ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

February 2008

BUDGET ACTIVITY	PE NUMBER AND TITLE
3 - Advanced technology development	**0603001A - Warfighter Advanced Technology**

	COST (In Thousands)	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
	Total Program Element (PE) Cost	63981	86103	46793	42611	44099	45457	46498
242	AIRDROP EQUIPMENT	3941	4127	3800	3841	3870	3957	4045
543	AMMUNITION LOGISTICS	1262	1320	1275	1362	1371	1401	1433
C07	JOINT SERVICE COMBAT FEEDING TECH DEMO	1973	1779	2265	2296	2312	2364	2418
J50	FUTURE WARRIOR TECHNOLOGY INTEGRATION	31918	36205	39453	35112	36546	37735	38602
J52	WARFIGHTER ADVANCED TECHNOLOGY INITIATIVES (CA)	24887	42672					

A. Mission Description and Budget Item Justification: This program element (PE) matures and demonstrates technologies to enhance dismounted Soldier capabilities while reducing the logistics burden on the battlefield, decreasing operation and sustainment costs, and improving ammunition logistics system performance. Efforts in this project are focused on improving Soldier survivability, sustainability, mobility, combat effectiveness, and field quality of life through maturation of technologies associated with air delivery of personnel and cargo, combat clothing, personal equipment (including protective equipment such as personal armor, helmets and eye wear), combat rations and combat feeding equipment. The overall goal is to provide the Soldier with the most effective personal clothing, equipment and rations at the least weight and sustainment burden. Efforts address technologies for use in the Future Force and, where feasible, exploit opportunities to enhance Current Force capabilities. The Airdrop Equipment project (242) provides enhancements to rapid deployment and force projection capabilities by maturing and demonstrating technology required for dropping increasingly heavier cargo to precise locations from high altitudes and greater offset distances, and increasing the precision of delivery to remote locations in challenging terrain. The objective is to increase both the survivability of aircraft and crews, and the probability that payloads delivered will land in a usable condition. This project provides technology development for the family of Joint Precision Airdrop Systems (JPADS) which will demonstrate a precision delivery capability with 100 meter or less Circular Error Probable (CEP) accuracy. The major effort within this project is to demonstrate a 30,000 pound precision airdrop capability. The Ammunition Logistics project (543) demonstrates technology that optimizes weapon system rearm, ammunition packaging/palletization, explosives safety, material handling equipment, and ammunition throughput/management for improved munitions availability and survivability. Project 543 is performed by the Armament Research, Development, and Engineering Center, Picatinny, NJ. The Joint Service Combat Feeding Technology project (C07) demonstrates technologies for military combat feeding systems and combat rations to include processing, preservation, packaging, and equipment and energy technologies to reduce the logistics footprint while enhancing warrior mental and physical agility. The DoD Combat Feeding Research and Engineering Board and Nutrition Committee provides oversight for this project. The Future Warrior Technology Integration project (J50) matures, demonstrates and integrates high-payoff technologies from a variety of sources for transition to current and future Soldier equipping programs. Efforts in this project are focused on improving Soldier survivability, sustainability, mobility, combat effectiveness, and field quality of life through maturation and demonstration of technologies associated with combat clothing and personal equipment including protective equipment such as personal armor, helmets and eyewear; lightweight, ruggedized, durable components for situational awareness and network connectivity; load-bearing/load carrying augmentation systems; and power/power management components/subsystems for the individual Soldier. Through FY07 the major effort was Future Force Warrior (FFW) Advanced Technology Demonstration (ATD). Using active duty Soldiers in a relevant field environment, the FFW ATD demonstrated system-of-systems functionality through a government-owned open architecture design. This Soldier system-of-systems consists of a lightweight protective ensemble that enabled advanced multi-functional

