Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Army										DATE: February 2011	
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 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	9.896	6.768	8.591	-	8.591	8.782	8.947	9.055	9.076	Continuing	Continuing
Y10: *COMPUTER/INFO SCI TECH*	5.518	6.768	8.591	-	8.591	8.782	8.947	9.055	9.076	Continuing	Continuing
Y11: *COMPUTER & INFORMATION SCIENCE APPLIED RES CA*	4.378	-	-	-	-	-	-	-	-	Continuing	Continuing

Note

FY10 funding increase for congressional special interest items.
FY12 funding increase for Materials Force Protection technology efforts and Networks.

A. Mission Description and Budget Item Justification

The objective of this program element (PE) is to conduct applied research that would enable enhanced understanding and accelerate the decision cycle time for commanders and leaders operating in a mobile, dispersed, highly networked environment. This PE supports research on information and communications technology (project Y10).

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).

Project Y11 funds Congressional Interest Items.

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 Army Research Laboratory (ARL) at the Adelphi and Aberdeen Proving Ground, MD locations.

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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*

B. Program Change Summary ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Previous President's Budget	5.609	6.768	5.960	-	5.960
Current President's Budget	9.896	6.768	8.591	-	8.591
Total Adjustments	4.287	-	2.631	-	2.631
• Congressional General Reductions		-			
• Congressional Directed Reductions		-			
• Congressional Rescissions	-	-			
• Congressional Adds		-			
• Congressional Directed Transfers		-			
• Reprogrammings	4.378	-			
• SBIR/STTR Transfer	-0.091	-			
• Adjustments to Budget Years	-	-	2.631	-	2.631

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army			DATE: February 2011
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 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
Y10: *COMPUTER/INFO SCI TECH*	5.518	6.768	8.591	-	8.591	8.782	8.947	9.055	9.076	Continuing	Continuing

Note

Not applicable for this item.

A. Mission Description and Budget Item Justification

The objective of this project is to conduct applied research in information and communications processing technologies to automate the delivery of local/global information for decision making (planning, rehearsal, and execution) so that it is synchronized, parallel and real-time; and devise communication/network technologies to enable synchronization of secure data/information from humans to humans, humans to computers, computers to humans, and reduce dependence on mouse and keyboard versus other modes of computer interaction. This is the key to enabling enhanced understanding and for accelerating the decision cycle time for commanders and leaders operating in mobile, dispersed, highly networked environment envisioned for the future force.

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 Army Research Laboratory (ARL), Adelphi and Aberdeen Proving Ground, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Title: Information Processing	1.084	1.160	1.191
Description: Enhance information processing techniques in order to inform and protect the force from imminent threats. Develop user directed fusion techniques that, when combined with methods developed at the Communications-Electronics Research, Development, and Engineering Center, enable semi-automated fusion to improve the completeness and timeliness of decision-making in command and control (C2) operations. The integrated technology will be used to support a Distributed Common Ground Station-Army (DCGS-A) architecture (an integrated architecture of all ground/surface systems) and for future force assessment.			
FY 2010 Accomplishments: Evaluated measures to mine relevant information from social network information sources and augment that information with data from local (sensor) assets for improved understanding of the human/terrain battlefield interactions.			
FY 2011 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
Investigate 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 investigate improved social network analysis tools, interfaces, and visualization routines for Army intelligence. ***FY 2012 Plans:*** Will extend these techniques to parallel architectures/algorithms and evaluate them in relevant tactical exercises, like Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) On-the-Move.			
Title: Information Assurance ***Description:*** Conduct applied research on tactical information protection technologies for agent-based vulnerability assessment over wireless bandwidth constrained links and security infrastructures for sensor networks. ***FY 2010 Accomplishments:*** Evaluated the wireless intrusion detection system (IDS) system performance in terms of network overhead (i.e., bandwidth, energy and latency). ***FY 2011 Plans:*** Evaluate secure information flow techniques in mobile tactical networks via simulation/emulation to enhance the reliable delivery of information to the Soldier. ***FY 2012 Plans:*** Will continue evaluating techniques for trading off IDS system performance and overall network performance in terms of network security metrics.	1.113	1.089	1.136
Title: Information Exchange ***Description:*** Investigate techniques to enable automated integration of global and local information, allowing tactical assets to cooperatively share sensed events within a wireless distributed fusion environment in order to inform the force of relevant events. ***FY 2010 Accomplishments:*** Evaluated data structures for policy-based information exchange (administrative approach used to simplify network management by establishing rules/guidelines to deal with situations that are likely to occur) and integrated information assurance modules to support the evaluation in tactically relevant environments. ***FY 2011 Plans:***	1.145	1.185	1.217

