ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

February 2005

BUDGET ACTIVITY
1 - Basic research

PE NUMBER AND TITLE
0601104A - University and Industry Research Centers

	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	95352	100066	81953	85938	88984	91779	93400	95051
H04	HBCU/MI CENTERS - TRADOC BATTLELABS	0	4560	2509	2593	2646	2700	2753	2808
H05	INSTITUTE FOR COLLABORATIVE BIOTECHNOLOGIES	0	4620	6825	7025	7130	7234	7378	7524
H09	ROBOTICS COLLABORATIVE TECH ALLIANCE (CTA)	0	2402	2510	2593	2646	2700	2753	2808
H50	COMMS & NETWORKS COLLAB TECH ALLIANCE (CTA)	7902	7762	8178	8481	8722	8841	9017	9196
H53	ADV DIS INTR SIM RSCH	2468	2364	2618	2714	2780	2844	2900	2958
H54	ADVANCED SENSORS COLLAB TECH ALLIANCE (CTA)	6192	6125	6514	6702	6902	6982	7121	7262
H56	ADV DECISION ARCH COLLAB TECH ALLIANCE (CTA)	5988	5852	6203	6578	6754	7121	7262	7407
H59	UNIV CENTERS OF EXCEL	20665	6286	1864	1923	1973	2009	2049	2090
H62	ELECTROMECH/HYPER PHYS	5653	5357	5792	6126	6233	6329	6454	6582
H64	MATERIALS CENTER	2816	3076	2464	2664	2730	2790	2845	2901
H65	MICROELECTRONICS CTR	936	897	946	1051	1078	1101	1123	1145
H73	NAT AUTO CENTER	7840	7422	2958	3074	3191	3233	3261	3286
HB3	IMMERSIVE ENVIRONMENTS BASIC RSCH INITIATIVES (CA)	1343	0	0	0	0	0	0	0
J08	INSTITUTE FOR CREATIVE TECHNOLOGY	11655	10582	7184	7315	7543	7757	7911	8068
J09	POWER & ENERGY COLLABORATIVE TECH ALLIANCE (CTA)	5732	5498	5646	5739	5884	6016	6136	6257
J12	NANOTECHNOLOGY	9446	9097	9933	10278	10535	10769	10983	11201
J13	UNIVERSITY AND INDUSTRY INITIATIVES (CA)	6716	18166	0	0	0	0	0	0
J14	ECYBERMISSION	0	0	4809	4963	5091	5184	5287	5392

J15	NETWEORK SCIENCES INTERNATIONAL TECHNOLOGY ALLIANC	0	0	5000	6119	7146	8169	8167	8166

A. Mission Description and Budget Item Justification: A significant portion of the work performed within this program directly supports Future Force requirements by providing research that supports enabling technologies for Future Force capabilities. Broadly, the work in this project falls into three catagories: Collaborative Technology Alliances (CTAs), University Centers of Excellence, and paradigm-shifting centers - University-Affiliated Research Centers (UARCs). The Army has formed CTAs to leverage large investments by the commercial sector in basic research areas that are of great interest to the Army. CTAs involve partnerships between industry, academia, and the Army Research Laboratory to incorporate the practicality of industry, the expansion of the boundaries of knowledge from universities, and Army scientist to shape mature and transition technology. CTAs have been competitively established in the areas of Advanced Sensors, Advanced Decision Architecture, Communications and Networks, Power and Energy, and Robotics. This program element includes the Army's Centers of Excellence (COE), which focus on expanding the frontiers of knowledge in research areas where the Army has enduring needs, such as rotorcraft, automotive, microelectronics, materials, and information sciences. COEs couple state-of-the-art research programs at academic institutions with broad-based graduate education programs to increase the supply of scientists and engineers in materials science, electronics, automotive and rotary wing technology. Also included is eCYBERMISSION, the Army's national web-based competition to stimulate interest in science, math and technology among middle and high school students. This program element also includes the four Army UARCs, which have been created to exploit opportunities to advance new capabilities through a sustained long-term multidisciplinary effort. The Institute of Advanced Technology funds basic research in electromagnetics and hypervelocity physics. The Institute for Soldier Nanotechnologies focuses on Soldier protection by emphasizing revolutionary materials research for advanced Soldier protection and survivability. The Institute for Collaborative Biotechnologies, focusing on full spectrum dominance, will broaden the Army's use of biotechnology for the development of bio-inspired materials, sensors, and information processing. The Institute for Creative Technologies is a partnership with academia and the entertainment and gaming industries to leverage innovative research and concepts for training and design. Examples of specific research of mutual interest to the entertainment industry and the Army are technologies for realistic immersion in synthetic environments, networked simulation, standards for interoperability, and tools for creating simulated environments. Historically Black Colleges and Universities and Minority Institution (HBCU/MI) Centers of Excellence address critical research areas for Army Transformation. The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Department of Defense Basic Research Plan (BRP). Work in this PE is managed by: the Army Research Lab (ARL); the U.S. Army Tank-Automotive Research, Development and Engineering Center (TARDEC); the Simulation & Training Technology Center (STTC); and the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI).

B. Program Change Summary	FY 2005	FY 2006	FY 2007
Previous President's Budget (FY 2005)	77658	76705	80157
Current Budget (FY 2006/2007 PB)	100066	81953	85938
Total Adjustments	22408	5248	5781
Net of Program/Database Changes			
Congressional Program Reductions	-1496		
Congressional Rescissions			
Congressional Increases	26776		
Reprogrammings			
SBIR/STTR Transfer	-2872		
Adjustments to Budget Years		5248	5781

Change Summary Explanation:

Nineteen FY05 Congressional Adds totaling $26776 were added to this PE.

FY05 Congressional Adds with no R-2A:
($959) Basic Research for Infrastructure Protection from Terrorist Attacks, Project J13: The purpose of this one year Congressional add is to fund basic research in infrastructure protection from terrorist attacks. No additional funding is required to complete this project.

($1438) Center for Advanced Sensors, Project J13: The purpose of this one year Congressional add is to fund basic research in advanced sensors. No additional funding is required to complete this project.

($1918) Center for Ferroelectric Electronic - Photonic Nanodevices, Project J13. The purpose of this one year Congressional add is to perform research in ferroelectric and photonic devices. No additional funding is required to complete this project.

($959) Center for Nanomaterials Research, Project J13. The purpose of this one year Congressional add is to perform nanomaterial research.

No additional funding is required to complete this project.

($959) Electronic Engineering Technology Program, Project J13: The purpose of this one year Congressional add is to fund basic research in electronic engineering technology. No additional funding is required to complete this project.

($959) Eye and Sensor Protection Against Laser Sources, Project J13. The purpose of this one year Congressional add is to perform research in eye and sensor protection against lasers. No additional funding is required to complete this project.

($1151) Information Assurance Research, Project J13: The purpose of this one year Congressional add is to fund basic research in information assurance at Norfolk State University, VA. No additional funding is required to complete this project.

($959) Interactive Training Tools to Promote Emergency Procedures in High-Rise Buildings and Mitigate Disasters from Attacks, Fires or Other Threats, Project J13: The purpose of this one year Congressional add is to fund basic research in interactive training tools to promote emergency procedures in high-rise buildings. No additional funding is required to complete this project.

($959) Nanotubes, Project J13. The purpose of this one year Congressional add is to perform research in nanotubes. No additional funding is required to complete this project.

($2398) National Infotonics Research, Project J13: The purpose of this one year Congressional add is to fund basic research in infotonics. No additional funding is required to complete this project.

($959) National Security Network Testbed, Project J13: The purpose of this one year Congressional add is to fund basic research in national security networks. No additional funding is required to complete this project.

($1438) Next Generation Joining Technology Research Initiative, Project J13: The purpose of this one year Congressional add is to fund basic research in joining technology. No additional funding is required to complete this project.

($1438) NOLES Composite Materials, Project J13: The purpose of this one year Congressional add is to fund basic research in composite materials. No additional funding is required to complete this project.

($959) Rapidly Deployable Visualization for Training and Simulation in Urban Terrains, Project J13. The purpose of this one year Congressional add is to perform research supporting deployable visualization for training and simulation. No additional funding is required to complete this project.

