Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Army										DATE: February 2011	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 1: *Basic Research*				R-1 ITEM NOMENCLATURE PE 0601101A: *In-House Laboratory Independent Research*							
COST ($ in Millions)	**FY 2010**	**FY 2011**	**FY 2012 Base**	**FY 2012 OCO**	**FY 2012 Total**	**FY 2013**	**FY 2014**	**FY 2015**	**FY 2016**	**Cost To Complete**	**Total Cost**
Total Program Element	19.278	21.780	21.064	-	21.064	20.692	21.501	21.948	22.411	Continuing	Continuing
91A: *ILIR-AMC*	13.203	17.205	16.301	-	16.301	15.940	16.436	16.821	17.202	Continuing	Continuing
91C: *ILIR-MED R&D CMD*	4.352	2.860	2.817	-	2.817	2.809	2.858	2.906	2.955	Continuing	Continuing
91D: *ILIR-CORPS OF ENGR*	1.095	1.075	1.066	-	1.066	1.067	1.088	1.105	1.119	Continuing	Continuing
91E: *ILIR-ARI*	0.155	0.152	0.151	-	0.151	0.151	0.154	0.155	0.158	Continuing	Continuing
F16: *ILIR-SMDC*	0.473	0.488	0.729	-	0.729	0.725	0.965	0.961	0.977	Continuing	Continuing

Note

FY12 funding increase to support Competitive ILIR.

A. Mission Description and Budget Item Justification

This program element (PE) supports basic research investigations at the Army laboratories through the In-House Laboratory Research (ILIR) program. Basic research lays the foundation for future developmental efforts by identifying fundamental principles governing various phenomena and appropriate pathways to exploit this knowledge. The ILIR program serves as a catalyst for major technology breakthroughs by giving laboratory directors flexibility in implementing novel research ideas and by nurturing promising, young scientists and engineers. It is also used to attract and retain top doctoral degreed scientists and engineers. The ILIR program also provides a source of competitive funds for peer reviewed efforts at Army laboratories to stimulate high quality, innovative research with significant opportunity for payoff to Army warfighting capability. This PE supports ILIR at the Army Materiel Command's (AMC) six Research, Development, and Engineering Centers (Project 91A); at the six Medical Research and Materiel Command (MRMC) laboratories (Project 91C); at the Corps of Engineer's seven laboratories at the US Army Engineer Research, and Development Center (ERDC) (Project 91D); at the Army Research Institute for the Behavioral and Social Sciences (ARI) (Project 91E); and at the Space and Missile Defense Command (SMDC) (Project F16).

The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Department of Defense Basic Research Plan, the Army Modernization Strategy, and the Army Science and Technology Master Plan.

The work in this PE is performed by the AMC, Aberdeen Proving Grounds, MD, MRMC, Ft. Detrick, MD, the ERDC, Vicksburg, MS, the ARI, Arlington, VA, and the SMDC, Huntsville, AL.

Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Army		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 1: *Basic Research*	R-1 ITEM NOMENCLATURE PE 0601101A: *In-House Laboratory Independent Research*	

B. Program Change Summary ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Previous President's Budget	19.568	21.780	19.139	-	19.139
Current President's Budget	19.278	21.780	21.064	-	21.064
Total Adjustments	-0.290	-	1.925	-	1.925
• Congressional General Reductions		-			
• Congressional Directed Reductions		-			
• Congressional Rescissions	-	-			
• Congressional Adds		-			
• Congressional Directed Transfers		-			
• Reprogrammings	0.198	-			
• SBIR/STTR Transfer	-0.488	-			
• Adjustments to Budget Years	-	-	1.925	-	1.925

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army			DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 1: *Basic Research*	R-1 ITEM NOMENCLATURE PE 0601101A: *In-House Laboratory Independent Research*	PROJECT 91A: *ILIR-AMC*	

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
91A: *ILIR-AMC*	13.203	17.205	16.301	-	16.301	15.940	16.436	16.821	17.202	Continuing	Continuing

Note

Not applicable for this item

A. Mission Description and Budget Item Justification

The project funds basic research within the Army Materiel Command's (AMC) Research, Development, and Engineering Centers and lays the foundation for future developmental efforts by identifying the fundamental principles governing various phenomena and appropriate pathways to exploit this knowledge.