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Design network service interfaces, refine policy-based information exchange structures, and conduct 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:*** Will extend experiments to social network analysis, fusion and collection techniques in this environment, and develop metrics for assessing their overall effectiveness within the DCGS-A Cloud architecture.			
Title: Language Translation ***Description:*** Conduct research into techniques for developing the underlying computational multilingual software framework to enable commanders and troops to bridge language barriers in order to counter adversaries and collaborate with allies. ***FY 2010 Accomplishments:*** Assessed the impact of pre-processing tools on downstream processes like named entity extraction, machine translation, and summarization that are critical to the Intelligence Community. ***FY 2011 Plans:*** Integrate new optical character recognition/machine translation (OCR/MT) evaluation tools and expand the testbed to accommodate select Net Centric Enterprise Services; jointly evaluate/modify/transition best-of-breed language processing tools with PM-Sequoyah (machine foreign language translation system) for the Army and Intelligence Communities. ***FY 2012 Plans:*** Will integrate additional tools to automate development of new OCR/MT rapidly from prepared data and develop/evaluate use of mobile applications for language translation functions.	0.551	0.580	0.609
Title: Network Theory ***Description:*** Statistical based methods for studying networks to support theory development in network science; evaluate a basis to validate or invalidate theoretical results, identify gaps between theory prediction and field performance; evaluate verification of mobility, channel, and topology models, and of convergence of adaptive protocols; guide development of the theoretical effort by providing a basis for refining models and assumptions. The long-term goal is to develop a real-time adaptive statistical analysis system that is coupled to a monitoring system that can infer/learn global network behavior and to a control system that controls local behavior so as to predictively improve performance, while ensuring the stability of the overall system. ***FY 2010 Accomplishments:***	1.625	1.742	1.817

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
Created models that incorporated network characteristics and human information processing, as well as communication and decision making capabilities for enhanced system performance. ***FY 2011 Plans:*** Investigate 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:*** Will investigate and evaluate techniques for controlling the behavior of hybrid networks using a measure of information quality.			
Title: Heterogeneous Computing and Computational Sciences ***Description:*** Research into emerging architectures and software engineering paradigms for hybrid core configurations. The focus is on application development and acceleration targeting heterogeneous systems to allow for scalable algorithms across a range of combined computing cores and operating Scenarios. ***FY 2011 Plans:*** Investigate scalable interface algorithms for implementing heterogeneous computing systems on battlefield applications of robotics information decision aids and biometric applications. ***FY 2012 Plans:*** Will continue investigating scalable interface algorithms on heterogeneous computing systems for battlefield and biometric applications.	-	1.012	1.621
Title: Material Modeling-Force Protection ***Description:*** This research effort will develop fundamental capability for advanced computational scientific modeling that extend beyond known limitations of the current state of the art. This effort builds on FY11 work under Heterogeneous Computing and Computational Sciences on the PE 0602783A/Y10 (COMPUTER/INFO SCI TECH). ***FY 2012 Plans:***	-	-	1.000

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 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.			
Accomplishments/Planned Programs Subtotals	5.518	6.768	8.591

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.

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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
Y11: *COMPUTER & INFORMATION SCIENCE APPLIED RES CA*	4.378	-	-	-	-	-	-	-	-	Continuing	Continuing

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Computer and Software Technology applied research.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Title: Integrated Information Technology Policy Analyses Research ***Description:*** This is a Congressional Interest Item. ***FY 2010 Accomplishments:*** Worked to create a more strategic, adaptive IT policy to advance the Army's Network Centric Operations vision for the future force, especially with regard to providing situational intelligence to soldiers on the battlefield.	3.184	-	-
Title: Optimizing Natural Language Processing of Open Source Intelligence ***Description:*** This is a Congressional Interest Item. ***FY 2010 Accomplishments:*** Provided an all-source fusion tool for collecting data from open sources such as the web, blog, and social networking sites.	1.194	-	-
Accomplishments/Planned Programs Subtotals	4.378	-	-

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.