Exhibit R-2, PB 2010 Army RDT&E Budget Item Justification								DATE: May 2009		
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 2008 Actual**	**FY 2009 Estimate**	**FY 2010 Estimate**	**FY 2011 Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
Total Program Element	8.676	6.274	5.639						Continuing	Continuing
Y10: COMPUTER/INFO SCI TECH	5.196	5.476	5.639						Continuing	Continuing
Y11: COMPUTER & INFORMATION SCIENCE APPLIED RES CA	3.480	.798	.000						Continuing	Continuing

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). Project Y11 funds congressional special interest items.

Work in this PE is related to and fully coordinated with efforts in 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 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 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 2008	FY 2009	FY 2010	FY 2011
Previous President's Budget	9.803	5.495	5.591	
Current BES/President's Budget	8.676	6.274	5.639	
Total Adjustments	-1.127	.779	.048	
Congressional Program Reductions	.000	-.021		
Congressional Rescissions	.000	.000		
Total Congressional Increases	.000	.800		
Total Reprogrammings	-.916	.000		
SBIR/STTR Transfer	-.211	.000		

Change Summary Explanation

FY08 decrease is due to transfer of congressional interest items.
FY09 increase is due to congressional adds.

Exhibit R-2a, PB 2010 Army RDT&E Project Justification								DATE: May 2009		
APPROPRIATION/BUDGET ACTIVITY 2040 - Research, Development, Test & Evaluation, Army/BA 2 - Applied Research				R-1 ITEM NOMENCLATURE PE 0602783A COMPUTER AND SOFTWARE TECHNOLOGY					PROJECT NUMBER Y10	
COST ($ in Millions)	**FY 2008 Actual**	**FY 2009 Estimate**	**FY 2010 Estimate**	**FY 2011 Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
Y10: COMPUTER/INFO SCI TECH	5.196	5.476	5.639						Continuing	Continuing

A. Mission Description and Budget Item Justification

The objective of this project is to fund applied research of information and communications technology towards the goal of developing information 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 devising communication/network technologies that will enable the synchronization of secure data/information from humans to humans, humans to computers, computers to humans, as well as reducing dependence on mouse and keyboard versus other modes of computer interaction. This is key to enabling enhanced understanding and accelerating the decision cycle time for commanders and leaders operating in the 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 locations.

B. Accomplishments/Planned Program ($ in Millions)	**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
Small Business Innovative Research/Small Business Technology Transfer Programs	.000	.083	.000	
Information Processing: Enhance information processing techniques in order to inform and protect the force from imminent threats. User directed fusion techniques that combined with methods developed at the Communications-Electronics Research, Development, and Engineering Center (CERDEC) will enable semi-automated fusion to improve the completeness and timeliness of decision-making in command and control (C2) operations. The integrated technology will be matured for Distributed Common Ground Station-Army (DCGS-A) and future force assessment. In FY08, implemented ontology to formalize the representation, attributes, and transforms necessary to track a soft target using various data sources. Integrated soft target tracking algorithms as small, self-contained fusion services that support the Intelligence Analyst in interpreting battlefield events. In FY09, develop and transition fusion (relationship discovery) services to CERDEC for integration into DCGS-A.	1.075	1.090	1.121	

Exhibit R-2a, PB 2010 Army RDT&E Project Justification		DATE: May 2009
APPROPRIATION/BUDGET ACTIVITY 2040 - Research, Development, Test & Evaluation, Army/BA 2 - Applied Research	R-1 ITEM NOMENCLATURE PE 0602783A COMPUTER AND SOFTWARE TECHNOLOGY	PROJECT NUMBER Y10