The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Department of Defense Basic Research Plan, the Army Modernization Strategy, and the Army Science and Technology Master Plan.

The work in this program is performed by the Edgewood Chemical and Biological Center, Aberdeen Proving Grounds, MD within AMC, the Armaments Research, Development, and Engineering Center, Picatinny, NJ, the Tank and Automotive Research, Development, and Engineering Center, Warren, MI, the Natick Soldier Research, Development, and Engineering Center, Natick, MA, the Aviation and Missile Research, Development, and Engineering Center, Huntsville, AL, and the Communications and Electronics Research, Development, and Engineering Center, Ft. Monmouth, NJ.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Title: Edgewood Chemical Biological Center	0.898	3.007	0.832
Description: Funds basic research in chemistry, biology, biotechnology, and aerosol for counter improvised explosive devices (IEDs), obscurants, and/or target defeat. ***FY 2010 Accomplishments:*** Conducted experiments that exploit recent advances in panomics for molecular toxicology; exploit rational molecular design for the design of functional self-organizing supramolecular self-assembly; exploit the complex behavior of mass transport in microporous systems; exploit the application of controlled coherent laser radiation to direct the dynamics of quantum systems; and characterize chemical and biochemical phenomena occurring at or near solid surfaces and interfaces. ***FY 2011 Plans:*** Conduct fundamental studies in surface science, specifically furthering the characterization of chemical and biochemical phenomena occurring at or near solid surfaces and interfaces; molecular programming techniques for bio-energy production; rational design of nano- biomolecular, abiotic structures; the interaction of matter and transfer of energy at the nanoscale and			

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 1: *Basic Research*	R-1 ITEM NOMENCLATURE PE 0601101A: *In-House Laboratory Independent Research*	PROJECT 91A: *ILIR-AMC*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
interfacial phenomena of particulate matter; and the controlled synthesis of nanomaterials to enable the controlled propagation of electromagnetic energy or to drive photonic behavior. ***FY 2012 Plans:*** Will continue basic research efforts in the areas of rational molecular and nano-system design for the design of functional abiotic structures, reconfigurable self-organizing systems, novel nanoparticles and supramolecular self-assembly; and will also continue investigations in synthetic biology using new molecular programming techniques for creating biofuels and materials. Will continue fundamental research in surface science in PE 0601102A, Project VR9, Surface Science Research.			
Title: Armaments Research, Development and Engineering Center ***Description:*** Funds basic research in weapons component development, explosives synthesis/detection and area denial. ***FY 2010 Accomplishments:*** Researched ways to synthesize more powerful explosives with insensitive munition (IM); investigated technologies for detection and neutralization of improvised explosive devices (IEDs) and other explosives; researched sensors/sensor fusion for area denial, investigated smaller more lethal warheads and composite materials. ***FY 2011 Plans:*** Conduct further basic research into synthesizing more powerful explosives with IM properties, technologies for detection and neutralization of IEDs/explosives, sensors/sensor fusion for area denial, smaller more lethal warheads and composite materials. ***FY 2012 Plans:*** Will solicit new efforts to further basic research in areas such as advanced materials and nanotechnologies, more powerful energetics including those with IM properties, counter terrorism technologies, power and energy systems, smaller more lethal warheads and composite materials.	1.588	1.684	1.674
Title: Tank-Automotive Research, Development and Engineering Center ***Description:*** Funds basic research in ground vehicle technologies to include power, mobility, and unmanned systems. ***FY 2010 Accomplishments:*** Developed high performance control algorithms for unmanned ground vehicles in heterogeneous off-road terrain environments; used fuzzy logic C-mean clustering algorithms for vehicle terrain classification; and investigated JP-8 heat release combustion chemistry as a function of cetane number and nozzle geometry. ***FY 2011 Plans:***	1.224	1.201	1.202

