Exhibit R-2, PB 2011 Army RDT&E Budget Item Justification										DATE: February 2010	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603772A: *Advanced Tactical Computer Science and Sensor Technology*							
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**Base FY 2011 Estimate**	**OCO FY 2011 Estimate**	**Total FY 2011 Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
Total Program Element	91.726	57.062	24.873	0.000	24.873	29.566	31.802	35.399	41.934	0	337.235
101: *Tactical Command and Control*	16.138	13.621	14.702	0.000	14.702	16.955	17.230	19.540	21.840	Continuing	Continuing
1AA: *Tactical Computer Science Demonstrations (CA)*	3.587	4.974	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
1AB: *SENSOR DEMONSTRATIONS (CA)*	10.366	10.744	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
243: *Sensors and Signals Processing*	30.929	27.723	10.171	0.000	10.171	12.611	14.572	15.859	20.094	Continuing	Continuing
VR2: *VADER-GMTI*	30.706	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

Efforts in this program element (PE) mature and demonstrate technologies that allow the Warfighter to effectively collect, analyze, transfer, and display situational awareness information in a network-centric battlefield environment. It matures and demonstrates architectures and provides technologies that enable synchronized Command and Control (C2) during rapid, mobile, dispersed, and Joint operations. It matures and develops software applications to more effectively integrate battle command across all echelons and to enable more effective utilization of resources (project D101). This PE also matures signal processing and fusion technologies for Army sensors; matures and demonstrates radio frequency (RF) systems to track and identify enemy forces and personnel; matures and demonstrates multi-sensor control and correlation for improving reconnaissance, surveillance, tracking, and target acquisition, (Project 243). Projects 1AA and 1AB fund congressional special interest items. Project VR2, (VADER-GMTI), funds the development and demonstration of the vehicle and dismount exploitation radar (VADER) Ground Moving Target Indicator (GMTI) radar demonstration on a manned platform. Work in this PE is fully coordinated with PE 0602270A (EW Technology), PE 0602782A (Command, Control, Communications Technology), PE 0603008A (Electronic Warfare Advanced Technology), PE 0602120A (Sensors and Electronic Survivability), and PE 0603270A (EW 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 PE is performed by the Army Research, Development, and Engineering Command (RDECOM), Communications-Electronics Research, Development, and Engineering, Center (CERDEC), Fort Monmouth, NJ and Aberdeen Proving Ground, MD.

Exhibit R-2, PB 2011 Army RDT&E Budget Item Justification	DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603772A: *Advanced Tactical Computer Science and Sensor Technology*

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	62.031	41.561	29.119	0.000	29.119
Current President's Budget	91.726	57.062	24.873	0.000	24.873
Total Adjustments	29.695	15.501	-4.246	0.000	-4.246
• Congressional General Reductions		-0.299			
• Congressional Directed Reductions					
• Congressional Rescissions		0.000			
• Congressional Adds		15.800			
• Congressional Directed Transfers					
• Reprogrammings	31.096	0.000			
• SBIR/STTR Transfer	-1.401	0.000			
• Adjustments to Budget Years	0.000	0.000	-4.246	0.000	-4.246

Change Summary Explanation

FY09 funding increase for VADER.FY10 Congressionally directed increases.FY11 Reduction in funding to support higher priority Army initiatives.

Exhibit R-2A, PB 2011 Army RDT&E Project Justification									DATE: February 2010		
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603772A: *Advanced Tactical Computer Science and Sensor Technology*				PROJECT 101: *Tactical Command and Control*			
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**Base FY 2011 Estimate**	**OCO FY 2011 Estimate**	**Total FY 2011 Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
101: *Tactical Command and Control*	16.138	13.621	14.702	0.000	14.702	16.955	17.230	19.540	21.840	Continuing	Continuing

A. Mission Description and Budget Item Justification

Efforts in this project mature and demonstrate technologies to move and display timely and relevant information across the battlefield to provide commanders at all echelons the situational awareness (SA) that allows them to understand, decide, and act faster than their adversaries, resulting in increased operating tempo (OPTEMPO), improved force synchronization, and reduced fratricide. This project matures and demonstrates technology solutions addressing: information storage and retrieval; digital transfer and display of battlefield SA and position/location information; synchronization of combined and Joint force operations; software services optimized for Command and Control (C2) of unmanned air and ground robotic systems; and C2 On-the-Move (OTM). 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, Development, and Engineering Command, Communications-Electronics Research, Development, and Engineering, Center (CERDEC), Fort Monmouth, NJ and Aberdeen Proving Ground, MD.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	**FY 2010**	**Base FY 2011**	**OCO FY 2011**	**Total FY 2011**
Program #1	5.687	7.928	0.000	0.000	0.000
Integrated Battle Command (BC): This effort matures and demonstrates technologies that allow forces to effectively collect, analyze, transfer, and display information in a net-centric battlefield environment. Technology areas include intelligent software agents, server virtualization, knowledge management, and automated query technologies. In FY09, matured network monitoring service for application in dynamic control of the Global Information Grid, from tactical through enterprise level network architectures, matured and demonstrated network monitoring services that allow other systems to monitor their own throughput and packet loss to enable dynamic adjustment and optimization of network utilization; demonstrated how quality of service metrics can be utilized to help intelligently manage the resources of distributed C2 service providers; developed digital mission representation to share/understand data between intelligence and operations functions. In FY10, mature and demonstrate intelligent agent based BC services for compliance in a Service Oriented Architecture; mature services for generation of warnings and alerts relevant to the commanders critical information requirements; mature and evaluate methods and software to train and improve information sharing and collaboration in network-					