sensors, weapons and weapon targeting systems, and medical monitoring devices which were modularly incorporated through hardware and software interfaces. Project J50 continues to work on reducing the size, weight and integration burden of several of the component technologies developed under FFW and also to mature and demonstrate technologies that support upgrades to fielded Soldier equipment and subsystems and components to enable additional capabilities at the Small Unit and individual Soldier level. Specific emphasis is on achieving capability improvements enabled by advanced integrated lightweight Soldier protective headgear and clothing; wearable load-bearing equipment that will assist in strength and mobility; lighter weight more energy efficient Soldier-borne computing and communication equipment; lighter, more durable Soldier displays and subsystems that provide greater situational awareness with less cognitive stress; and lightweight high-energy-density Soldier power. These efforts support the goals of the Soldier as a System concept, as well as, the Ground Soldier System requirements. Project J52, Warfighter Advanced Technology Initiatives, funds Congressional special interest items. The cited work is consistent with the Department of Defense Research and Engineering Strategic Plan, the Army Science and Technology Master Plan, the Army Modernization Strategy, and the Army Posture Statement. The projects in this PE adhere to Tri-Service Agreements on clothing, textiles, and food with oversight and coordination provided by the directors of Service laboratories through the Warrior Systems Technology Base Executive Steering Committee. Work in this PE is related to and fully coordinated with efforts in PE 0602786A (Warfighter Technology), PE 0602105A (Materials Technology), PE 0602618A (Ballistics Technology), PE0602624A (Weapons and Munitions Technology), PE 0602705A (Electronics and Electronic Devices), PE 0603004A (Weapons and Munitions Advanced Technology), PE 0603008A (Command, Control, Communications Advanced Technology), and PEs 0602623A and 0603607A (Joint Service Small Arms Program). Work is performed by the US Army Natick Soldier Research, Development and Engineering Center, Natick, MA; the Armament Research, Development, and Engineering Center, Picatinny, NJ; and the Research, Development, and Engineering Command, Edgewood MD.

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

February 2008

BUDGET ACTIVITY	PE NUMBER AND TITLE
3 - Advanced technology development	**0603001A - Warfighter Advanced Technology**

B. Program Change Summary	FY 2007	FY 2008	FY 2009
Previous President's Budget (FY 2008/2009)	65632	47065	47055
Current BES/President's Budget (FY 2009)	63981	86103	46793
Total Adjustments	-1651	39038	-262
Congressional Program Reductions		-3906	
Congressional Rescissions			
Congressional Increases		42944	
Reprogrammings	78		
SBIR/STTR Transfer	-1729		
Adjustments to Budget Years			-262

Twelve FY08 congressional adds totaling $42944 were added to this PE.

($800) Extended Shelf Life Produce for Remotely Deployed Forces
($1440) High Pressure Alrbeam Shelter Cost Reduction Technology Improvements
($1600) ChemBio Integrated Material for Tent Structures
($1600) Deployment of Affordable Guided Airdrop System
($1600) Flame & Thermal Protection for Individual Soldier
($1600) High-Pressure/Microwave MRE Processing
($3000) BioSensor Communicator and Controller System
($3000) Multifunctional Protective Packaging Technology
($3200) Joint Precision Airdrop System (JPADS) Program for Payloads up to 30K lbs
($4504) Remote Environmental Monitoring and Diagnostics in the Perishables Supply Chain
($4600) Ration Packaging Materials and Systems for Meals Ready-to-Eat
($16000) Alternative Energy Research

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2008

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
3 - Advanced technology development	**0603001A - Warfighter Advanced Technology**	**242**

COST (In Thousands)	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
242 AIRDROP EQUIPMENT	3941	4127	3800	3841	3870	3957	4045

A. Mission Description and Budget Item Justification: This project matures and demonstrates equipment and innovative techniques for aerial delivery of cargo and personnel. This is a key capability for rapid force projection and global precision delivery envisioned for the Future Force. Precision airdrop can provide a long-range, autonomous airdrop capability, with the option to deliver separate and distinctive payloads to multiple locations. Capitalizing on advances in decelerators, guidance, and sensing (e.g., Global Positioning System), and wind sensing technologies, precision airdrop systems have the ability to be deployed from high altitudes (up to 25,000 feet) with large offset distances (between 8 and 20 kms) and to deliver payloads with improved accuracy, which enhances cargo, crew, and aircraft survivability. This project provides technology development for the family of Joint Precision Airdrop Systems (JPADS) which demonstrates a precision delivery capability with 100 meter or less Circular Error Probable (CEP) accuracy. The Medium Precision Airdrop effort advances the payload capability to 30,000 pounds. Advanced Precision Airdrop Enhancements leverages the latest Guidance, Navigation and Control (GN&C) airdrop technologies, advanced under the applied research program (PE 0602786A), to develop a precision airdrop capability that is highly precise for resupply in complex, mountainous terrain with small, challenging drop zones. The efforts in this project support the Army Transformation goals in the area of rapid deployment. The cited work is consistent with the Department of Defense Research and Engineering Strategic Plan, the Army Science and Technology Master Plan, the Army Modernization Strategy, and the Army Posture Statement. Work in this project is performed and managed by the US Army Natick Soldier Research, Development and Engineering Center, Natick, MA.