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Develop reinforcement-based Learning and Control for Robots Using Ethical Behavior Frameworks; investigate photophysical response measurements for directed energy carbon-60 colloid materials; and use event-driven control strategies to couple remote dynamical systems. ***FY 2012 Plans:*** Will develop and investigate models for nanofluid coolants and lubricants; will develop and investigate durability and blast models for composite materials, including carbon nanotube reinforced composite; and will develop algorithms for bio-inspired object recognition for unmanned systems.			
Title: Natick Soldier Research, Development and Engineering Center ***Description:*** Funds basic research in food sciences, textiles, and lightweight materials with potential for individual protection. ***FY 2010 Accomplishments:*** Solicited new concepts for basic research efforts with broad applicability to science and technology that enable advancement of developments such as electro-textiles, multifunctional fibers, advanced nutrient delivery, performance enhancing biomechanics and precision airdrop systems. ***FY 2011 Plans:*** Continue fundamental research of nanoelectronics that has the potential to provide new nanomaterials and nanoarchitectures that could help revolutionize the performance and miniaturization of optoelectronic devices; further the understanding of fundamental principles, which govern Botulinim Neurotoxin catalytic activity and binding of peptide and aptamers to this catalytic domain that may lead to new technologies, which couple toxin capture and inactivation. ***FY 2012 Plans:*** Will create zwitterionic 3-dimensional nanofibrous architectures for antifouling and food pathogen sensing; will conduct fundamental studies on novel metal oxides for tuned optical response; and will explore understanding of the lysis mechanisms of peptides for antimicrobial protection.	1.350	1.323	1.358
Title: Aviation and Missile Research, Development and Engineering Center: Missile Efforts ***Description:*** Funds basic research in guided missile and rocket systems, directed energy weapons, unmanned vehicles, and related components. ***FY 2010 Accomplishments:***	2.234	2.243	2.264

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army		DATE: February 2011
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Explained why complex networks can respond consistently to external signals; explored phase locked harmonic generation of light; experimentally demonstrated a quantum electromagnetic field sensor; and experimentally demonstrated terahertz holographic imaging of obscured objects/IEDs. ***FY 2011 Plans:*** Experimentally demonstrate and evaluate performance of chaotic antenna arrays and electronic steering based on lag synchronization in chaotic circuits; experimentally demonstrate inhibition of absorption in opaque materials through a phase locking dynamic and theoretical and experimental investigations of nanoplasmonic switches. ***FY 2012 Plans:*** Will solicit new concepts for basic research efforts with broad applicability to science and technology that support exploratory and advanced development for guided missile and rocket systems, directed energy weapons, unmanned vehicles, and related components.			
Title: Aviation and Missile Research, Development and Engineering Center: Aviation Efforts ***Description:*** Funds basic research for aviation enabling technologies in the areas of aerodynamics, structural dynamics, and material science. ***FY 2010 Accomplishments:*** Conducted dynamic stall testing of advanced active and passive concepts with an emphasis on the fundamental flow physics of unsteady separation of turbulent boundary layers; developed microscopic particle image velocimetry for identification of flow reversal and separation in unsteady turbulent boundary layers; and developed an analytical framework that enables the systematic evaluation of autonomous unmanned aerial system path planning algorithms. ***FY 2011 Plans:*** Investigate the effectiveness of fluidic oscillators to control separation for bluff body flow and also initiate computational fluid dynamics and computational structural dynamics methods for accurate rotor stability analysis. ***FY 2012 Plans:*** Will investigate inflow dynamics and wake physics at high advance ratios and will investigate dielectric barrier discharge plasma devices for reduced bluff body drag.	1.657	1.623	1.622
Title: Communications-Electronics Research, Development, and Engineering Center ***Description:*** Funds basic research for communication and network enabling technologies in the areas of antenna design, network management, power generation and storage, and also sensors.	1.400	1.487	1.476