($719) Small Trailer Corrosion Prevention Program, Project J13. The purpose of this one year Congressional add is to fund basic research in corros

ion prevention. No additional funding is required to complete this project.

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2005

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
1 - Basic research	**0601104A - University and Industry Research Centers**	**H04**

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
H04	HBCU/MI CENTERS - TRADOC BATTLELABS	0	4560	2509	2593	2646	2700	2753	2808

A. Mission Description and Budget Item Justification: Centers of Excellence have proven to be effective in harnessing a critical mass of university research expertise and focusing their intellectual capabilities on Army unique science and technology problems. The objective is to transition the advances resulting from basic research to technology demonstration as rapidly as possible. This Project takes that approach one step further by partnering the university researchers at Historically Black Colleges and Universities/Minority Institutions (HBCU/MI) with Army TRADOC Battlelabs to gain first hand perspective of the end-user's needs. Through these Centers, the Army user begins the collaboration with university researchers from the outset of the research. These Centers of Excellence will join with Army and industrial partners to accelerate the transition from research phase to actual technology demonstration. In addition, these Centers of Excellence will recruit, educate and train outstanding students and post doctoral researchers in science and technology areas vital to Army Transformation. This project was previously funded in PE 611104A Project H59 and is a restructuring of ongoing research into a distinct project for visibility and management. The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Department of Defense Basic Research Plan (BRP). Work on this project is performed extramurally by the Army Research Laboratory (ARL).

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2005

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
1 - Basic research	**0601104A - University and Industry Research Centers**	**H04**

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
- This program was initiated in FY04 in this PE under Project H59. In FY05, fully establish the HBCU/MI Centers of Excellence for Battlefield Capability Enhancements: Tuskegee University – research on flexible extremities protection; North Carolina A&T University – research on flexible displays and human engineering research in cognitive strategies – "sense making; , Tennessee State University – research on sensor fusion; and Prairie View University – research on Beyond-Line-of-Sight Continue to forge close collaborative working relationships with TRADOC Battle Labs and accelerate technology transitions to Army labs/centers and industry. In FY06, will conduct rheological characterization studies of fabric composites for flexible extremities protection; investigate 2D stationary and non-stationary distributed sensors with varying operational modalities; characterize non-crystalline wide band gap materials for environmentally stable flexible displays; conduct cognitive process experiments for human-centric decision making. In FY07, will model and simulate wave propagation of shear thickening fluid/fabric composites for extremities protection; expand sensing taxonomy to 3D located sensors and combine with 2D and 3D non-stationary sensor nodes; characterize electrical and optical properties of organic multilayer films for flexible displays; model adaptivity of decision maker in dynamic situations.	0	2310	2509	2593
- The purpose of this one year Congressional add is to support basic research at Lincoln University, a Historically Black University. No additional funding is required to complete this project.	0	2250	0	0
Totals	0	4560	2509	2593

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2005

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
1 - Basic research	**0601104A - University and Industry Research Centers**	**H05**

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
H05	INSTITUTE FOR COLLABORATIVE BIOTECHNOLOGIES	0	4620	6825	7025	7130	7234	7378	7524

A. Mission Description and Budget Item Justification: This project was previously funded in PE 611104A Project H59 and is a FY05 restructuring of ongoing research into a distinct project for visibility and management. This Project supports the Army's Institute for Collaborative Biotechnologies (ICB), a University Affiliated Research Center located at the University of California-Santa Barbara, and two major subcontractors, the California Institute of Technology and the Massachusetts Institute of Technology. The ICB is the Army's primary conduit for leveraging biotechnology for: (1) advanced sensors; (2) new electronic, magnetic and optical materials; and (3) information processing and network analysis. The objective is to perform sustained multidisciplinary basic research supporting technology to provide the Army with biomolecular sensor platforms with unprecedented sensitivity, reliability, and durability; higher-order arrays of functional electronic and optoelectronic components capable of self-assembly and with multi-functions; and new biological means to process, integrate and network information. A second ICB objective is to educate and train outstanding students and post doctoral researchers in revolutionary areas of science to support Army Transformation. The ICB has many industrial partners, such as IBM and SAIC, and has strong collaborations with Argonne, Lawrence Berkley, Lawrence Livermore, Los Alamos, Oak Ridge and Sandia National Laboratories, the Army's Institute for Soldier Nanotechnologies, the Institute for Creative Technologies, and Army Medical Research and Materiel Command laboratories. The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Department of Defense Basic Research Plan (BRP). Work in this project is performed extramurally by the Army Research Laboratory (ARL).

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2005

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
1 - Basic research	**0601104A - University and Industry Research Centers**	**H05**

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
Institute for Collaborative Biotechnologies: In FY04, this program was funded under Project BH59. In FY05, explore biologically derived and biologically inspired synthesis and processing for enhanced performance materials properties; investigate and leverage design and characterization of biological networks as insight for battlefield networks. In FY06, will formulate fastest available method for generating binding peptides for Army biosensing, diagnostics and therapeutics applications; will devise the collective optical response of multichromophore macromolecules and DNA-specific electrode surfaces and microfabrication for detection and identification of multiple DNA sequences for threat, Identification Friend or Foe (IFF) and soldier status-analysis; will adapt unique proteomics technology and diagnostic markers into microfluidics-based modified proteomics libraries for advanced analysis in early detection of human pathology; and will establish the roles of interfaces for potential use of biological + non-biological hybrid components in advanced electronic and photonic devices. In FY07, will provide foundation for incorporation of deterministic and stochastic dynamic models from biological systems, endowing engineered Army networks with robustness; will use the power and selectivity of biomolecular recognition and accelerated genetic selection and rapid evolution for elaboration of growth-directing peptides for specific crystalline semiconductor materials and electrode bridges with potential for electronic device application; will enable controlled surface functionalization and ligand display on, and integration into, materials for application in sensors, multi-functional materials, and device assembly; and will devise genetically engineered microbial systems that efficiently incorporate un-natural amino acids into proteins for unique materials application for the Army.	0	4620	6825	7025
Totals	0	4620	6825	7025

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2005

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
1 - Basic research	**0601104A - University and Industry Research Centers**	**H09**

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
H09	ROBOTICS COLLABORATIVE TECH ALLIANCE (CTA)	0	2402	2510	2593	2646	2700	2753	2808

A. Mission Description and Budget Item Justification: This project was previously funded in PE 601104A project H59 and is a restructuring of ongoing research into a distinct project for visibility and management. This project conducts basic research in key scientific areas that will expand the capabilities of intelligent mobile robotic systems for military applications with a focus on enhanced innate intelligence, ultimately approaching that of a dog or other intelligent animal, to permit unmanned systems to function as productive members of a military team. Research will be conducted in perception, including the exploration of sensor phenomenology and the maturation of basic machine vision algorithms enabling future unmanned systems to more fully understand their local environment for enhanced mobility and tactical performance intelligent control, including maturation of artificial intelligence techniques for robot behaviors permitting future systems to autonomously adapt and alter their behavior to dynamic tactical situations, and understanding the interaction of humans with machines focusing upon intuitive control by soldiers that minimizes cognitive burden. The program will conduct both analytic and experimental studies. Research products will be transitioned to the companion applied research program, 62618 H3, for integration and evaluation in test bed platforms and will form the scientific basis for new technology that will migrate into Army and Joint advanced and system development programs to provide highly capable unmanned systems for the Future Force. The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Department of Defense Basic Research Plan (BRP). Work in this project is performed by the Army Research Laboratory (ARL).

