Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army									DATE: February 2012	

APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 2: *Applied Research*				R-1 ITEM NOMENCLATURE PE 0602783A: *COMPUTER AND SOFTWARE TECHNOLOGY*						

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
Total Program Element	6.599	8.577	9.830	-	9.830	8.939	9.001	8.911	8.975	Continuing	Continuing
Y10: *COMPUTER/INFO SCI TECH*	6.599	8.577	9.830	-	9.830	8.939	9.001	8.911	8.975	Continuing	Continuing

Note

FY13 funding increased for language translation technologies.

A. Mission Description and Budget Item Justification

This program element (PE) develops and evaluates hardware and software algorithms enabling enhanced understanding and accelerating the decision cycle time for commanders and leaders operating in a mobile, dispersed, highly networked environment. Project Y10 supports research on information and communications technology.

Work in this PE complements and is fully coordinated with efforts in PE 0602705A (Electronics and Electronic Devices), 0602716A (Human Factors Engineering Technology), PE 0602782A (Command, Control, Communications Technology), PE 0603772A (Advanced Tactical Computer Science and Sensor Technology), and PE 0603008A (Command, Control, Communications Advanced Technology).

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Army Research Laboratory (ARL) at the Adelphi and Aberdeen Proving Ground, MD locations.

B. Program Change Summary ($ in Millions)

	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total
Previous President's Budget	6.768	8.591	8.782	-	8.782
Current President's Budget	6.599	8.577	9.830	-	9.830
Total Adjustments	-0.169	-0.014	1.048	-	1.048
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.066	-			
• Adjustments to Budget Years	-	-	1.048	-	1.048
• Other Adjustments 1	-0.103	-0.014	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army										DATE: February 2012	

APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602783A: *COMPUTER AND SOFTWARE TECHNOLOGY*	PROJECT Y10: *COMPUTER/INFO SCI TECH*

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
Y10: *COMPUTER/INFO SCI TECH*	6.599	8.577	9.830	-	9.830	8.939	9.001	8.911	8.975	Continuing	Continuing

Note
Not applicable for this item.

A. Mission Description and Budget Item Justification

This project develops and evaluates information and communications processing software to automate the delivery of information for planning, rehearsal, and execution by ground commanders. Efforts develop communication/network architectures and software and the information fusion software necessary to simplify the understanding and interactions from humans to humans, humans to computers, computers to humans. Research results in enable enhanced understanding of many information sources and for accelerating the decision cycle time for commanders and leaders operating in mobile, dispersed, highly networked environment envisioned for the future force.

This project sustains Army science and technology efforts supporting the Command Control and Communications portfolio. Work in this project is fully coordinated with PE 0603008A (Command, Control, Communications Advanced Technology) and PE 0603772A (Advanced Tactical Computer Science and Sensor Technology).

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Army Research Laboratory (ARL), Adelphi and Aberdeen Proving Ground, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Information Processing	1.130	1.193	1.222
Description: This effort develops and evaluates fusion software to improve the completeness and timeliness of decision-making in command and control (C2) operations. The goal of this effort is to develop software applicable to the Distributed Common Ground Station-Army (DCGS-A) architecture (an integrated architecture of all ground/surface systems) and for future force assessment. *FY 2011 Accomplishments:* Investigated the concept of social network exploitation and its relationship to communication and information network domains in collaboration with the Network Sciences International Technology Alliance (ITA); and investigated improved social network analysis tools, interfaces, and visualization routines for Army intelligence. *FY 2012 Plans:*			

Exhibit R-2A, **RDT&E Project Justification:** PB 2013 Army		**DATE:** February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602783A: *COMPUTER AND SOFTWARE TECHNOLOGY*	**PROJECT** Y10: *COMPUTER/INFO SCI TECH*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013**
Extend these techniques (network analysis tools, interfaces, and visualization routines for Army intelligence) to parallel architectures/algorithms and evaluate them in relevant tactical exercises, like Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) On-the-Move. ***FY 2013 Plans:*** Will develop scalable decision support and social network analysis algorithms; evaluate network and information visualization software for cellular wireless environments.			
Title: Information Assurance ***Description:*** This effort designs and evaluates software for the protection of information and networks in wireless tactical environments. The goal is to develop software algorithms that detect and defeat malicious activities of adversaries in the bandwidth constrained tactical networks. ***FY 2011 Accomplishments:*** Evaluated secure information flow techniques in mobile tactical networks via simulation/emulation to enhance the reliable delivery of information to the Soldier. ***FY 2012 Plans:*** Continue evaluating techniques for trading off intrusion detection system (IDS) system performance and overall network performance in terms of network security metrics. ***FY 2013 Plans:*** Will design and evaluate new software algorithms and architectures, along with predictive models, for distributed intrusion detection of cyber attacks in bandwidth-constrained environments.	1.000	1.012	1.166
Title: Information Exchange ***Description:*** This effort will investigate and develop software that integrates sensor data from local and external information sources. The goal is to enable tactical users to cooperatively share relevant and timelier tactical information within a distributed wireless environment. ***FY 2011 Accomplishments:*** Designed network service interfaces, refined policy-based information exchange structures, and conducted assessments on policy-based exchange software in an operational command, control, communications, computer, intelligence, surveillance and reconnaissance (C4ISR On-the-Move environment). ***FY 2012 Plans:***	1.184	1.217	1.249