Accomplishments/Planned Program:	FY 2007	FY 2008	FY 2009
Medium Precision Airdrop: In FY07, completed all component-level evaluations, system design, and system modeling; integrated components into airdrop system; and began system evaluation and system control logic validation. In FY08, demonstrate full-scale concept for guided, autonomous, precision medium (30,000 pound) airdrop payload for JPADS.	3941	4028	
Advanced Precision Airdrop Enhancements: In FY09, will mature and demonstrate latest GN&C airdrop technologies in a precision airdrop concept that is designed for accurate resupply in complex, mountainous terrain with small, challenging drop zones; will optimize and demonstrate GN&C technology enhancement for precision airdrop; will spiral the second generation GN&C technology into JPADS family.			3800
Small Business Innovative Research/Small Business Technology Transfer Programs		99	
Total	3941	4127	3800

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2008

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
3 - Advanced technology development	**0603001A - Warfighter Advanced Technology**	**543**

COST (In Thousands)	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
543 AMMUNITION LOGISTICS	1262	1320	1275	1362	1371	1401	1433

A. Mission Description and Budget Item Justification: This project develops technology that provides rapid munitions deployability, resupply, and return from deployment for the Army's Future Force. It enhances force readiness and reduces the logistics footprint through improvements in explosive safety, Materials Handling Equipment (MHE), ammunition and missile packaging/palletization, and asset throughput/management. It also improves weapon system rearm for artillery, armor, air defense, aviation, and infantry. A major effort is a lightweight, high strength cargo platform system, the Joint Modular Intermodal Platform (JMIP), a component of the Joint Modular Intermodal Distribution System (JMIDS) Joint Capability Technology Demonstration (JCTD) and leverages work funded in Defense-wide PE 0603750D. The effort facilitates logistics through its compatibility with the C-17 and C-130 aircraft; current and future trucks; and aerial delivery systems. The JMIP's modularity and compatibility will reduce aircraft load/unload time by up to 75 percent, and allow more efficient loading of aircraft (reducing number of aircraft missions required). The Tactical Ammunition Accountability (TAA) effort demonstrates advanced supply chain procedures coupled with state of the art remote surveillance devices at the weapon system/munition level to provide precise knowledge of ammunition, location and health status through out an Area Of Responsibility (AOR). Technology developed within this project transitions to development programs for weapons, munitions, MHE, force sustainment, and tactical vehicles. The cited work is consistent with the Department of Defense Research and Engineering Strategic Plan, the Army Science and Technology Master Plan, the Army Modernization Strategy, and the Army Posture Statement. This project is managed by the US Army Armament Research, Development, and Engineering Center, Picatinny Arsenal, NJ.

Accomplishments/Planned Program:	FY 2007	FY 2008	FY 2009
Component of the JMIDS JCTD: In FY07, modified, designed and tested demonstration quantities of Joint Modular Intermodal Platforms (JMIPs) with integrated automated identification technology that tracks, delivers, and manages supplies to the soldier. Conducted Military Utility Assessments (MUA) as part of the JCTD. In FY08, conduct residual evaluation of JMIDS with field users as part of the JCTD.	1262	500	
Tactical Ammunition Accountability (TAA) - In FY08, develop low cost environmental sensors, both automated and visual indicators, for munition health monitoring at the point of consumption: conduct industry search of available hand held devices suitable for remote inventory activities. In FY09, will develop software interface for tactical ammunition management systems and will integrate with health monitoring sensors.		790	1275
Small Business Innovative Research/Small Business Technology Transfer Programs		30	
Total	1262	1320	1275

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2008

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
3 - Advanced technology development	**0603001A - Warfighter Advanced Technology**	**C07**

COST (In Thousands)		FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
C07	JOINT SERVICE COMBAT FEEDING TECH DEMO	1973	1779	2265	2296	2312	2364	2418