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
- Robotics Collaborative Technology Alliance: Explore new opportunities to enable revolutionary autonomous mobility for the Future Force. Research is an integral part of the larger Army Robotics Program and feeds technology into PE 0602618 (Robotics Technology). Research focuses on unmanned systems operating as a team with human supervisors and displaying a high degree of adaptability to dynamic environmental and tactical situations. In FY05, research focuses on understanding sensor phenomenology and determining new methodologies to enable accurate terrain classification in the local environment permitting intelligent autonomous tactical movement through complex terrain. Emphasis will be upon the advancing specialized algorithms able to classify distinct objects, e.g., water, wire structures, embedded in a complex background to enable higher speed cross-country mobility required for Future Combat Systems unmanned ground elements. Investigate control concepts that allow autonomous systems to adapt to dynamic environments and learn from past performance in a mixed manned/unmanned collaborative environment thus reducing the cognitive workload placed upon soldiers controlling unmanned systems. Characterize the performance of a probabilistic, genetic algorithm and market based algorithms in an M&S evaluation framework for autonomous robot scout systems. In FY06, will compare adaptive capability of tactical behaviors to a baseline approach utilizing task decomposition/case-based machine behavior; and will perform assessment for Improvised Explosive Devices (IED) threat mitigation designed to stress both perception and control strategies, proving concept viability and mitigating the risk associated with meeting FCS objectives. In FY07, will evaluate tactical behavior of core algorithmic structures and determine performance of best features of each in various tactical behavior applications stressing performance in changing tactical situations in complex environments.	0	2402	2510	2593
Totals	0	2402	2510	2593

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2005

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
1 - Basic research	**0601104A - University and Industry Research Centers**	**H50**

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
H50	COMMS & NETWORKS COLLAB TECH ALLIANCE (CTA)	7902	7762	8178	8481	8722	8841	9017	9196

A. Mission Description and Budget Item Justification: This project supports a competitively selected university/industry consortium, the Communication and Networks Collaborative Technology Alliance (CTA), that was formed to leverage commercial research investments to provide solutions for the Army's requirements for robust, survivable, and highly mobile wireless communications networks. The Future Force has a requirement for state-of-the-art wireless mobile communications networks for command-on-the-move. The objectives include designing communications systems for survivable wireless mobile networks; providing signal processing for communications-on-the-move; secure jam-resistant communications; and tactical information protection. The CTA also facilitates the exchange of people among the collaborating organizations to provide cross-organizational perspectives on basic research challenges, as well as the use of state-of -the-art facilities and equipment at the participating organizations. This CTA accelerates the transition of communications and networks technology to PE 0602783 (Computer and Software Technology). The results of this work will significantly affect Future Force communications/networking formulation efforts. The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Department of Defense Basic Research Plan (BRP). Work in this project is performed by the Army Research Laboratory (ARL).

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
- Survivable Wireless Mobile Networks: perform research in dynamically self-configuring wireless network technologies that enables secure, scaleable, energy-efficient, and reliable communications for command-on-the move. In FY04, integrated self-organizing and auto configuring subnet protocols that enable persistent on-the-move communication sessions in highly mobile conditions. In FY05, validate self-organizing and auto configuring subnet protocols that enable persistent on-the-move communication sessions in highly mobile conditions. In FY06, will devise and validate auto configuration protocols that allow mobile networks to adapt to dynamic conditions. In FY07, will conduct analytical and experimental studies validating dynamic and survivable resource pooling to enable mobile networks to exploit distributed network infrastructures.	2675	2670	2862	2971
- Signal Processing for Communication-on-the-Move: perform research in signal processing techniques to enable reliable low-power multimedia communications among highly mobile users under adverse wireless conditions. In FY04, conducted analytical and experimental studies investigating high performance multiple access techniques and high spectral efficiency modulation schemes for communications on the move. Combined Digital Signal Processing (DSP) and hardware to enhance Radio Frequency (RF) transmission efficiency. In FY05, conduct analytical and experimental studies validating high performance multiple access techniques and high spectral efficiency modulation schemes for communications on the move. In FY06, will conduct analytic and experimental studies of Multi-Input, Multi-Output systems that are spectrally-efficient and robust for non-line-of-sight mobile communications. In FY07, will conduct analytical and experimental studies of signal processing aided medium access control algorithms that improves communications performance while on-the-move.	1972	1962	2044	2124
- Secure Jam-Resistant Communication: perform research in secure, jam-resistant, multi-user communications effective in noisy/cluttered and hostile wireless environments enabling low probability of detection/intercept. In FY04, conducted analytical and experimental studies investigating low probability of detection waveforms, interference mitigation techniques, and anti-jam modulation to enable survivable communications and spectrum reuse. In FY05, conduct analytical and experimental studies validating low probability of detection waveforms, interference mitigation techniques, and anti-jam modulation to enable survivable communications and spectrum reuse. Investigate ultra-violet non-line-of-sight sensor communications. In FY06, will conduct analytical and experimental studies of frequency-hopping systems that enable robust and mobile anti-jam effectiveness. In FY07, will devise and study sensor array processing and interference techniques that enable adaptive antennas for improved interference rejection and spectrum reuse.	1653	1574	1636	1691

Accomplishments/Planned Program (continued)	FY 2004	FY 2005	FY 2006	FY 2007
- Tactical Information Protection: perform research in scaleable, efficient, adaptive, and secure information protection for very resource-constrained and highly mobile ad hoc networks. In FY04, conducted analytical studies investigating a highly efficient and noise robust security suite with distributed trust, distributed key management, and intrusion detection. In FY05, conduct analytical and experimental studies validating a highly efficient and noise robust security suite with distributed trust, distributed key management, and intrusion detection. In FY06, will conduct analytical and experimental studies of intrusion detection algorithms that are effective in mobile ad hoc networks with no concentration points where traffic can be analyzed. In FY07, will devise and study security schemes for distributed servers supporting dynamic network infrastructures.	1602	1556	1636	1695
Totals	7902	7762	8178	8481

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2005

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
1 - Basic research	**0601104A - University and Industry Research Centers**	**H53**

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
H53	ADV DIS INTR SIM RSCH	2468	2364	2618	2714	2780	2844	2900	2958

A. Mission Description and Budget Item Justification: This project supports Army critical research at the Army High Performance Computer Research Center (AHPCRC). The AHPCRC research is focused on the Future Force, including: structural response of armored vehicles to perforating and non-perforating projectiles, investigating more efficient gun projectile and missile propulsion systems, evaluating materials suitable for armor/anti-armor applications, defense from chemical/biological agents, signature modeling, and associated enabling technologies. This project also supports a long-term collaboration between the Army Research Laboratory and competitively selected Army Center of Excellence in Information Sciences (ACEIS). The objective of this center is to perform research in knowledge fusion technology in support of global and tactical battle command for the Future Force. The most significant technical barrier is determining how fusion can function usefully as a service in the rapidly evolving, universal distributed web environment to build systems to support reasoning and inference of human decision processes. Areas of emphasis include real-time and near-real-time multi-sensor fusion for situational awareness and threat prediction. A key problem to be solved is information overload. Major portions of the work of the ACEIS are performed at Clark Atlanta University and Morgan State University; both are HBCU institutions. The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Department of Defense Basic Research Plan (BRP). Work in this project is performed by the Army Research Laboratory (ARL).

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
- Perform research at the Army High Performance Computing Research Center (AHPCRC) that requires computationally intensive algorithms in the areas of projectile target interaction, signature modeling, chemical/biological defense, nano-science and nano-mechanics, and enabling technologies to include scientific visualization that support the Future Force transition path. In FY04, created interdisciplinary tools and validated integration of chem-bio defense propagation with Army meteorology models, to include data mining approaches for chemical-biological models and weather models; integrated intrusion detection software into Army systems; created algorithms for computational nanomechanics; validated computational fluid dynamics and structural mechanics approaches with relevant Army applications. In FY05, create novel computational algorithms for chemical-biological defense at the cell level; explore algorithms at nano-level and mechanics towards multifunctional nano-materials; explore coupled approaches for integrating Army meteorology models with electromagnetics; investigate new scalable higher order techniques in mechanics and electromagnetics; explore scientific visualization approaches to meet new hardware, software, and user requirements. In FY06, will integrate scalable software for intrusion detection and validate for Army application; will implement dial-up software to enhance interior ballistics and validate with Army application; and will explore nanotechnologies scalable algorithm toward relevant Army applications. In FY07, will complete an infrastructure to allow for nanoscale optical, magnetic, and biosensors on a deployable chip; explore multi-sensory visualization approaches to better understand and process multivariate data; and will devise algorithms for flexible-rigid multi-body dynamics and new methods for nonlinear computational structural mechanics.	1998	2000	2000	2000
- Perform research into knowledge fusion technologies and systems that enhance situational awareness and threat prediction on the battlefield to improve tactical and global battle command. In FY04, performed experiments on distributed databases using intelligent agent technologies; implemented network-centric, service-based fusion research platform to test fusion algorithms at points all along the sensor-to-warrior chain. In FY05, show distributed streaming video fused with geographic data to present real-time battlefield on-request information delivery. In FY06, will extend research to include indexing and queries that cluster around time and space using superimposed visualization to enhance imagery. In FY07, will investigate additional heterogeneous multimedia data sources for potential extension and experimentation in a mobile environment.	470	364	618	714
Totals	2468	2364	2618	2714