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APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602783A: *COMPUTER AND SOFTWARE TECHNOLOGY*	**PROJECT** Y10: *COMPUTER/INFO SCI TECH*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Extend experiments to social network analysis, fusion and collection techniques in a wireless distributed fusion environment, and develop metrics for assessing their overall effectiveness within the DCGS-A Cloud architecture. *FY 2013 Plans:* Will develop and assess fusion and information exchange software to reduce network bandwidth necessary to transmit information; evaluate the software using tactically realistic equipment and text/video data.			
Title: Language Translation	0.525	0.599	1.631
Description: This effort develops and assesses computational multilingual algorithms and software frameworks to enable commanders and troops to bridge language barriers in order to counter adversaries and collaborate with allies. *FY 2011 Accomplishments:* Integrated new optical character recognition/machine translation (OCR/MT) evaluation tools and expanded the testbed to accommodate select Net Centric Enterprise Services; evaluated/modified/transitioned best-of-breed language processing tools with PM-Sequoyah (machine foreign language translation system) for the Army and Intelligence Communities. *FY 2012 Plans:* Integrate additional tools to automate development of new OCR/MT rapidly from prepared data and develop and evaluate use of mobile applications for language translation functions. *FY 2013 Plans:* Will develop and evaluate adaptive OCR/MT workflow analysis software to improve the quality of automated reasoning techniques when applied to HUMINT documents (both foreign and English).			
Title: Network Theory	1.760	1.925	1.865
Description: This effort investigates and designs theory based software models to evaluate and validate emerging network protocols and structures. The goal of this effort is to develop software algorithms that maintain effective communications in networks in spite of disruptive effects such as task reorganization, mobility of friendly forces, and adversarial attacks on friendly networks. *FY 2011 Accomplishments:* Investigated bio-inspired approaches for robust resilient networking and assess the trade-offs between simplicity, resilience, overhead and performance for heterogeneous tactical networks (work in this area will build on technology transitioned from the Institute for Collaborative Biotechnologies, PE 0601104A/project H05). *FY 2012 Plans:*			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Investigate and evaluate techniques for controlling the behavior of hybrid networks using a measure of information quality to enhance the overall network performance for improved decision making. *FY 2013 Plans:* Will investigate and evaluate algorithms to improve delivery time and quality of information in unreliable tactical mobile networks; investigate and evaluate software algorithms that exploit network user movement and usage to improve communication and information delivery.			
Title: Heterogeneous Computing and Computational Sciences *Description:* This effort researches and develops software algorithms to allow information processing across different computing hardware platforms. The goal of this research is to provide high performance computing (HPC) equivalent processing capabilities to the Soldier on the battlefield. *FY 2011 Accomplishments:* Investigated scalable interface algorithms for implementing heterogeneous computing systems on battlefield applications of robotics information decision aids and biometric applications. *FY 2012 Plans:* Continue investigating scalable interface algorithms on heterogeneous computing systems for battlefield and biometric applications. *FY 2013 Plans:* Will develop and evaluate scalable algorithms for battle command applications, such as modeling electromagnetic propagation in urban areas on a HPC cloud hybrid computing platform; evaluate algorithm performance and accuracy for developing high fidelity models of complex battlefield scenarios.	1.000	1.000	1.033
Title: Material Modeling-Force Protection *Description:* This effort designs and evaluates software to improve parallel processing for computational intensive physics. Intent is to create a computational science environment to assist researchers from different disciplines to work collaboratively and to exchange models and results. *FY 2012 Plans:* Explore innovative approaches in developing a parallel computational framework for next generation petaflop high-performance computers (both cluster and hybrid computers) to study coupled nonlinear multi-scale material problems on a massive scale. *FY 2013 Plans:*	-	1.631	1.664

Exhibit R-2A, **RDT&E Project Justification:** PB 2013 Army		**DATE:** February 2012
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B. Accomplishments/Planned Programs ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013**
Will design new parallel computational science environment architecture, as well as theory and implementation strategies for coupling multi-physics modeling software; will evaluate new data models and formats for using petascale data from multi-physics applications to enable higher resolution/fidelity simulations.			
Accomplishments/Planned Programs Subtotals	6.599	8.577	9.830

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.