	-4483

Change Summary Explanation:
FY06 - Funds realigned ($10172K) to higher priority requirements.

Ten FY05 Congressional adds totaling $16100 were added to this PE.

FY05 Congressional adds with no R-2A:
($959) ASAS Light RDTE Development, Project 1AB: The purpose of this one year Congressional add is to develop an interface for the Unmanned Ground Sensor (UGS) sensor hub and provide the appropriate visualization and query tools. No additional funding is required to complete this project.

($1630) Blast and Damage Assessment Risk Analysis and Mitigation Application (BADARAMA), Project 1AB: The purpose of this one year Congressional add is to integrate Force Protection/Blast Visualization Software. No additional funding is required to complete this project.

($958) Digital Army Radar Technology, Project 1AB: The purpose of this one year Congressional add is to mature, and demonstrate technologies for a next generation, digital array that can perform multi-mission functions such as air defense, counter fire target acquisition, precision target identification, active fire and air traffic control. No additional funding is required to complete this project.

($959) Distributed Scalable C2 Communications System, Project 1AA: The purpose of this one year Congressional Add is to produce a collaboration system to permit the commander and field soldier to markup 2D and 3D virtual battlefields in order to query, clarify and refine directives. No additional funding is required to complete this project.

($1247) Dominant Military Operations on Urbanized Terrain, Project 1AB: The purpose of this one-year Congressional add is to develop a long range, stand off, three dimensional imaging radar for covert interior imaging of fortified bunkers and urban structures. No additional funding is required to complete this project.

($2397) LCMR-Capabilities Enhancement, Project 1AB: The purpose of this one-year Congressional add is to enhance the Lightweight Counter Mortar Radar in response to feedback from OEF/OIF. Modifications include improved ruggedness, increased range, improved accuracy and reduced false alarms, improved user interface and automatic digital messaging. No additional funding is required to complete this project.

($959) MVMNT Program for Simulation Based Operations, Project 1AA: The purpose of this one year Congressional Add is to develop software tools for the virtual fabrication and configuration management of C4ISR systems embedded in/on vehicular and/or soldier platforms. No additional funding is required to complete this project.

($2110) PING Wideband RF Target ID Systems, Project 1AB: The purpose of this one-year Congressional add is to enhance the current PING system to: (1) improve the likelihood of correctly identifying concealed weapons behind visible obstructions; (2) increase the range of detection and provide faster algorithm processing; and (3) operate while on the move. No additional funding is required to complete this project.

($3260) Radar Tags, 1AB: The purpose of this one-year Congressional add is to enhance Blue Force Tracking and Combat ID through acceleration of radar tags electronic unit development, including field testing/demonstrations using existing radars. No additional funding is required to complete this project.

($959) Weather Intelligence Sensor System, Project 1AB: The purpose of this one-year Congressional add is to develop a lightweight passive weather suite to collect local weather information critical to radio/satellite communications transmissions and ballistic accuracy. No additional funding is required to complete this project.

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BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
3 - Advanced technology development	**0603772A - Advanced Tactical Computer Science and Sensor Tech**	**101**

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
101	TACTICAL AUTOMATION	14923	14401	13038	17950	20124	21226	18759	18895