A. Mission Description and Budget Item Justification: This project matures and demonstrates technologies for military combat feeding systems and combat rations to include processing, preservation, packaging, and equipment and energy technologies to reduce the logistics footprint while enhancing warrior mental and physical agility. The project supports the Army Transformation with a goal to demonstrate combat feeding technology with potential to reduce logistics (in component parts, weight, cube, fuel, and water) and labor requirements, while improving the quality of food service. It exploits advances in ration formulation and quality, packaging, preservation, and nutritional content to improve morale, extend endurance, and sharpen mental acuity. The project, a Department of Defense (DoD) program for which the Army has Executive Agent responsibility, provides technology development for Joint Service Combat Feeding. The DoD Combat Feeding Research and Engineering Board provides oversight for this project. The Combat Feeding Equipment Technologies effort focuses on improving energy utilization and using advanced heating technologies to provide logistically streamlined combat feeding systems with enhanced fuel efficiencies to decrease the combat feeding logistics tail. Ration Stabilization, Packaging, and Novel Nutrient Delivery Technologies focuses on demonstrating advances in combat ration technology, nutritionally advanced rations, packaging materials, and biosensor technologies for food pathogen contamination/wholesomeness assessment. It also demonstrates predictive modeling and simulation to assist in ration design, mission, planning, and Class I (subsistence) distribution and tracking. The cited work is consistent with the Department of Defense Research and Engineering Strategic Plan, the Army Science and Technology Master Plan, the Army Modernization Strategy, and the Army Posture Statement. The work in this project is performed and managed by the US Army Natick Soldier Research, Development and Engineering Center, Natick, MA. This project has collaborative efforts with the US Army Research Institute for Environmental Medicine.

Accomplishments/Planned Program:	FY 2007	FY 2008	FY 2009
Combat Feeding Equipment Technologies: In FY07 demonstrated and transitioned thermoelectric self-powered tray ration heater for Army, US Marine Corps, and Air Force kitchens reducing reliance on JP8 by about 50 percent; drafted initial procurement document for quasicrystal nonstick durable coating for cookware. In FY08, integrate and demonstrate a prototype beverage chiller with a standard commercial or military backpack hydration system and transition to PM-Clothing and Individual Equipment (CIE) and PM-Individual Combat Equipment (ICE); develop new Joint Service Battlefield Kitchen; demonstrate Multi-serving Self-Heating Hot Water System enhancement to Unitized Group Ration Express (UGR-E); and complete prototype development and demonstration of Solar-powered Refrigerated Container and transition to PM Force Sustainment Systems (FSS). In FY09, will complete demonstrations of Joint Service Battlefield Kitchen based on state of the art power generation systems and transition to PM-FSS; will complete final technology demonstration of Waste to Energy Converter and transition to PM FSS.	243	639	582
Ration Stabilization, Packaging, and Novel Nutrient Delivery Technologies: In FY07 validated novel diagnostic technologies for rapid detection of food pathogens and demonstrated feasibility/utility of incorporation into array (matrix) systems; conducted producibility and performance testing of Meals Ready to Eat (MRE) meal bags fabricated from a low density polyethylene nanocomposite to significantly reduce weight and cube of individual ration packaging. In FY08, downselect novel diagnostic technologies for incorporation into advanced array systems which expand diagnostic capability, while reducing weight and cube of deployable array system; conduct biodegradable coating trials for prototype compostable fiberboard containers; characterize for biodegradation, water resistance and insect	1730	1140	1683

repellency. In FY09, will demonstrate effectiveness of providing performance enhancers via buccal delivery (directly into bloodstream through tissue in mouth); will conduct final technology demonstration of novel diagnostic technologies incorporated into array systems for food pathogen detection and will transition to Veterinary Services Activity and Office of the Surgeon General for procurement; will incorporate performance enhancers into ration components to achieve a 20 percent demonstrated human performance optimization in one or more highly relevant validated military performance tasks (e.g., victim rescue, 30m combat rushes).			
Total	1973	1779	2265

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2008

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
3 - Advanced technology development	**0603001A - Warfighter Advanced Technology**	**J50**

COST (In Thousands)		FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
J50	FUTURE WARRIOR TECHNOLOGY INTEGRATION	31918	36205	39453	35112	36546	37735	38602

