ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

February 2004

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

	COST (In Thousands)	FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
	Total Program Element (PE) Cost	26928	24731	31951	52647	53762	36778	30212
101	TACTICAL AUTOMATION	16035	15015	14803	19881	21325	21515	21509
1AA	TACTICAL COMPUTER SCIENCE DEMONSTRATIONS (CA)	1430	2766	0	0	0	0	0
1AB	SENSOR DEMONSTRATIONS (CA)	0	1976	0	0	0	0	0
243	SENSORS & SIGNALS PROC	9463	4974	17148	32766	32437	15263	8703

A. Mission Description and Budget Item Justification: This Program Element (PE) supports information dominance for the Army's Future Force. To gain and maintain battlefield dominance, the Future Force needs to understand, decide and act more rapidly than its adversaries. This PE will allow forces to more effectively collect, transfer and display digital information around the battlefield. It provides architectures and products to correct command and control (C2) deficiencies affecting rapid mobile, dispersed operations. It demonstrates technologies necessary for integrated battlefield situational awareness (SA), force synchronization, data correlation, tactical surveillance, and combat identification. Additionally, the technologies support split-based, on-the move (OTM) C2 operations, and multi-sensor payload for an A-160 class unmanned platform. The PE also addresses radar and signal processing. Technology solutions from this PE will be demonstrated in the Agile Commander Advanced Technology Demonstration (ATD).

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 is related to and fully coordinated with PE 0602783A (Computer and Software Technology), PE 0602782A (Command, Control and Communications Technology), and PE 0602120A (Sensors and Electronic Survivability). Work in this PE is performed by the Communications-Electronics Research, Development, and Engineering Center (CERDEC), Fort Monmouth, NJ.

B. Program Change Summary	FY 2003	FY 2004	FY 2005
Previous President's Budget (FY 2004)	22153	20255	31565
Current Budget (FY 2005 PB)	26928	24731	31951
Total Adjustments	4775	4476	386
Congressional program reductions		-232	
Congressional rescissions			
Congressional increases		4800	
Reprogrammings	4775	-92	
SBIR/STTR Transfer			
Adjustments to Budget Years			386

Significant Change Explanation.
FY03 - Funds increased to support the LCMR Program.
FY04 - Two FY04 Congressional adds totaling $4800 were added to this PE.

FY04 Congressional Adds with no R-2As:
($2685) MVMNT Program for Simulation Based Operations, Project 1AA: The purpose of this one year Congressional add is to mature and demonstrate technologies enabling simulation based operation. No additional funds are required to complete this project.
($1919) Palletized Radar for Black Hawk Helicopters, Project 1AB: The purpose of this one year congressional add is to mature and demonstrate one palletized Synthetic Aperture Radar/Ground Moving Target Indicator radar and integrate on an UH-60. No additional funds are required to complete this project.

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

February 2004

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

COST (In Thousands)		FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
101	TACTICAL AUTOMATION	16035	15015	14803	19881	21325	21515	21509

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 (S&T) solutions addressing: (1) digital transfer and display of horizontal battlefield situational awareness (SA) and a common view of the battlefield; (2) synchronization of combined and joint force operations; and (3) 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. The Agile Commander ATD will demonstrate digital hardware and software technologies that provide agile, rapidly deployable, split-based C2 operation. The Networked Sensors for the Future Force ATD will demonstrate flexible C2 technologies to enable the commander of a Unit Cell to manage multiple battlefield sensors, including those on unmanned air and ground platforms, in a timely, effective manner. Joint developer/warfighter demonstrations will be conducted in coordination with the Unit of Action, dismounted, battle command and combat service support battle labs. Products transition to the Program Executive Offices for integration.

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

Accomplishments/Planned Program	FY 2003	FY 2004	FY 2005
- Distributed Command and Control (C2) On-the-Move: In FY03, demonstrated semi-automated Course of Action Analysis (COAA) and wargaming capabilities and web-based intelligent agents for execution monitoring. Matured initial mobile adaptive computing software, integrated and demonstrated with scaleable communications capabilities, to ensure C2 under varying operating conditions, both dispersed and while on-the-move. Participated in C4ISR On-The-Move testbed demonstrations; and matured and transitioned course of action (COA) and decision support software to PM Maneuver Control System (MCS) and automated data input software to PM-FBCB2. In FY04, demonstrate capability to monitor the execution of 100 events, task sensors, receive a fused sensor data picture, and enable networked sensors and fires. Develop and deliver decision support software to serve as the common component integrating multiple battlelabs in a series of collaborative experiments. Demonstrate adaptive command and control applications working within a quality-of-service communications network. In FY05, will mature a distributed collaboration software environment for use in complex and urban terrain and mature a set of web-based decision support and modeling and simulation tools for FCS and Army Future Force commanders to collaboratively plan coalition activities in highly mobile operations. Will design and build a cohesive, intelligent agent-based C2 and ISR module and demonstrate near real-time surveillance and reconnaissance information in support of Commander's Priority Intelligence Requirements.	13233	11403	4655
- Tactical Intelligence, Surveillance and Reconnaissance: Provide a real-time, integrated Red and Blue forces picture with the capability to drill down to the underlying sensor data, define battlespace visualization requirements, and adapt COA tools to integrate C2, intelligence and resource allocation data to reduce workload of mission planners. In FY03, demonstrated an integrated common C2 and intelligence database, battlespace visualization products, and associated COA tools.	2802	0	0