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February 2005

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
1 - Basic research	**0601104A - University and Industry Research Centers**	**H54**

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
H54	ADVANCED SENSORS COLLAB TECH ALLIANCE (CTA)	6192	6125	6514	6702	6902	6982	7121	7262

A. Mission Description and Budget Item Justification: This project supports a competitively selected industry/university consortium, the Advanced Sensor Collaborative Technology Alliance (CTA), for the purpose of leveraging world-class commercial research necessary to address Future Force and Army Transformation needs. The CTA links a broad range of government technology agencies and industry/academia partners with the Army Research Lab (ARL). This Advanced Sensors CTA conducts innovative research focusing on three main technical areas: micro-sensors, electro-optic smart sensors, and advanced radar concepts. The payoff to the warfighter will be advanced sensing technologies to support Future Force requirements. The technical areas addressed under this project include overcoming technical barriers associated with: autonomous calibration and management of micro sensor networks; multi-domain smart sensors (includes multi-spectral infrared focal plane arrays); a novel concept for laser radar (LADAR); multifunction radar sensors; and sensor modeling and algorithms for automatic target recognition (ATR) involving fusion of data from multiple sensors and signal processing. The CTA also facilitates the exchange of people among the collaborating organizations to provide cross-organizational perspectives on basic research challenges, as well as the use of state-of -the-art facilities and equipment at the participating organizations. Work in this CTA accelerates the transition of technology to PE 0602120 (Sensors and Electronic Survivability). The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Department of Defense Basic Research Plan (BRP). Work in this project is performed by the Army Research Laboratory (ARL).

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
- Perform microsensor research focused on sensors, algorithms, low-power signal processing, and autonomous sensor/network management for the unattended sensor network component of FCS, resulting in technology transfer and delivery of sensor nodes to applied research. In FY04, evaluated significant reduction of sensor network power budget to increase sensor operational lifetime. In FY05, implement multi-sensor (acoustic & infrared image) fusion on a cluster of five nodes for detection, identification and tracking of multiple vehicles. For FY06, will implement multi-sensor fusion on multiple clusters for detection, identification and tracking of multiple targets (people and vehicles). For FY07, will extend sensor fusion to include robotic/unmanned aerial vehicles and ground vehicles, with autonomous sensor management and self-calibration.	2473	2450	2606	2681
- Perform electro-optics research focused on infrared sensors, laser radar, hyperspectral imaging, and automatic target recognition algorithms for improved situational awareness and targeting. In FY04, devised and characterized separate passive infrared imager and active laser radar imager. In FY05, devise prototype 8x8-pixel integrated active/passive imager; fabricate a medium wavelength infrared (MWIR) 320 x 256 gallium antimonide passive imaging array; validate mercury cadmium telluride MWIR passive imaging array with operating temperature of 120 Kelvin. In FY06, will validate a 32 x 32 integrated active/passive imager. In FY 07, will fabricate a long wavelength infrared 320x256 gallium antimonide passive array.	2167	2144	2280	2343
- Perform radar research focused on low-cost electronically scanned antennas; integration of analog and digital components, advanced materials and device designs; and system studies to increase radar performance and reduce the detection of FCS platforms. In FY04, completed the electronically scanned antenna subsystem comprised of low-cost phase control modules. In FY05, verify low-power Micro-Electrical-Mechanical System (MEMS) phase shifters for electronically scanned antennas. In FY06, will validate multi-bit low-temperature-growth gallium arsenide phase shifter with low loss. In FY07, will fabricate low-cost liquid crystal polymer MEMS phase shifter and validate in an electronically scanned antenna array.	1552	1531	1628	1678
Totals	6192	6125	6514	6702

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2005

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
1 - Basic research	**0601104A - University and Industry Research Centers**	**H56**

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
H56	ADV DECISION ARCH COLLAB TECH ALLIANCE (CTA)	5988	5852	6203	6578	6754	7121	7262	7407

A. Mission Description and Budget Item Justification: This project supports a competitively selected industry/university consortium, the Advanced Decision Architecture Collaborative Technology Alliance (CTA), for the purpose of leveraging world-class commercial research in support of the Future Force and Army Transformation needs. The Future Force will require state-of-the-art user-centered decision support technologies to include user-interface concepts, design practices and principles that will provide real-time situation awareness, distributed commander-staff-subordinate collaboration and planning, and execution monitoring in a high tempo, high stress battlefield environment with speeds that permit the commander and his staff to operate inside the enemy's decision cycle. This project will conduct an intensive and accelerated program to formulate, validate, and transition basic research to provide solutions for the many requirements for understanding situation awareness, expert decision making, team collaboration, the ability to display information in a way that facilitates knowledge assimilation on the battlefield, and visualization and decision support architectures. Research is conducted in four areas: cognitive process modeling and measurement, analytical tools for collaborative planning and execution, user adaptable interfaces, and auto-adaptive information presentation. The technical barriers associated with this project are: human-computer interface in an information rich environment; display configuration; real time visualization; architecture; information presentation; and control coupling. The CTA also facilitates the exchange of people among the collaborating organizations to provide cross-organizational perspectives on basic research challenges, as well as the use of state-of -the-art facilities and equipment at the participating organizations. This CTA accelerates the transition of advanced decision architecture technology to PE 0602716 (Human Factors Engineering Technology) and PE 0602783 (Computer and Software Technology). The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Department of Defense Basic Research Plan (BRP). Work in this project is performed by the Army Research Laboratory (ARL).

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
- Modeling and measurements of cognitive processes of Army commanders and staffs (decision makers). In FY04, investigated naturalistic planning and decision-making, specifically the constructs of mental simulation and pattern matching, as key cognitive processes in projecting battlefield scenario outcomes. Conducted virtual reality simulation experiments to provide the necessary data to enhance computational models that are sensitive to contextual cues. In FY05, validate computational models of cognitive processing to include models which predict operator performance while interacting with graphic displays. In FY06, will investigate applicability of social network models of commander and staff interactions for organizational design. In FY07, will validate architecture for information fusion, which uses diagrammatic reasoning as an aid to evaluate the commander's preferred course of action.	2177	2165	2295	2434
- Analytical tools for collaborative planning and execution: create tools that effectively support teams in coordinating and collaborating to achieve mission success across the spectrum of operations. In FY04, evaluated cognitively based methods and procedures for improved situation awareness, team collaboration and decision making in a distributed environment. Results indicated that the common operational picture (display), audio conferencing, and face-to-face were the most effective tools for planning and execution overall; but instant messaging was most effective in execution. In FY05, integrate concepts, equipment, and software to examine multi-national coalition collaboration in a stability and support operation. In FY06, will design and complete experiments to examine variations on decision-making processes and procedures and the use of advanced digital tools for continuous planning in a distributed environment. In FY07, will validate prototype architecture for collaboration and visualization test bed.	1208	1145	1210	1284
- User-adaptive interfaces: explore ideas, frameworks, and technologies that assist the Soldier in understanding, problem solving, planning and decision-making. In FY04, evaluated feedback frameworks for enhancing situation awareness. Experiments indicated that displays that combined risk information resulted in faster response times and resource allocations that were closer to optimal. In FY05, provide solutions for identification and fusion of information necessary to make and control decisions from generally distributed and disparate databases with varied data uncertainties. In FY06, will integrate advanced haptic (touch) displays into a multi-modal test bed and evaluate effect on soldier performance. In FY07, will integrate capability for multinational, multilingual communication in stability and support test bed.	1584	1578	1675	1776

Accomplishments/Planned Program (continued)	FY 2004	FY 2005	FY 2006	FY 2007
- Auto-adaptive information presentation: investigate how to make autonomous machines team players with their human partners or supervisors in warfighting operations. In FY04, investigated prototype human robotic displays and devised a set of concepts for improved remote perception which enable human perceptual capabilities to assist in guiding the path of a robot in search and rescue operations. Initiated agile computing concepts to enable management of sensor data feeds in distributed sensor networks. In FY05, validate baseline system for improving the flexibility of FCS through dynamically reconfigurable software agent systems. In FY06, will validate test bed for multi-modal information exchange and dynamic adaptation. In FY07, will extend software agent systems to provide an agile computing infrastructure for Unit of Action. Will validate architecture for simplifying Soldier adaptation to new display technologies.	1019	964	1023	1084
Totals	5988	5852	6203	6578