A. Mission Description and Budget Item Justification: This project matures, demonstrates and integrates high-payoff technologies from a variety of sources (including PE0602786A) for transition to current and future Soldier equipping programs. The overall goal is to provide the Soldier with the most effective personal clothing and mission equipment at the least weight, sustainment and cognitive burden. Efforts in this project are focused on improving Soldier survivability, sustainability, mobility, combat effectiveness, and field quality of life through maturation and demonstration of technologies associated with combat clothing and personal equipment including protective equipment such as personal armor, helmets and eyewear; lightweight, ruggedized, durable components for situational awareness and network connectivity; load-bearing/load carrying augmentation systems; and power/power management components/systems for the individual Soldier. Through FY07 the major effort was Future Force Warrior (FFW) Advanced Technology Demonstration (ATD). Using active duty Soldiers in a relevant field environment, the FFW ATD demonstrated system-of-systems functionality through a government-owned open architecture design. This Soldier system-of-systems consists of a lightweight protective ensemble that enabled advanced multi-functional sensors, weapons and weapon targeting systems, and medical monitoring devices which were modularly incorporated through hardware and software interfaces. FFW provided capability to Small Combat Units (SCU) and individual Soldiers that allowed them to connect to other dismounted combat personnel, the Future Combat Systems and robotic air/ground platforms, giving them unparalleled situational awareness and effectiveness. The open architecture and individual components (including hardware and software) matured and demonstrated in FFW were transitioned to Program Executive Officer (PEO) Soldier and are being incorporated into on-going programs that will benefit the Current, as well as the Future Force. Project J50 continues to work on reducing the size, weight and integration burden of several of the component technologies developed under FFW and also to mature and demonstrate technologies that support upgrades to fielded Soldier equipment and enable additional capabilities at the Small Unit and individual Soldier level. Specific emphasis is on achieving capability improvements to Soldier protective headgear and clothing; wearable load-bearing equipment that will assist in strength and mobility; lighter weight more energy efficient Soldier-borne computing and communication equipment; and lightweight high-energy-density Soldier power. These efforts support the goals of the Soldier as a System concept, as well as, the emerging Ground Soldier System requirements. The Soldier Ballistic and Blast Protection effort designs/refines survivability test protocols and analysis tools to assess blast and ballistic protective systems in support of Project Manager-Soldier Equipment. This effort collaborates with the Medical Research and Materiel Command (MRMC) and begins to fill a significant gap by addressing the complex injury mechanisms presented by explosive devices. The Integrated Soldier Protection effort focuses on maturing and demonstrating innovative, integrated personal protection and casualty management solutions for ground and mounted Soldiers and aviators in the areas of improved tactical concealment; protection against ballistics, blast, flame, lasers, and toxic industrial chemicals and materials (TIC/TIM); multi-spectral signature reduction; and integrated protection concepts incorporating passive and active ventilation and micro-climate conditioning with combat headgear-integrated respiratory and ocular protection. Concepts and material technologies are leveraged for integrated protection from PEs 0602786A, 0602105A, and the DoD Chemical / Biological Protection Program that include: selectively permeable membranes; flame resistant fibers, fabrics and treatments, nano-technology based materials; and cooling, ventilation, and filtration technologies optimized for weight and power reduction. The goal of the Soldier Mobility and Enhanced Load Carriage effort is to mature, demonstrate, and integrate innovative Soldier mobility and load carriage solutions. The effort focuses on exploiting and further maturing and demonstrating technology concepts including those initially developed under PE 0602786A, the Defense Advanced Research Projects Agency's (DARPA) Exoskeleton program, Army biomechanical tools for maximizing Soldier load carriage capability, and the Institute of Soldier Nanotechnology's (ISN) lightweight nanomaterials for lightening the Soldier's load. The goal of the Small Combat Unit Command, Control, Communications and Computers (C4) Integration and Interfaces effort is to reduce size and weight, as well as ruggedize C4 components and subsystems that are designed and developed by others and integrate them with current and future Soldier systems. The objectives are to provide platoon, squad and individual Soldiers situational awareness and