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army		DATE: February 2011
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
FY 2010 Accomplishments: Explored new metamaterial to significantly improve antenna signature and power handling capacity; conducted research in network science to investigate novel neural management tools for optimum network performance; researched separator-electrolyte sub-components for high voltage electrochemical cells; and developed a novel approach for extensions of advanced signal processing from a cooperative regime (known parameters) to a non-cooperative regime. ***FY 2011 Plans:*** Investigate new anode and cathode materials for electrochemical couples with increased kinetic properties; perform research on developing cost-effective metamaterial antenna fabrication concept; perform research and experimental validation of the derived theoretical limits of explosive ordnance interference cancelation systems intended to enable communications during jamming; perform experimental validation of new cognitive radio techniques for blind signal interception; investigate fundamental parameters affecting Shockley-Reed-Hall defect centers in narrow gap infrared (IR) semiconductors (e.g., III-V and II-VI epitaxial compounds); research and investigate novel conducting polymers for use as explosive specific sensors and as low power displays; and explore new measurement methodologies (e.g., catholuminescence) for studying IR detector defects at the atomic level. ***FY 2012 Plans:*** Will perform research for developing cognitive algorithm and intelligent cognitive network with optimized managed resources, and flexible and reconfigurable radio frequency (RF) technologies; will explore RF interaction of nano-tubes and metamaterial for wideband signal amplification and also electromagnetic radiation; will explore control theory in addressing the uncertainty and latency in the cognitive ad-hoc network; will perform research on sensor network scenarios that can perform blind signal sensing and classification of weak signals; will investigate alternative separator and electrolytes for high energy/power electrochemical couples; will concentrate on reducing the parasitic (non-electrochemical) reactions between synthesized separator and electrolyte and high energy electrode components; and will investigate new metallic polymers for next generation infrared sensors.			
Title: Peer Reviewed Proposal Efforts ***Description:*** Funds peer reviewed proposals in basic research to provide increased quality and responsiveness in exploring new technological concepts that are highly relevant to Army needs. This funding also enhances recruitment, development, and retention of outstanding scientists and engineers engaged in high quality basic research for the Army, which provides a constant flow of new knowledge to Army laboratories. ***FY 2010 Accomplishments:***	2.852	4.637	5.873

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Awarded 5 new projects in network/internet optimization of detection capabilities; IR detectors and focal plane arrays for night vision, surveillance, target acquisition, searching, tracking and missile seeking; and effect of vortex interactions not only on the tip vortex formation, but also on the lift and drag aircraft wings. ***FY 2011 Plans:*** Conduct basic research efforts to develop and maintain a cadre of active research scientists who can distill and extend results from worldwide research in areas of interest to the Army. ***FY 2012 Plans:*** Will solicit new basic research efforts aimed at developing and maintaining a cadre of active research scientists who can distill and extend results from worldwide research in areas of interest to the Army.			
Accomplishments/Planned Programs Subtotals	13.203	17.205	16.301

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army			DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 1: *Basic Research*	R-1 ITEM NOMENCLATURE PE 0601101A: *In-House Laboratory Independent Research*	PROJECT 91C: *ILIR-MED R&D CMD*	

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
91C: *ILIR-MED R&D CMD*	4.352	2.860	2.817	-	2.817	2.809	2.858	2.906	2.955	Continuing	Continuing

A. Mission Description and Budget Item Justification

The objective of this project is to address investigator-driven medical and force health protection basic research initiatives performed at the six US Army Medical Research and Materiel Command laboratories. Research areas address countermeasures against infectious diseases, defense against environmental extremes and operational hazards to health, mechanisms of combat trauma and innovative treatment and surgical procedures, and medical chemical/biological warfare threats.

The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy, and the Army Science and Technology Master Plan.