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2005

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
1 - Basic research	**0601104A - University and Industry Research Centers**	**H59**

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
H59	UNIV CENTERS OF EXCEL	20665	6286	1864	1923	1973	2009	2049	2090

A. Mission Description and Budget Item Justification: Army Centers of Excellence couple state-of-the-art research programs with broad-based graduate education programs at academic institutions with the goal of increasing the supply of scientists and engineers who can contribute to Army Transformation. In FY04, this project supported the Rotorcraft Center of Excellence and eCYBERMISSION, a web-based science, math and technology competition designed to stimulate interest and encourage advanced education in these areas among middle and high school students nationwide. Also supported in FY04 were five Historically Black Colleges and Universities/Minority Institutions (HBCU/MI) Centers of Excellence for Battlefield Capability Enhancements, the Institute for Collaborative Biotechnologies and the Collaborative Technology Alliance in Robotics. These three efforts were restructured in FY05 from H59 to Projects H04, H05 and H09, respectively, for increased visibility and management oversight. Starting in FY06, the eCYBERMISSION effort will be restructured to Project J14 for increased visibility and management oversight, leaving the Rotorcraft Center of Excellence as the only program funded in this project in FY06 and 07. In FY06 and FY07, this project supports Army Transformation by providing research into technologies that can improve tactical mobility, reduce the logistics footprint, and increase survivability for rotary wing vehicles. The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Department of Defense Basic Research Plan (BRP). Work in this project is performed extramurally by the Army Research Laboratory (ARL) and Aviation and Missile Research, Development, and Engineering Center (AMRDEC).

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
eCYBERMISSION national competition to stimulate interest in science, math and technology in middle and high school students. In FY04, conducted full-scale launch of competition to all middle school (grades 6-8) and 9th grade high school students across the country and Department of Defense Educational Activity (DoDEA) schools, nearly doubling participation to include 5,854 students in 1,624 completed teams. In FY 05, sustain eCYBERMISSION and implement enhancements as necessary based on previous years' lessons learned and expand student and teacher participation beyond the results of FY04. In FY06, this effort will be restructured into PE 0601104A Project J14 for increased visibility and management oversight.	4989	4531	0	0
In FY04, established five HBCU/MI Centers of Excellence for Battlefield Capability Enhancements. The centers' focus areas are Sensor Fusion; Lines of Sight/Beyond Line of Sight Lethality, Flexible Extremities Protection; Mounted/Dismounted Maneuver; Human Engineering research in Cognitive Strategies: “Sense Making”. Each center is establishing a close collaborative working relationship with one or more TRADOC Battlelab, industry and Army labs. The Battlelabs are providing a hands-on real-world operational perspective to the centers’ researchers. In FY05, this effort has been restructured into PE 0601104 Project H04 for increased visibility and management oversight.	2385	0	0	0
Robotics Collaborative Technology Alliance: Explore new opportunities to enable revolutionary autonomous mobility for the Future Force. Research conducted as an integral part of the larger Army Robotics Program. In FY04, conducted research in advanced sensors for autonomous mobility, modeling of human-robot interaction, and creation of tools for the analysis of robotic vehicle survivability. In FY05, this effort has been restructured into PE 0601104A Project H09 for increased visibility and management oversight.	2385	0	0	0

Accomplishments/Planned Program (continued)	FY 2004	FY 2005	FY 2006	FY 2007
Institute for Collaborative Biotechnologies: Conduct biologically inspired research in sensors, electronics and information processing. In FY04, devised DNA sensing and authentication technique in which DNA detection is read directly as an electronic signal; incorporated recombinant virus protein-directed synthesis of semiconductor nanowires into functional electronic circuits; extended protein-based low-temperature catalysis of synthesis and nanostructural control of semi-conductors using protein discovered responsible for bio-nanofabrication with silica; advanced cell-display and selection technology resulting in a system with unprecedented high-throughput selection; formulated realistic biological reduced order model for the bacterial heat shock response where generalization enables first step comprehensive quantitative analysis of networks and their control in living cells. In FY05, this effort has been restructured into PE0601104A Project H05 for increased visibility and management oversight.	7596	0	0	0
Rotorcraft Centers of Excellence. In FY04, investigated elastically tailored smart composite rotor blades. Investigated innovative design, and conducted fundamental analysis of micro-rotorcraft and Unmanned Aerial Vehicles (UAVs). Devised a smart materials based actively conformable rotor airfoil. Investigated passive and semi-active reduction concepts of gearbox vibration and noise. Investigated active rotorcraft blade tip concepts for tip vortex core modifications using smart structures. In FY05, investigate limit detection and limit avoidance methods for carefree maneuvering. Devise experimental and computational analysis capabilities on rotor wakes and tip vortices. In FY06, will develop active flow control concepts for improving rotorcraft performance and reducing noise and vibratory loads; will investigate advanced adaptive flight control systems and autonomous control functionality; will investigate low Reynolds number aerodynamics for small UAV design analysis; and will develop advanced concepts for rotorcraft UAV systems. In FY07, will investigate high-lift airfoil concepts for delaying dynamic stall onset and reducing adverse pitching moments; will develop data fusion and biomimetic materials for rotorcraft health monitoring systems; will develop light-weight high-flexibility rotorcraft shafts using flexible matrix composites and active bearing controls; and will develop efficient and affordable joining concepts for high-stiffness, light-weight composites.	1865	1755	1864	1923
Army Centers of Excellence. The purpose of this one year Congressional add is to fund basic research in cooperation with TRADOC Battle Laboratories. No additional funding is required to complete this project.	1445	0	0	0
Totals	20665	6286	1864	1923

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2005

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
1 - Basic research	**0601104A - University and Industry Research Centers**	**H62**

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
H62	ELECTROMECH/HYPER PHYS	5653	5357	5792	6126	6233	6329	6454	6582

A. Mission Description and Budget Item Justification: This project funds Army basic research in electromechanics and hypervelocity physics relating to electromechanical components (electromagnetic launchers and power supplies) for applications to electromagnetic (EM) guns. Additionally, this project provides for research, evaluation and computer modeling of advanced hypervelocity projectiles. This project funds a University Affiliated Research Center, the Institute for Advanced Technology (IAT), at the University of Texas. In keeping with the Army EM Armaments Program strategy, highest emphasis has been placed on advancing the state-of-the-art in pulsed power, materials and techniques to achieve extended rail life, and on establishing the utility of hypervelocity projectiles. This project will research underpinning technologies for EM gun pulsed power; address technical barriers associated with EM gun launch; and research advanced technologies for hypervelocity target defeat. The sum of these focused efforts serves as a catalyst for technological innovation and provides crucial support to the Army technology base for advanced weapon systems development with applications for anti-armor, artillery, air defense, and the Future Force. The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Department of Defense Basic Research Plan (BRP). Work in this project is monitored and guided by the Army Research Laboratory (ARL).