information now only available at the company and/or higher command headquarters level. This effort leverages and is non-duplicative with work accomplished by the Army Communications and Electronics Research, Development and Engineering Center (CERDEC) and the Flexible Display Center (PE 0602705A). The Soldier Power and Energy effort further matures, reduces size and weight, ruggedizes, integrates and demonstrates components developed by others (such as CERDEC, the Army Research Laboratory (ARL) and DARPA) that have potential to significantly reduce the weight and volume of power generating and storage devices required to support advanced Soldier-borne computers, communications and situational awareness equipment. Efforts focus on batteries, fuel cells and devices with increased efficiency and reduced weight. The Small Unit Lethality Integration thrust area builds upon the foundation that the FFW program established. Using government owned open system architecture, this systems engineering approach allows subsystem components to be matured and integrated into current and future system of system architectures. This thrust area is focused on Soldier-centric design within an SCU down to the individual warfighter bounded by Soldier-centric design. Weapon mounted sensors allow ground combatants to identify targets and allow other shooters to service these targets. This effort is complementary to and relies on component technologies designed and evaluated in PE 0603603A, Joint Small Arms Program. The goals of Small Unit Systems Integration and Demonstration effort are to bring technology to the Soldier through subsystem-level testing and evaluation to enhance Soldier combat performance. The cited work is consistent with the Department of Defense Research and Engineering Strategic Plan, the Army Science and Technology Master Plan, the Army Modernization Strategy, and the Army Posture Statement. The US Army Natick Soldier Research, Development and Engineering Center, Natick, MA, manages this project.

Accomplishments/Planned Program:	FY 2007	FY 2008	FY 2009
FFW Body Borne System: In FY07, completed final system development and integration, and integration of Personal Area Network enhancements; retrofitted existing 12 systems and fabricated and tested 30 additional integrated body borne systems to support up to platoon level size field demonstrations.	3316		
FFW Headgear: In FY07, completed integration of headgear ballistic material, single aperture vision enhancement, sensor fusion, Tactical Engagement System (TES) functionality, XM50 chem/bio mask interface, and Air Force Special Operations Command (AFSOC) Battlefield Air Operations (BAO) Kit; modified existing 12 systems and fabricated, integrated and tested 25 additional headgear systems to support field demonstrations; performed systems engineering tasks to support integration, interoperability, and supportability. This task leveraged and integrated technologies developed in PE 0602786A and PE 0602105A.	5581		
FFW Soldier Computer/Software (SW): In FY07, down-selected and completed computer/software functionality development; used built in test to check/verify system performance when system is booted up, optimized and code for a power constrained computing environment; conducted field demonstrations with FFW computer hardware/software (HW/SW); closely monitored/participated in Army activities concerning Information Assurance (IA) and Multiple Level Security; performed system engineering to support integration/interoperability/supportability. Task leveraged/integrated PE 0602308A.	4903		
FFW Personal Area Network (PAN): In FY07, refined PAN; fabricated and tested PAN to support field demonstrations; performed systems engineering tasks to support integration, interoperability and supportability. This work included the investigation and development of a wireless interface to the weapon system.	695		
FFW Power Sources: In FY07, conducted analyses on energy usage from FY06 FFW demonstrations. Procured, tested, and integrated direct methanol fuel cells for FY07 FFW demonstrations. This task leveraged and integrated technologies developed in PE 0602705A.	803		
FFW Network/Communications/ Antennas: In FY07, refined network based on FY06 demonstrations and Modeling and Simulation (M&S). Fabricated 25 additional communication subsystems to support field demonstrations. Performed systems engineering tasks to support integration, interoperability, and supportability. This task leveraged and integrated technologies developed in PEs 0602782A and 0603008A.	2661		