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
In FY10, will investigate measures of interest 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.				
Information Exchange: 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. In FY08, used social networking concepts to develop soft target tracking algorithms that can be used to identify relevant changes in the tactical environment. In FY09, integrate cross-security-level information exchange algorithms to ensure tactically relevant information is presented to the user in a minimally intrusive manner. In FY10, will investigate data structures for policy-based information exchange and integrate information assurance modules to support the evaluation in tactically relevant environments.	1.050	1.103	1.172	
Information Assurance: Conduct applied research on tactical information protection technologies for agent-based vulnerability assessment over wireless bandwidth constrained links and security infrastructures for sensor networks. The future force will operate in a complex wireless environment where survivability must be maintained in spite of inherent vulnerabilities of standardized protocols and commercial technologies. In FY08, investigated and evaluated an integrated distributed wireless intrusion detection system (IDS) capable of detecting multiple classes of intrusions from multiple simultaneous intruders. Enhanced network protocol to provide a more efficient healing process. In FY09, evaluate the scalability of the distributed wireless IDS system in large networks and determine the expected bounds of performance (e.g. overhead, missed detection probability, and false alarm probability). In FY10, will evaluate the wireless IDS system performance in terms of network overhead (i.e., bandwidth, energy and latency).	1.033	1.040	1.119	
Network Theory: Statistical based methods for studying networks supports theory development in network science. Provide a basis to validate or invalidate theoretical results, point gaps between theory prediction, and field performance, provide verification of mobility, channel, topology models, and of convergence of adaptive protocols, guide development of the theoretical	1.497	1.615	1.675	

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
effort by providing a basis for refining models and assumptions. All of this leads to the right levels of robust abstraction to understand network behavior, resulting in a tight coupling between theoretical developments, simulation, emulation, and over-the-air testing in lab and field environments. 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. In FY08, acquired software and hardware, including network monitoring tools, and setup emulation and in-the-lab/field assessments to gather network performance data, based on algorithms developed in this PE/project. In FY09, refine and expand the scope of the effort (size of the network, complexity of the deployed algorithms and protocols, heterogeneity of the nodes, harshness of the radio frequency (RF) channel conditions and sophistication of the adaptation). Theoretical work will be validated against the acquired data. In FY10, will create models that incorporate network characteristics and human information processing, and communication and decision making capabilities for enhanced system performance.				
Language Translation: Conduct research into techniques for developing the underlying computational multilingual software framework to enable commanders and troops to bridge language barriers in order to anticipate adversaries and collaborate with allies. In FY08, implemented optical character recognition (OCR), machine translation (MT) and name extraction via web services in Deployable Harmony Document Exploitation (DOCEX) System (DHDS) and DCGS-A test beds. In FY09, evaluate use of document image processing tools operating through web service on noisy and handwritten foreign language documents. In FY10, will assess the impact of pre-processing tools on downstream processes, like named entity extraction, machine translation, and summarization that are critical to the Intelligence community.	.541	.545	.552	
Total	5.196	5.476	5.639	

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

Exhibit R-2a, PB 2010 Army RDT&E Project Justification		DATE: May 2009
APPROPRIATION/BUDGET ACTIVITY 2040 - Research, Development, Test & Evaluation, Army/BA 2 - Applied Research	R-1 ITEM NOMENCLATURE PE 0602783A COMPUTER AND SOFTWARE TECHNOLOGY	PROJECT NUMBER Y10

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, PB 2010 Army RDT&E Project Justification			DATE: May 2009
APPROPRIATION/BUDGET ACTIVITY 2040 - Research, Development, Test & Evaluation, Army/BA 2 - Applied Research	R-1 ITEM NOMENCLATURE PE 0602783A COMPUTER AND SOFTWARE TECHNOLOGY		PROJECT NUMBER Y11

COST ($ in Millions)	FY 2008 Actual	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Y11: COMPUTER & INFORMATION SCIENCE APPLIED RES CA	3.480	.798	.000						Continuing	Continuing

A. Mission Description and Budget Item Justification

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

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
Biologically-Inspired Security Infrastructure for Tactical Environments	1.934	.000	.000	
Integrated Information Technology Policy Analyses Research	1.546	.000	.000	
Lightweight Soldier Sensor Computing	.000	.776	.000	
SBIR/STTR	.000	.022	.000	
Total	3.480	.798	.000	

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.