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
- Pulsed Power: In FY04, devised parametric model of EM pulsed power system and established feasibility of high power Silicon Carbide (SiC) switches. In FY05, include thermal effects in model; analyze constitutive behavior of candidate materials in short EM pulse testers; and mature advanced topology SiC switches. In FY06, will conduct component material experiments and mature a parallel SiC switch module. In FY07, will model electromagnetic, mechanical and thermal properties of candidate EM pulsed power systems.	2046	2089	2200	2355
- Launch: In FY04, established performance of non-transitioning EM launchers and armatures and investigated improved materials to solve technical barriers to EM launch. In FY05, investigate novel, high efficiency launcher configurations and develop model of sliding electric contact. In FY06, will incorporate launcher model into pulsed power model. In FY07, will show long-life, multi-shot EM launcher operation.	1507	1232	1492	1457
- Electromagnetic Lethality: In FY04, matured and evaluated a robust novel kinetic energy penetrator (NKEP) against one half scale heavy armor targets. In FY05, evaluate concepts for enhanced behind-armor debris and evaluate against full-scale targets. In FY06, will flight test complete NKEP and incorporate NKEP into half-scale launch package for EM launch. In FY07, will prove NKEP launch from full-scale EM launcher.	2100	2036	2100	2314

Accomplishments/Planned Program (continued)	FY 2004	FY 2005	FY 2006	FY 2007
Totals	5653	5357	5792	6126

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2005

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
1 - Basic research	**0601104A - University and Industry Research Centers**	**H64**

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
H64	MATERIALS CENTER	2816	3076	2464	2664	2730	2790	2845	2901

A. Mission Description and Budget Item Justification: This project concentrates scientific resources on research to advance innovative materials technologies and exploit breakthroughs in materials science and engineering through Materials Cooperative Research Agreements (MCRAs). MCRAs promote long-term synergistic collaboration between the Army Research Laboratory (ARL), scientists and university researchers. The MCRAs provide for mutual exchange of personnel and sharing of research facilities with U. Delaware, Johns Hopkins U., Rutgers U., and U. Massachusetts. The MCRAs focus research on armor, anti-armor, personnel protection, ground vehicle, rotorcraft and tactical missile applications. Lightweight, multi-functional composites, advanced armor ceramics, bulk amorphous metals, nanomaterials technology, and new polymer hybrid materials for flexible extremities (combat warrior) protection are emphasized. Closely coordinated with ARL in-house materials research projects (PE 0601102A, Project H42), this effort enables the effective and efficient transfer of fundamental scientific research to address requirements for the Future Force. The center accelerates the transition of technology to PE 0602105 (Materials Technology). The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Department of Defense Basic Research Plan (BRP). Work in this project is performed by the Army Research Laboratory (ARL).

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
In FY04, devised techniques to exhibit multifunctional capabilities in structural composite materials and showed concepts for embedded self-healing, electrical, optical, and power-generating properties in polymer composite materials for Future Force platform survivability; devised theory and design criteria for generating hierarchical hybrid polymer materials using directed self-assembly methods; and devised processing of nano-scale metallics and ceramics envisioned for use in the Future Force. In FY05, devise electro-optical composite structural materials; explore practical strategies to scale-up synthesis and processing of hierarchical polymers and polymer-inorganic hybrid materials; and devise physics based models to predict the effects of microstructure on the behavior of metallic and ceramic material systems under dynamic loading conditions. In FY06, will characterize fundamental behavior of multifunctional composite materials; will devise materials concepts that utilize self-assembly methods to produce polymers, fibers, or coatings with unprecedented properties; and will validate physics based models to predict the effects of microstructure on inorganic materials systems. In FY07, will devise appropriate physics based models that describe the attributes of multifunctional materials; will determine the fundamental response of hierarchical polymer based materials; will devise new inorganic materials that incorporate microstructures designed for specific armor related properties.	2020	2250	2464	2664
Composite Materials Research. The objective of this Congressional Add is to perform composite materials research. In FY04, matured energy storage materials and explored options for incorporation into load bearing structures. In FY05, advance the fundamental composite materials research ongoing at the University of Delaware. No additional funding is required to complete this project.	796	826	0	0
Totals	2816	3076	2464	2664

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2005

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
1 - Basic research	**0601104A - University and Industry Research Centers**	**H65**

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
H65	MICROELECTRONICS CTR	936	897	946	1051	1078	1101	1123	1145

A. Mission Description and Budget Item Justification: This project conducts basic research in the area of semiconductor electronics which have broad application to many enduring Army requirements, including power and energy (from soldier micro power to high power high temperature electronics for electric vehicles), prognostics and diagnostics, networked microsensors, radio frequency electronics for secure communications, chemical-biological detection and electro-optical sensing. The benefits and impact to the Warfighter will be to provide basic semiconductor electronics research to support the required electronics for future army applications - both mounted and dismounted. This includes the research to support cost effective, smaller, lighter weight semiconductor electronics that can operate in harsh environments with increased reliability. This basic research effort is conducted through a cooperative agreement between the U.S. Army Research Laboratory and academia, which includes: (1) basic research projects pairing an Army Research Laboratory principal investigator and a principal investigator from academia; (2) the undergraduate student education program, which brings in high quality students to learn the principles of basic research; and (3) a graduate fellowship program. This agreement funds academics to solve current technical barriers and cultivates future talent. Technical barriers include: (1) identifying, understanding and resolving materials defects that can dramatically affect device performance; (2) identifying appropriate materials candidates and device designs in order to investigate devices that can operate under a variety of harsh conditions required by military applications, such as, high power, high temperature, intense vibration and corrosive environments; and (3) scaling issues associated with shrinking device sizes from the macro scale to the micro/nano scale. This project will serve to enhance the survivability, lethality, and mobility, while reducing logistics, of future Army platforms. This center accelerates the transition microelectronics technology to PE 0602705(Electronics and Electronic Devices). The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Department of Defense Basic Research Plan (BRP). Work in this project is performed by the Army Research Laboratory (ARL).

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2005

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
1 - Basic research	**0601104A - University and Industry Research Centers**	**H65**

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
- The objective of this effort is to conduct basic research in the area of semiconductor electronics & micro/nano electronics. The research supports future army applications and requirements for electronics that are cost effective, smaller, lighter, and that can operate under realistic military environments including high temperature, high power, intense vibration and corrosion while increasing reliability, enabling future army applications to meet the demands of a lighter weight force with increased/improved capabilities. In FY04, investigated a boron/nitride annealing cap to enable the fabrication of an improved functional Junction Barrier Schottky (JBS) diode for high temperature and power operation; this device has been transitioned to the Power and Energy Collaborative Technology Alliance. In FY05, investigate dielectric materials compatible with silicon carbide (SiC) along with process development techniques in order to develop SiC (Silicon Carbide) based power devices that operate at high temperatures (300 degrees Celsius and above). Model 6H and 4H MOSFETS (metal oxide semiconductor field effect transistor) and MISFETS (metal insulator field effect transistor) for high temperature/high power applications required by all hybrid- electric vehicles. In FY06, will investigate applications of focused ion beam nanofabrication and other nanofabrication techniques to novel devices for general applicability to a wide array of required Army nanoscale electronic devices. In FY07, will investigate semiconducting carbon nanotubes for terahertz (THz) device operation.	936	897	946	1051
Totals	936	897	946	1051

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2005

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
1 - Basic research	**0601104A - University and Industry Research Centers**	**H73**

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
H73	NAT AUTO CENTER	7840	7422	2958	3074	3191	3233	3261	3286

A. Mission Description and Budget Item Justification: A. Mission Description and Budget Item Justification: The Center of Excellence for Automotive Research is a key element of the basic research component of the National Automotive Center (NAC), a business group within the U.S. Army Tank-Automotive Research, Development, and Engineering Center (TARDEC). The Center is an innovative university/industry/government consortium leveraging commercial technology for potential application in Army vehicle systems through ongoing and new programs in automotive research, resulting in significant cost savings while maximizing technological achievement. The goal of this project is to significantly enhance the Army's transformation to the Future Force by the application of leap-ahead technologies that can be phased in as improvements to vehicles over the next several decades. The research performed in this project contributes to formulating and establishing the basic scientific and engineering principles for these leap-ahead technologies. Efforts are fully coordinated and complementary to those performed by the NAC and TARDEC under PE 0602601A (Combat Vehicle and Automotive Technology). Selected university partners include: University of Michigan, University of Wisconsin, Wayne State University, University of Alaska, University of Tennessee, and Clemson University. Key industry partners include all major U.S. automotive manufacturers and suppliers. Automotive Research Center (ARC) formulates and evaluates advanced automotive technologies relative to the future FCS vehicular platforms. This effort advances state-of-the-art modeling and simulation for the Army's automotive technologies, with strong emphasis on the Army's FCS program. The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Defense Basic Research Plan (BRP). Work in this project is performed by TARDEC, Warren, MI.