FFW Small Combat Unit (SCU) Lethality and Fire Control: In FY07, down-selected optimal lethality/fire control solution and completed development and integration into FFW System of Systems (SoS); fabricated distributed lethality components to support field demonstrations; performed systems engineering tasks to support integration, interoperability, and supportability. This task leveraged and integrated technologies developed in PEs 0602623A and 0603607A. This task used three systems: a current system (Storm Multi Function Laser), a modified PM system (XM104), and an R&D product, Smart Sight.	1088		
FFW Precision Position System (PPS): In FY07, integrated precision position/navigation system into overall FFW architecture; completed development and maturation of PPS systems and conducted integration into FFW HW/SW architecture to support field demonstrations. Performed systems engineering tasks to include metrics, requirements allocation, interoperability, and supportability.	2355		
FFW Technical Evaluations, Analysis, Assessments and Demonstrations: In FY07 conducted Experimental Force training and executed FFW System level demonstrations through participation in FCS Exp 1.1, C4ISR On The Move Demonstration and Army Air Expeditionary Force Spiral D demonstrations employing an FFW equipped platoon to validate system performance at Technical Readiness Level 6; completed final analyses regarding SCU combat effectiveness; initiated trade studies to identify optimal technology solutions and integration opportunities for investment after completion of the FFW ATD.	6516		
Soldier Ballistic and Blast Protection: In FY08, design and refine test equipment and experimental protocols to generate an inexpensive/reliable means of evaluating current/future protective systems against primary blast lung injury (PBLI). Conduct comprehensive analysis of available blast and ballistic protective system and component assessment tools, devices and protocols to determine which have the most promising capabilities to evolve into a suite of standardized system level assessment protocols. Conduct blast testing with the devices to determine required changes to the devices (e.g., sensor responsiveness, sensor location/density, device networking), and begin to develop associated specific standardized personnel blast test protocol so that the correlation to the effects on the blast testing device and biological surrogates are understood and characterized. In FY09, will finalize test equipment and protocol for PBLI protection system assessment, benchmark the protection afforded by currently fielded items and transition equipment protocol to the acquisition program manager (PM) and industry; will lead effort to develop assessment protocols and/or test devices to address other characterized blast-related injury mechanisms (fragments, burns, inhalation of toxic gas, etc.); will begin to translate knowledge of injury data, criteria, and blast event characterization efforts into materiel solutions and evaluate effectiveness of protection systems. This task collaborates with MRMC and leverages / integrates technologies and knowledge products developed in PE 602786A and PE 602747A.		5322	4966
Integrated Soldier Protection: In FY08, design integrated chemical, biological, toxic industrial chemicals and materials (TIC/TIM), and microclimate technology protection solutions in collaboration with Joint Science and Technology Offices Joint Chemical Ensemble project. Mature concepts and material technologies leveraged from PE 602786A and PE 602105A for integrated protection that include: selectively permeable membranes; flame resistant fibers, fabrics and treatments, nano-technology based materials; cooling, ventilation and filtration technologies optimized for weight and power reduction; and physiological sensors and algorithms. In FY09, will select the most promising integrated protection technology solutions designed in FY08, (i.e., casualty management, eye protection, ballistic, Microclimate Cooling) and will continue to mature and demonstrate; will conduct technical tests and structured and freeplay field demonstrations of both technology and systems to obtain relevant user feedback for design improvement, and to ensure technical and operationally-based system performance metrics are met and to support rapid transition of integrated technology solutions.		5322	6016
Soldier Mobility and Enhanced Load Carriage: In FY08, leverage technology transition from PE 0602786A and the Defense Advanced Research Projects Agency's (DARPA) Exoskeleton program; further mature and refine select components and subsystems; continue to develop concept for using exoskeleton to aid Soldiers in loading/delivery operations. In FY09, will develop human use protocols to assess effects of wearing exoskeleton; continue to mature technology and integrate safety performance parameters into Soldier load carriage and		3472	3466