Accomplishments/Planned Program (continued)	FY 2003	FY 2004	FY 2005
- Networked Unmanned Ground and Air Systems: Mature and demonstrate a networked battle management and unmanned system capability at the Unit of Action (UA) and lower echelons to allow soldiers to execute battle command with effective use of multiple air and ground unmanned systems. In FY04, evaluate maturity and applicability of existing technology in unmanned systems and establish a notional overall system architecture to enable the simultaneous Command and Control (C2) of multiple air and ground robotic systems. Integrate and demonstrate initial C2 tools for sensor mission planning for forward scouts that provide C2 for tactical networked sensors through the management of unmanned platform assets. In FY05, will conduct comparative tests of integration approaches from TARDEC, AMRDEC, ARL, and DARPA to determine critical functions needed to control unmanned assets at the UA. Will enhance and mature the C2 tools for the forward scout; mature modeling and simulation capability; and demonstrate C2 for networked sensors, including management of robotic sensor systems.	0	3392	4500
- Battle Information and Knowledge Exchange: Mature and demonstrate technologies to support the interfacing and information exchange management between unit of action/unit of employment (UA/UE) C2 software applications and Army, Joint, Coalition and National information systems. In FY04, analyze conceptual UE operational architectures being developed by TRADOC, with emphasis on connectivity and information exchange requirements between FCS systems and Joint, Interagency, and Multi-National information systems. In FY05, will test the architecture using candidate interface and information exchange technologies and distributed computing technologies for information management.	0	78	5648
Small Business Innovative Research/Small Business Technology Transfer Programs	0	142	0
Totals	16035	15015	14803

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3 - Advanced technology development	**0603772A - Advanced Tactical Computer Science and Sensor Tech**	**243**

COST (In Thousands)		FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
243	SENSORS & SIGNALS PROC	9463	4974	17148	32766	32437	15263	8703

A. Mission Description and Budget Item Justification: The Army needs a single multi-role sensor with sufficient mobility to support early entry forces or contingency theaters. A full complement of battlefield sensors cannot currently be expediently deployed. 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 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 Foliage Penetration Radar Program will provide the Warfighter an all weather airborne capability to detect and locate tactical targets employing camouflage and foliage as deceptive tactics. The goal of the Eye in the Sky (EIS) program is to demonstrate a multi-function, integrated sensor payload, including 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, correlation of data for an integrated operational picture will be matured with significant leveraging of signal processing achievements from industry, DARPA and other services.

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

Accomplishments/Planned Program	FY 2003	FY 2004	FY 2005
- Multi-Mission Radar (MMR) and Foliage Penetrating Radar (FOPEN): In FY03, completed system design, critical design review and test and demonstration plans. Matured software and hardware components for subsystem to include signal processor and software algorithms. In FY04, perform integration for software and algorithm for target classification, mission sorting, and target queuing management. Perform hardware, software, and engineering test. In FY05, will perform Radar system test with dedicated targets. Will build and demonstrate efficient/lightweight transmitters and power supplies.	3391	4864	7579
– Eye-in-the-Sky: In FY05, will conduct Operational Concept Study for integration of multi-sensor payload for Class IV UAV; will begin Mission Management Module design and maturation for cross-sensor control and data correlation; will initiate the development of a simulation effort to identify means of autonomous sensor management to capitalize on sensor synergies and identify COTS/GOTS sensors for the multi-sensor payload.	0	0	5700
- Suite of Sense Through the Wall Systems for the Future Force (STTW): In FY05 will integrate prototype STTW systems with emerging FCS and Objective Force Warrior (OFW) network communications architecture to demonstrate transmission of STTW data on a real time basis. Will evaluate data transmission, dissemination and software tools. Will provide STTW performance model for incorporation into Battle Lab and OFW operational modeling and simulation. Will investigate technologies for personnel detection, concealed explosive detection and concealed weapons detection. Will establish techniques for detection of stationary personnel through light construction materials.	0	0	3869
- Automated Passive Propagation Sensor/Analyzer: This one year Congressional add demonstrated an automated weather data collection and measurement module that integrated into existing sensor systems. This information will be fed to existing intelligence gathering systems. No additional funding is required to complete this project.	952	0	0
- Lightweight Counter Mortar Radar: In FY03, developed and built two (2) prototype, man portable counter mortar radar systems capable of locating enemy mortar (81mm, 120mm) firing positions from 1-7 km for SOCOM. System improvements resulted in location accuracy within 100m and continuous 360° coverage. Prototype units used in live fire tests at Yuma Proving Grounds in Arizona and for CONOPs development.	5120	0	0
Small Business Innovative Research/Small Business Technology Transfer Programs	0	110	0
Totals	9463	4974	17148