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
Automotive Research Center (ARC): In FY04, completed optimization of the Army's ground vehicle simulation network and implemented a mathematical framework capable of accepting modular subroutines in all generic automotive areas; evaluated and analyzed systems for intelligent remote monitoring, guidance, and controls used for unmanned autonomous and semi-autonomous FCS ground vehicles; integrated newly matured advanced automotive technology algorithms within the overall simulation network. In FY05, evaluate and analyze models suitable for ground vehicle design decisions relative to collision avoidance warning systems, rollover warning, active yaw control, path departure, wireless intelligence systems, and advanced propulsion systems. In FY06, will formulate and analyze modeling and simulation tools relating to systems engineering of advanced and alternative energy powered ground vehicles, improved vehicle fuel economy, reduced visual signature, pollutant emissions through the use of advanced diesel and hybrid power trains, fuel cell auxiliary power units, and lightweight material structures; will evaluate new concepts, hybrid architectures, component designs and control strategies for duty cycles representing realistic missions of medium and large trucks, including off-road use of tactical trucks with the human in the loop. In FY07, will evaluate and analyze models suitable for ground vehicle design decisions relative to vehicle reliability, reliability based design optimization, high mobility and fuel economy, high power density propulsion, thermal management and parasitic losses, advanced control, robust modeling and validation of vehicle systems.	2927	2870	2958	3074
University Based Automotive Research. This one year Congressional add developed modeling and simulation tools that leveraged commercial technologies for potential application in Army vehicle systems through on-going and new programs in automotive research. No additional funds are required to complete this project.	2023	0	0	0
TACOM Automotive Research Center University Research. This one year Congressional add focused on developing modeling and simulation tools for alternative propulsion systems leveraging commercial technologies for potential application in Army vehicle systems. No additional funds are required to complete this project.	2890	0	0	0
University Based Automotive Research. This one year Congressional add is to develop modeling and simulation tools for military ground vehicles. No additional funds are required to complete this project.	0	3594	0	0
Partnership for the Next Generation of Vehicles / TACOM: This one-year Congressional add will perform fundamental research that may improve the fuel economy in the Army's current and future fleet of ground vehicles. No additional funds are required to complete this project.	0	958	0	0

Accomplishments/Planned Program (continued)	FY 2004	FY 2005	FY 2006	FY 2007
Totals	7840	7422	2958	3074

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2005

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
1 - Basic research	**0601104A - University and Industry Research Centers**	**J08**

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
J08	INSTITUTE FOR CREATIVE TECHNOLOGY	11655	10582	7184	7315	7543	7757	7911	8068

A. Mission Description and Budget Item Justification: This project supports simulation and training technology research at the Institute for Creative Technologies (ICT) at the University of Southern California, Los Angeles, California. The ICT was established to support Army training and readiness through research into simulation and training technology for applications such as mission rehearsal, leadership development, and distance learning. The ICT actively engages industry (multimedia, location-based simulation, interactive gaming) to exploit dual-use technology and will serve as a means for the military to learn about, benefit from, and facilitate the transfer of applicable entertainment technologies into military systems. The ICT also works with creative talent from the entertainment industry to adapt concepts of story and character to increase the degree of participant immersion in synthetic environments and to improve the realism and usefulness of these experiences. Creating a true synthesis of the creativity, technology and capabilities of the industry and the R&D community is revolutionizing military training and mission rehearsal by making it more effective in terms of cost, time, the types of experiences that can be trained or rehearsed, and the quality of the result. This project accomplishes this by performing basic research in modeling and simulation in accordance with the core competencies for the ICT University Affiliated Research Center (UARC). The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Department of Defense Basic Research Plan (BRP). Work in this project is performed by the Army Research Laboratory (ARL).

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
- Conduct basic research in immersive environments, to include virtual humans, three dimensional (3D) sound and visual media, to achieve more efficient and affordable training and modeling and simulation solutions. Research includes investigation of techniques and methods to address the rapid development of synthetic environments that can be used for mission rehearsal and training of military operations. In FY04, completed the specification of algorithms and architecture constructs for the proof of concept test beds and addressed computational efficiency and stability issues, devised new techniques to enhancing the immersiveness of the prototypes. In FY05, investigate hardware and software solutions to timing and processing of multimodal, synchronized, queued media in synthetic environments, including blending virtual and physical objects into the mixed reality aspects of the test beds. In FY 06, will explore the computational hardware and software approaches for representing the immersive environment using holographic imaging techniques. In FY 07, will investigate the timing, synchronization and rendering techniques for augmenting the test beds with holographic imagery.	5534	5653	2800	2849
-Conduct basic research in two significant aspects of immersive environments - graphics and sound. Research will improve computational techniques in graphics for achieving real-time photo-realistic rendering of physical and synthetic environments for training and simulations. Research into auditory aspects of immersion will provide the sound stimulus for increasing the realism for military training and simulation devices. In FY04, devised computationally efficient techniques for applying global illumination to synthetic objects; and extended research into second order effects of natural lighting on real persons in synthetic environments. In FY05, explore techniques for the sonification (using sound, alone or in combination with visual imaging techniques) of data; investigate the recovery of shape and reflectivity for highly reflective objects, and investigate sound as a source of emotion in an immersive environment. In FY 06, will explore Multiview Object and Imaging techniques; and will examine sound cancellation techniques to improve auditory cues in noisy environments. In FY 07, will investigate the concept of generalized reciprocity as it relates to how objects transform incident illumination into reflected light; and will extend the concept of virtual loudspeakers to address multiple participants in a given mixed reality setting.	2616	2427	1645	1675

Accomplishments/Planned Program (continued)	FY 2004	FY 2005	FY 2006	FY 2007
- Conduct research on intelligent avatars for virtual environments to enhance realism of interactions with trainee(s) and increase training effectiveness. In FY04, completed draft specification of data elements and parameters to permit synchronized verbal communications techniques for virtual characters to interact with soldiers in education and training situations; and conducted research on the impact that modeling the emotional aspects of verbal and non-verbal communications for virtual humans will have on interaction with human participants. In FY05, complete draft specification of data elements and parameters for non-verbal communications techniques; and integrate emotional models and timing constraints into the draft specification. In FY 06, will investigate an intelligent agent architecture concept that accounts for the emotional models, cultural/ethnic impact on verbal and non-verbal communication, synchronized verbal communications techniques and human – virtual human interaction. In FY07, will explore a conceptual framework for intelligent agents to enable adaptation of the environment based on human and virtual human interactions.	3505	2502	2739	2791
Totals	11655	10582	7184	7315

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2005

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
1 - Basic research	**0601104A - University and Industry Research Centers**	**J09**

	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
J09	POWER & ENERGY COLLABORATIVE TECH ALLIANCE (CTA)	5732	5498	5646	5739	5884	6016	6136	6257

A. Mission Description and Budget Item Justification: This project supports the Collaborative Technology Alliance (CTA) in Power and Energy Technologies. This CTA is a long-term collaboration between the Army Research Laboratory (ARL) and a competitively selected industry/university consortium for the purpose of leveraging world-class commercial research relevant to Army needs. Power and energy research supports lightweight, compact power for the individual soldier, and energy conversion and control technologies for advanced electric mobility, survivability, and lethality applications - such as hybrid electric drive, electromagnetic armor, and electro-thermal-chemical gun – for fuel efficient Future Force Systems including manned and unmanned platforms. Technical barriers include overcoming energy density limitations of traditional electrochemical portable power sources, reforming logistics fuels to generate fuel for fuel cells, and reducing the size and weight of electric power components and systems. The CTA focuses on three main technical areas: portable compact power sources (non-electrochemical), fuel cells and fuel reforming, and hybrid electric propulsion and pulsed power for survivability and lethality. These technologies are fundamental elements required to realize the Army Transformation and support the Future Force. The research in pulsed power and hybrid electric is done in coordination with the U.S. Army Tank-Automotive Research, Development and Engineering Center (TARDEC). The CTA also facilitates the exchange of people among the collaborating organizations to provide cross-organizational perspectives on basic research challenges, as well as the use of state-of-the-art facilities and equipment at the participating organizations. Work in this CTA accelerates the transition of technology to PE 0602705 (Electronics and Electronic Devices). The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Department of Defense Basic Research Plan (BRP). Work in this project is performed extramurally by the Army Research Lab (ARL).