mobility systems; will conduct technical tests and field demonstrations with Combined Arms Support Command (CASCOM/Ft. Lee) for user feedback to ensure relevant system performance evaluations that enables rapid transition of technology solutions to PEO Soldier.			
Small Combat Unit C4 Interfaces: In FY08, select, assess and mature ground Soldier components and/or subsystems that require refinement and further maturation (see-through/ flexible displays, heads-up/heads-down displays, small form-factor processors, Soldier Radio Waveform based communicating devices, advanced communication headsets with hearing protection, motion-sensing gloves, integrated trackball/mouse and keypads; reliable jam-proof wireless technologies and advanced cabling and connectors to include e-textiles and micro/nano connectors to enhance personal area networking between head, body, and weapon systems); continue to mature the software translation tools and demonstrate additional modular capabilities. In FY09, will continue to exploit Soldier, squad, and platoon network technology maturation efforts; will conduct technical tests and field demonstrations, combined with user feedback, to ensure relevant system performance evaluations that enable rapid transition of integrated technology solutions. These systems and subsystems will be focused on Soldier centric design as well as cognitive loading.		6272	8416
Soldier Power and Energy: In FY07, evaluated hybrid power systems for reliability, suitability, and utility on Soldiers, leveraging test results and knowledge developed in PE0602705A and from feedback gained from lab and field demonstrations; collected data during field demonstrations that captured duty cycles and load profiles by duty position and mission for use in refining Soldier system architectures and power source system optimization; matured conformal rechargeable battery concept and demonstrated completed battery packs on a bench-top; monitored and tracked developments in solid oxide fuel cells as well as thin-film rechargeable battery technology with technical support from ARL; evaluated various candidate technologies in collaboration with CERDEC and ARL for use as platoon-level generators including engines and fuel cells. In FY08, integrate innovative Soldier power and energy solutions and mature system solutions for ground and mounted Soldiers and aviators to include: a methanol-based Soldier hybrid fuel cell power source designed under PE 0602705A, conformal rechargeable battery packs integrated into Soldier tactical gear, solid oxide fuel cells, thin-film rechargeable batteries, platoon-level battery recharging generator, and half-sized BA 5590 Li/CFx batteries. In FY09, will continue to mature methanol-based Soldier hybrid fuel cell power source; higher energy density conformal rechargeable battery; and half-sized BA 5590 Li/CFx batteries; will initiate rechargeable battery development based on packaging thin film rechargeable battery technology; will integrate nano-technology based electro-textiles with photovoltaic energy properties to augment primary system power sources; will demonstrate platoon-level generator recharging batteries; will conduct technical tests and demonstrations, combined with user feedback to ensure relevant system performance evaluations that enable rapid transition of integrated technology solutions to Army PMs.	4000	4847	4978
Small Unit Lethality Integration: In FY08, conduct lethality analyses of Small Combat Unit (SCU) operational concepts and enabling technologies and evaluate promising technologies individually and as integrated systems of systems in a relative field environment. Analyze effectiveness (using models and simulations where applicable to assess the combat effectiveness of the SCU) of networked lethality; small-unit weapon systems; weapon-based sensors, optics and fire control; fighting in urban and complex environments; innovative message processing that reduces time, increases accuracy and safety, and coordinates identification, gunfire detection, targeting, synchronization, and massing of internal and external Platoon fires (e.g. Field Artillery and Army/Joint Aviation). Assess design parameters impacting the SCU to include: system size, weight, power, and cost; cognitive load precision of direct and indirect fires; weapon system range; ability to reduce operational cycle from detection to service the target in order to identify cost/performance trade space. Integrate enhancements to small unit cooperative engagement for more accurate firing solutions to include integration with XM-320 grenade launcher and improved firing solution software (updated ballistics tables) for both the fielded Storm Multi function Laser, XM-104 and Picatinny Smart Sight. In FY09, will continue to mature government owned open system architectures that are focused on current and future networks; will assess and evaluate latency across the networks to enable quicker call for effects and battlefield sensor awareness; will conduct laboratory tests and field demonstrations, combined with user feedback, to ensure desired system performance.		4722	5072

Small Unit Systems Integration and Demonstration: In FY08, expand the Soldier Systems Integration Lab (SIL) capabilities to include an open architecture lab environment, coupled with a robust data collection infrastructure to support early and iterative analysis of emerging Government, Industry, Soldier and Small Combat Unit (SCU) technology integration, interface, and operational issues; continue to identify means to improve Soldier and SCU physical, network, software, interoperability, and human integration testing within a system of systems platform without impacting concurrent technology innovation; integrate performance evaluation and assessment of survivability, lethality, and power and energy technologies seamlessly within current and emerging small unit operational and technical architectures; evaluate rapidly configured and reconfigured modular operational concepts, network architectures, and C2 information systems through modeling and simulation. In FY09, will develop and implement transportable test and demonstration Soldier subsystem modules featuring pre-tested architectures, data collection infrastructure/plans/analysis with efforts conducted through simulation, design, demonstration, and test in both the Soldier Systems Integration Laboratory and operational venues, such as Future Combat System Experiments, Joint Forces Experiments (JFEX), and Air Assault Expeditionary Force (AAEF) field experiments at Ft. Benning, GA; will analyze test and experiment data to assess subsystem usefulness to Soldiers and recommend transition of products to Army and Joint PMs.		5288	6539
Small Business Innovative Research/Small Business Technology Transfer Programs		960	
Total	31918	36205	39453