A. Mission Description and Budget Item Justification: This project provides improved command and control architectures and technologies for Future Force information dominance. For the Army Future Force, the key change in battle command will be in the use of automated information technologies embedded throughout its units that enable it to use information as an element of combat power. This project supplies the tools to provide commanders at all echelons better and more timely information and allow them to command from anywhere on the battlefield, freed from their command posts and while on-the-move. This will allow Future Force commanders to understand, decide and act faster than their adversaries, resulting in increased OPTEMPO, improved force synchronization and reduced fratricide. This project matures advanced computer science and technology solutions addressing: digital transfer and display of horizontal battlefield situational awareness (SA) and a common view of the battlefield; synchronization of combined and joint force operations; and Command and Control (C2) On-the-Move (OTM). It matures key technologies in the following areas: automated decision support; advanced database design and distribution; dynamic digital display and manipulation; web-based architectures for intelligent software agents and mission execution monitoring; and mobile adaptive computing. Networked Sensors for the Future Force matures and demonstrates C2 technologies to enable the commanders to effectively manage and utilize the emerging host of unmanned sensors and platforms carrying them, while at the same time increasing organizational agility on the future battlefield. Network Enabled Battle Command (NEBC) matures and demonstrates advanced C2 software services for the Unit of Employment (UE) and software services for seamless Unit of Action (UA) /UE interoperability. Command and Control of Robotic Entities (C2ORE) Matures and demonstrates application domain software services for use with unmanned air and ground robotic systems for the Future Combat Systems (FCS) Battle Command System (BCS). Joint developer/warfighter demonstrations will be conducted in coordination with the UA, dismounted, battle command and combat service support battle labs.

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, Development and Engineering Command, Communications-Electronics Research Development and Engineering Center (CERDEC), Fort Monmouth, NJ.

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
- Distributed Command and Control (C2) On-the-Move: In FY04, demonstrated capability to monitor the execution of 100 events; delivered decision support software to serve as the common component integrating multiple battlelabs in a series of collaborative experiments; demonstrated adaptive command and control applications working within a quality-of-service communications network. In FY05, mature a distributed collaboration software environment for use in complex and urban terrain, and mature lightweight geospatial service-based mapping tools, coupled with mobile software agents for use in a mobile environment. In FY06, will prototype a set of service-based decision support and C2 modeling and simulation tools for dismounted Future Force commanders to collaboratively plan coalition activities in highly mobile operations. In FY07, will mature software tools for transition and use on Land Warrior, Future Force Warrior and Commander's Digital Assistant programs.	11543	2478	2380	1425
- Networked Sensors for the Future Force: In FY04, leveraged, customized, matured and integrated C2 tools for sensor mission planning; conducted experiments to demonstrate C2 tools for networked sensors; participated in Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) demonstrations with unmanned networked sensors and platforms. In FY05, enhance C2 tools and mature decision aids to support semi-automatic sensor mission planning and management; conduct experimentations to demonstrate C2 for networked sensors; participate in C4ISR demonstrations with multiple unmanned networked sensors and platforms.	3380	3000	0	0
- Network Enabled Battle Command (NEBC): In FY05, mature techniques for measuring situation awareness and decision quality and integrate into demonstration plans; mature and demonstrate mission plan representation tools. In FY06, will mature and demonstrate technologies to support the interfacing and information exchange management between UA/UE C2 software applications and Army, Joint, Coalition and National information systems. In FY07, will demonstrate and transition to Joint Command and Control (JC2) System execution decision support services for Current Force/UE; will transition information exchange/interface technologies to FCS for integration into System of Systems Common Operating Environment (SOSCOE) software.	0	6300	7000	7400

Accomplishments/Planned Program (continued)	FY 2004	FY 2005	FY 2006	FY 2007
- Command & Control of Robotic Entities (C2ORE): In FY05, establish baseline M&S environment; define interfaces to support system of systems integration; complete identification of candidate software services; and define prototype software services. In FY06, will mature software service candidates per M&S based assessment; and identify and mature "best of breed" unmanned air-ground systems and technologies. In FY07, will create prototype software services and demonstrate in M&S environment; conduct experiment to characterize communications baseline and perform system of systems evaluation of integrated prototype software services using selected tactical application scenarios; will continue M&S refinement of software services and integrate selected software services with FCS BCS Build 4.	0	2623	3658	9125
Totals	14923	14401	13038	17950

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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
243	SENSORS & SIGNALS PROC	4865	16479	29437	31329	15057	8462	11207	11317