Work in this project is performed by the Walter Reed Army Institute of Research, Silver Spring, MD; US Army Medical Research Institute of Chemical Defense, Aberdeen Proving Ground, MD; US Army Medical Research Institute of Infectious Diseases, Fort Detrick, MD; US Army Institute of Environmental Medicine, Natick, MA; US Army Institute of Surgical Research, Fort Sam Houston, TX; US Aeromedical Research Laboratory, Fort Rucker, AL; and the Telemedicine and Advanced Technology Research Center, Fort Detrick, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Title: Independent Research Efforts	2.910	2.860	2.817
Description: Funds basic research in medical and force health protection.			
FY 2010 Accomplishments: The ILIR program funded innovative in-house basic research proposals that focus on research to explore treatments and countermeasures against militarily relevant infectious diseases; defense against environmental extremes and operational hazards to health; and mechanisms of combat trauma and innovative treatment and surgical procedures.			
FY 2011 Plans: The program funds innovative in-house basic research proposals that will focus on research to explore treatments and countermeasures against militarily relevant infectious diseases; defense against environmental extremes and operational hazards to health; mechanisms of combat trauma and innovative treatment and surgical procedures, and medical chemical/biological warfare threats.			
FY 2012 Plans: The program will fund innovative in-house basic research proposals that will focus on research to explore treatments and countermeasures against militarily relevant infectious diseases; defense against environmental extremes and operational hazards			

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 1: *Basic Research*	R-1 ITEM NOMENCLATURE PE 0601101A: *In-House Laboratory Independent Research*	PROJECT 91C: *ILIR-MED R&D CMD*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
to health; mechanisms of combat trauma and innovative treatment and surgical procedures; and medical chemical/biological warfare threats.			
Title: Peer Reviewed Proposal efforts ***Description:*** Funds peer reviewed proposals in basic research to provide increased quality and responsiveness in exploring new technological concepts that are highly relevant to Army needs. This funding also enhances recruitment, development, and retention of outstanding scientists and engineers engaged in high quality basic research for the Army, which provides a constant flow of new knowledge to Army laboratories. ***FY 2010 Accomplishments:*** Solicited new and continuing basic research efforts aimed at developing and maintaining a cadre of active basic research scientists who can initiate new research as well as extend results from worldwide research and apply them to Army problems.	1.442	-	-
Accomplishments/Planned Programs Subtotals	4.352	2.860	2.817

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army			DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 1: *Basic Research*	R-1 ITEM NOMENCLATURE PE 0601101A: *In-House Laboratory Independent Research*	PROJECT 91D: *ILIR-CORPS OF ENGR*	

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
91D: *ILIR-CORPS OF ENGR*	1.095	1.075	1.066	-	1.066	1.067	1.088	1.105	1.119	Continuing	Continuing

Note

Not applicable for this item

A. Mission Description and Budget Item Justification

This project funds In-house Laboratory Independent Research (ILIR) in the areas of geospatial research and engineering, military engineering, and environmental quality/installations at the seven laboratories within the Corps of Engineer's US Army Engineer Research and Development Center (ERDC).

The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Department of Defense Basic Research Plan, the Army Modernization Strategy, and the Army Science and Technology Master Plan.

The work in this project is performed by the U.S. Army ERDC, Vicksburg, MS.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Title: Geospatial Research and Engineering/Military Engineering/Environmental Quality and Installations	1.095	1.075	1.066
Description: Funds basic research in the areas of geospatial research and military engineering as well as environmental quality and installations. ***FY 2010 Accomplishments:*** Investigated reduction potentials for military compounds through the application of computationally feasible approximations for predicting reduction-oxidation reaction potentials of explosives and their environmental transformation products; determined whether mineral surfaces or surface chemical processes can be exploited to promote the adsorption and transformation of nitroaromatic compounds and other explosives munitions on military training, testing and demolition ranges. ***FY 2011 Plans:*** Investigate a set of theoretical algorithms for poly-disperse soil packings based upon historical granular research and using simulations to validate performance; and continue basic research efforts focused on fundamental questions in science relevant to military application such as signature physics, next generation remote sensing, and ecological risk of military unique emerging contaminates in the environment. ***FY 2012 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army		DATE: February 2011
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Will complete basic research efforts for ultra-compact soils for soil mechanics systems; will investigate vegetation photopigment decay for remote sensing of hazardous materials; and will investigate DNA pattern formation upon non-directed assembly at a functionalized surface for Army relevant compounds.			
Accomplishments/Planned Programs Subtotals	1.095	1.075	1.066