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2005

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
1 - Basic research	**0601104A - University and Industry Research Centers**	**J09**

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
- Research, investigation and characterization of a micro electro mechanical system (MEMS) based micro-gas turbine generator for producing electricity for the dismounted soldier of the Future Force. In FY04, designed 2nd generation engine with non-magnetic generator and turbine film cooling. In FY05, complete demo engine design, begin engine fabrication, and validate magnetic generator. In FY06, will prove first MEMS micro-gas turbine engine. In FY07, will validate MEMS micro-gas turbine engine generator operating with net electrical power output.	2207	2144	2202	2246
- Research, investigation and characterization of novel fuel cells/components and logistic fuel reformation techniques to produce electricity for the dismounted soldiers of the Future Force, as well as produce electricity for vehicle prime power and accessory power for the Future Combat System. In FY04, matured a 20-watt fuel cell using reformed-methanol as fuel for Soldier Power applications. In FY05, integrate a catalytic partial oxidation fuel reformer with a solid oxide fuel cell designed to operate with partially reformed logistics fuels for vehicle and robotic platforms, and prove in test rig. In FY06, will validate a compact direct methanol fueled 20W cell with improved performance over current state of the art. In FY07, will validate a 'benchtop' solid oxide fuel cell operating on Army Logistics fuel without the addition of water.	3525	3354	3444	3493
Totals	5732	5498	5646	5739

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2005

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
1 - Basic research	**0601104A - University and Industry Research Centers**	**J12**

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
J12	NANOTECHNOLOGY	9446	9097	9933	10278	10535	10769	10983	11201

A. Mission Description and Budget Item Justification: This project supports sustained multidisciplinary nanotechnology research for the Soldier at the Institute for Soldier Nanotechnologies (ISN) at the Massachusetts Institute of Technology. The ISN emphasizes revolutionary materials research for advanced Soldier protection and survivability. The ISN works in close collaboration with several major industrial partners including Raytheon and DuPont, the Army Research Laboratory (ARL), the Army's Natick Soldier Center (NSC), and other Army Research Development and Engineering Command (RDECOM) laboratories in pursuit of its goals. The institute is designated as a University Affiliated Research Center (UARC) to support the Army Future Force Warfighter through research to devise nanotechnology-based solutions for the Soldier. This research emphasizes revolutionary materials research toward an advanced uniform concept. The future uniform will integrate a wide range of functionality, including ballistic protection, responsive passive cooling and insulating, screening of chemical and biological agents, biomedical monitoring, performance enhancement, and extremities protection. The objective is to lighten the Soldier's load through system integration and multifunctional devices while increasing survivability. Computational models will be created that predict the Soldier's performance with the new technologies. The new technologies will be compatible with other Soldier requirements, including Soldier performance, limited power generation, integrated sensors, communication and display technologies, weapons systems, and expected extremes of temperature, humidity, storage lifetimes, damage and spoilage. The work cited is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and Department of Defense Basic Research Plan (BRP). Work in this project is performed extramurally by the ARL and by visiting RDECOM scientists.

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
- Conduct research in nano-based multifunctional materials for Soldier protection. In FY04, characterized new molecular architectures with promising energy absorbing properties for lighter-weight ballistic protection. In FY05, devise innovative processes and techniques to construct high performance layered structures to provide multifunctionality, including waterproofing, microbicidal protection, and sensing, for light-weight fabrics and non-woven materials to improve Soldier protection. In FY06, will create hierarchical structures which demonstrate a range of material properties and improved protection against various Soldier threats. In FY07, will provide materials for evaluation that have improved survivability capabilities with nano-tailored surfaces, to provide capabilities such as nutrient delivery, water harvesting, and moisture repellency.	1723	1868	2040	2111
- Conduct research in nano-structured polymer actuators to improve Soldier performance. In FY04 integrated high-power, high-force nanostructured polymer actuator materials and sensors into materials to improve the force achievable by human muscle to enable the Soldier to perform at higher physical levels. In FY05, explore biomimetic muscular and structural behavior with potential to provide new approaches to outperform natural systems. In FY06, will characterize elastomeric, electrical and mechanical properties experimentally and with advanced modeling and simulation. In FY07, will create prototype hierarchical structures that deflect strains and stresses resulting from environmental and man-made threats while also providing improved performance.	3389	3711	4052	4192
- Conduct research on integration, fabrication and modeling of nano-structured materials to create mechanically-active devices and sensors. In FY04, characterized new liquid crystal block copolymers and conducting polymers for actuating materials for ballistic protection and on-demand medical intervention; incorporated semiconductor nanoparticles into ultra-thin polymer films for decontaminating toxic materials; carried out novel chemistry on common textiles to make them antibacterial; and characterized viral arrays on surfaces that may be used to detect chemical and biological materials. In FY05, integrate new measurement and characterization research, including femtosecond laser characterization; and demonstrate and enhance innovative methodologies to transition breakthroughs to Army labs/centers and industrial partners. In FY06, will begin fabrication of model systems of two or more nano-components to provide useful macro capabilities; and will use modeling and simulation to advance systems architecture for integrating multiple, nano-enabled survivability capabilities into Soldier systems. In FY07, will integrate subassemblies into larger assemblies to assess potential benefit for improved survivability.	4334	3518	3841	3975

Accomplishments/Planned Program (continued)	FY 2004	FY 2005	FY 2006	FY 2007
Totals	9446	9097	9933	10278

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2005

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
1 - Basic research	**0601104A - University and Industry Research Centers**	**J14**

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
J14 ECYBERMISSION	0	0	4809	4963	5091	5184	5287	5392

A. Mission Description and Budget Item Justification: This project supports eCYBERMISSION, a web-based science, math and technology competition designed to stimulate interest and encourage advanced education in these areas among middle and high school students nationwide. The project supports Army Transformation through the sponsorship of a nation-wide education competition that encourages the nation's youth to pursue advanced education and careers in Science, Mathematics, and Engineering, thereby providing a pool of technologically trained potential soldiers and civilians for the Army workforce of tomorrow. The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, the Department of Defense Basic Research Plan (BRP), and supports the President's initiative for education. Work in this project is performed extramurally by the Army Research Laboratory (ARL). Note: This project was previously funded in PE 0601104A Project H59 and is a restructuring of ongoing research into a distinct project for increased visibility and management oversight

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
- In FY04 and FY05, this effort was funded in this PE under Project H59. eCYBERMISSION national competition to stimulate interest in science, math and technology in middle and high school students. In FY06, will continue full-scale competition to all middle school (grades 6-8) and 9th grade high school students across the country and Department of Defense Educational Activity (DoDEA) schools, with the goal of increasing student and teacher participation beyond the results of FY05. In FY07, sustain eCYBERMISSION and implement enhancements as necessary based on previous years' lessons learned.	0	0	4809	4963
Totals	0	0	4809	4963

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2005

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
1 - Basic research	**0601104A - University and Industry Research Centers**	**J15**

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
J15	NETWEORK SCIENCES INTERNATIONAL TECHNOLOGY ALLIANC	0	0	5000	6119	7146	8169	8167	8166

A. Mission Description and Budget Item Justification: This project supports a competitively selected United States (US)/United Kingdom (UK) government, university, and industry consortium established to perform collaborative fundamental research on topics relevant to US/UK military requirements. The US Army Research Laboratory (ARL) and the UK Ministry of Defense (MOD) will establish a jointly funded and managed US and UK consortium, to be known as an International Technology Alliance (ITA) on Network and Information Sciences. The goal is fundamental science breakthroughs to enable superior coalition operations. Emphasis is on integration of multiple technical disciplines in an international arena. The "Network and Information Sciences" scope includes basic research into sensors exploitation, human dimension, and networking technologies. This program supports the Future Force transition path of the Transformation Campaign Plan (TCP). The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Department of Defense Basic Research Plan (BRP). Work in this project is performed by the Army Research Laboratory.

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
- Network & Information Sciences ITA: Perform research into fundamental scientific underpinnings and theory for application to network and information science in the areas of network theory, security across a system of systems, sensor processing and information exploitation, and distributed coalition planning and decision making. In FY06, will award a competitive procurement establishing the US/UK International Technology Alliance in Network and Information Sciences for fundamental research into sensors exploitation, human dimension (distributed coalition decision-making), and networking technologies. In FY07, will conduct analytical and experimental studies in network theory and the interaction of networks, information exploitation and distributed decision making.	0	0	5000	6119
Totals	0	0	5000	6119