A. Mission Description and Budget Item Justification: This project provides improved ground based radar, sensor fusion and correlation technologies for Future Force information dominance. The Multi-Mission Radar (MMR) program will mature a Multi-mission HMMWV mounted radar technology to support air defense, counter-battery, and air traffic control missions within a single system to enhance Future Combat Systems (FCS) mobility and agility. MMR will be self-contained to process target data, identify aircraft/unmanned aerial vehicles (UAVs), and classify artillery, mortar and rockets. All target data will be distributed to relevant units in the battlefield through network centric channels. The Eye in the Sky (EIS) program will demonstrate cross-sensor control and data correlation (Fusion) of a multi-function, integrated sensor payload. Sensor suite candidates may include moving-target-indicator (MTI)/synthetic aperture radar (SAR), Night Vision and Electronic Sensors Directorate (NVESD)'s electro-optical/infrared (EO/IR) and signals intelligence technologies. This sensor suite will demonstrate wide area reconnaissance, surveillance, and targeting capability in adverse weather on manned and tactical unmanned aerial vehicles (UAVs), such as the A-160. Synergistic operation of sensors with on-board sensor management and the correlation of data for an integrated operational picture will be matured with significant leveraging of signal processing achievements from industry, Defense Advanced Research Projects Agency (DARPA) and other services. The Suite of Sense Through the Wall Systems will mature techniques for detection of personnel and objects through multiple wall types.

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, Development and Engineering Command, Communications – Electronics Research, Development and Engineering Center (CERDEC), Fort Monmouth NJ.

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
- Multi-Mission Radar (MMR): In FY04, matured radar antenna array; matured software to perform target classification, mission sorting, and target queuing management. In FY05, mature and demonstrate radar hardware and software; conduct systems engineering test to verify hardware and software; conduct initial field tests against targets of opportunity. In FY06 will perform radar system test against dedicated targets to validate performance; will conduct demonstration of system capabilities to user community, and deliver prototype MMR system and prime item development specification suitable for moving into system development and demonstration phase in support of Future Force MMR development.	4865	6579	5100	0
- Eye-in-the-Sky: In FY05, conduct operational concept study for integration of multi-sensor payload for Class IV UAV; begin mission management module design and maturation for cross-sensor control and data correlation; establish a simulation effort to identify means of autonomous sensor management to capitalize on sensor synergies and identify commercial off-the-shelf/Government off-the-shelf sensors for the multi-sensor payload. In FY06, will complete system hardware design and level 1 fusion algorithms/software for automated data correlation and target tracking; will begin to integrate sensors and payload onto Blackhawk aircraft and conduct limited flight-testing in the Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) On-the-Move (OTM) Demonstration at Fort Dix. In FY07, will mature and demonstrate target patterns recognition software for automatic cross-cueing of sensors; will develop sensor performance analysis tools and aircraft platform sensor management tool; will complete integration of sensors onto Blackhawk and conduct flight-testing in the C4ISR OTM Demonstration.	0	6024	18481	24472

Accomplishments/Planned Program (continued)	FY 2004	FY 2005	FY 2006	FY 2007
- Suite of Sense Through the Wall (STTW) Systems for the Future Force: In FY05, integrate prototype STTW systems with emerging FCS UA and Future Force Warrior (FFW) network communications architecture to demonstrate transmission of STTW data on a real time basis; evaluate data transmission, dissemination and software tools; provide STTW performance model for incorporation into Battle Lab and FFW operational modeling and simulation; evaluate technology advancements for use in personnel detection, concealed explosive detection and concealed weapons detection. In FY06, will conduct lab and user testing of STTW prototypes; utilize experiments to characterize urban and complex terrain phenomenology; mature techniques for the detection of stationary personnel through light construction materials. FY07, will mature and demonstrate integrated personnel detection/Concealed Weapon Detection (CWD)/Concealed Explosive Detection (CED) systems with greater standoff capability and increase probability of detection; will conduct lab testing of individual STTW sensors against multiple wall types; will develop techniques for detection of stationary personnel through multiple wall types and participate in C4ISR OTM Demonstration as well as FFW ATD with hand held STTW prototype.	0	3876	5856	6857
Totals	4865	16479	29437	31329