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army			DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 1: *Basic Research*	R-1 ITEM NOMENCLATURE PE 0601101A: *In-House Laboratory Independent Research*	PROJECT 91E: *ILIR-ARI*	

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
91E: *ILIR-ARI*	0.155	0.152	0.151	-	0.151	0.151	0.154	0.155	0.158	Continuing	Continuing

Note

Not applicable for this item

A. Mission Description and Budget Item Justification

This project provides funding for In-house Laboratory Independent Research (ILIR) in the Army Research Institute for Behavioral and Social Sciences (ARI). This project supports basic research in the Cognitive Sciences and is focused on theories, approaches, and models from the Behavioral and Social Sciences that have the highest potential to improve human performance. Improved recruiting, selection, assignment, training, leader development, performance, performance assessment, organizational dynamics, and retention are the goals.

Work in this project is performed by the Army Research Institute, Arlington, VA.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Title: Army Research Institute	0.155	0.152	0.151
Description: Funds basic research in cognitive, behavioral, and social sciences to improve Soldier recruiting, assignment and retention and providing fundamental knowledge for human performance and organizational behavioral research. ***FY 2010 Accomplishments:*** Identified relevant variables for longitudinal modeling of career performance using latent curve analysis. ***FY 2011 Plans:*** Identify key training aspects of synthetic teammates in virtual worlds that will promote training transfer to a team performance setting. ***FY 2012 Plans:*** Research will focus on topics such as improving training in complex environments, leader and team performance, identifying attributes critical to Soldier recruiting, assignment and retention as well as providing fundamental knowledge for human performance and organizational behavioral research.			
Accomplishments/Planned Programs Subtotals	0.155	0.152	0.151

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 1: *Basic Research*	**R-1 ITEM NOMENCLATURE** PE 0601101A: *In-House Laboratory Independent Research*	**PROJECT** 91E: *ILIR-ARI*

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army			DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 1: *Basic Research*	R-1 ITEM NOMENCLATURE PE 0601101A: *In-House Laboratory Independent Research*	PROJECT F16: *ILIR-SMDC*	

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
F16: *ILIR-SMDC*	0.473	0.488	0.729	-	0.729	0.725	0.965	0.961	0.977	Continuing	Continuing

A. Mission Description and Budget Item Justification

The objective of this project is to provide funding for In-house Laboratory Independent Research (ILIR) in the Space and Missile Defense Command (SMDC) Technical Center. This basic research on lasers and directed energy lays the foundation for future developmental efforts on high energy lasers and directed energy systems for missile defense by identifying the fundamental principles governing various phenomena and appropriate pathways to exploit this knowledge.

The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Department of Defense Basic Research Plan, the Army Modernization Strategy, the Army Science and Technology Master Plan.

Work in this project is performed by the Army SMDC, Huntsville, AL.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Title: SMDC In-house Laboratory Independent Research (ILIR)	0.473	0.488	0.729
Description: Funds basic research to investigate laser propagation phenomenology for application in modeling and simulation and future directed energy weapons design.			
FY 2010 Accomplishments: Investigated beam propagation codes versus real laser beam propagation down an open air range to improve the accuracy of beam propagation codes and to improve understanding of the impact of various atmospheric phenomena, to include a detailed mapping of the beam path unrivaled to date via Schlieren, optical sensors, and weather metrology data; conducted an experiment implementing quantum optics rather than classical optics for beam propagation to compare the two approaches for computational ease, accuracy, and time requirements; and set up a laboratory tabletop version of a high energy laser adaptive optic system and developed algorithms for sensing and correcting for atmospheric distortion in open loop (without a wavefront sensor or beacon).			
FY 2011 Plans: Use prior year data to develop more complex beam propagation experimentation to improve the beam propagation knowledge, codes, and algorithms for Adaptive Optics systems for directed energy weapons; begin scaling to higher powers using a 2 KW fiber laboratory laser.			
FY 2012 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army		DATE: February 2011
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Will conduct modeling and simulation studies and experiments for new laser technology and beam propagation concepts to enable understanding of next generation high energy laser systems.			
Accomplishments/Planned Programs Subtotals	0.473	0.488	0.729

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.