Exhibit R-2A, PB 2011 Army RDT&E Project Justification		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
enabled operations; demonstrate/validate data aggregation and alert capabilities based on mission context; develop architecture for Warfighter-composable web-based and web-delivered applications; develop framework for the execution of composed applications. Related work is also accomplished under PE 0602782A/project 779. *FY 2009 Accomplishments:* FY 2009 *FY 2010 Plans:* FY 2010 *Base FY 2011 Plans:* FY 2011 Base *OCO FY 2011 Plans:* FY 2011 OCO					
Program #2 Integrated Battle Command (BC)(continued): In FY11, will demonstrate dynamic agent based service orchestration to provide workflow adaptation for unexpected events; will mature smart filtering services to enable extraction of structured data (graphics, numeric) from free text and will finalize and test in an operational environment all software for transition to PM BC; will mature additional functionality in data aggregation and alert capabilities and provide lessons learned; will enhance methods and software to improve info sharing and collaboration in network-enabled operations; will enhance Microsoft office products to support composability; will develop web-based gallery to support collaboration of Warfighter-developed applications. Related work is also accomplished under PE 0602782A/project 779. *FY 2009 Accomplishments:* FY 2009	0.000	0.000	8.875	0.000	8.875

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
FY 2010 Plans: FY 2010 *Base FY 2011 Plans:* FY 2011 Base *OCO FY 2011 Plans:* FY 2011 OCO					
Program #3 Command and Control (C2) for Unmanned Systems: This effort develops and demonstrates software services that provide coordinated dynamic battle command tactical control of unmanned systems and software tool sets that enable the commander to manage teams of manned and multiple unmanned air and ground platform assets. In FY09, matured tactical battle command services and air/ground collaboration services to include unmanned ground sensors (UGSs), unmanned aerial systems (UASs), and unmanned ground vehicles (UGVs) and demonstrated all in a relevant environment; executed a Command and Control of Robotic Entities capstone demonstration exercising the final set of software that provided effective positioning and placement in battlefield scenarios of up to five UGS clusters, five UGVs, and three UASs; analyzed data and provided evaluation and analysis report detailing lessons learned and metrics evaluated. In FY10, develop and mature software services for unmanned collaboration and coordination, UGV/UAS platform behaviors and C2 information knowledge management of unmanned systems to provide the capability to manage large numbers of air and ground robots over extended urban areas at scales beyond current robot inventories due to the expansion of unmanned assets in the battlespace. In FY11, will mature mission planning, execution, and monitoring software services to support collaborative, teamed UAS/UGV operations as well as provide greater battlefield awareness and situational understanding for operations in urban terrain; will enhance software algorithms for UAS/UGV perception and control technologies which will facilitate increased autonomy and more complex missions; will incorporate models for terrain and weather effects into planning software to enable more effective planning in complex	9.132	3.546	3.759	0.000	3.759

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
environments; will conduct experiments in modeling and simulation environments to evaluate effectiveness and establish a performance base line. *FY 2009 Accomplishments:* FY 2009 *FY 2010 Plans:* FY 2010 *Base FY 2011 Plans:* FY 2011 Base *OCO FY 2011 Plans:* FY 2011 OCO					
Program #4 Battle Space Awareness and Positioning: This effort demonstrates positioning and navigation tools to mitigate the impacts of jamming, terrain features, and buildings that limit the performance of Global Positioning System (GPS) only navigation systems. In FY09, built on the munitions-focused Common Guidance Common Sense Micro-Electro Mechanical System (MEMS) Inertial Measurement Units (IMUs) effort and matured the MEMS IMUs for suitable precision and accuracy for dismounted Soldier and tactical vehicle applications; evaluated MEMS preliminary design models of gyroscopes in a laboratory environment and developed prototype gyroscopes suitable for integration into a MEMS IMU. In FY10, begin the integration of position/navigation sensors with technologies that exploit the synergy between position/navigation and communications, such as radio frequency (RF) ranging and network-assisted navigation. In FY11, will mature an integrated position/navigation suite combining advanced small inertial sensors, advanced GPS technology and algorithms and radio technologies to provide position/location information in all terrains and environments. Related work is also accomplished under PE 0602782A/project 779.	1.319	2.000	2.068	0.000	2.068

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
FY 2009 Accomplishments: FY 2009 *FY 2010 Plans:* FY 2010 *Base FY 2011 Plans:* FY 2011 Base *OCO FY 2011 Plans:* FY 2011 OCO					
Program #5 Small Business Innovative Research/Small Business Technology Transfer Programs *FY 2009 Accomplishments:* FY 2009 *FY 2010 Plans:* FY 2010 *Base FY 2011 Plans:* FY 2011 Base *OCO FY 2011 Plans:* FY 2011 OCO	0.000	0.147	0.000	0.000	0.000
Accomplishments/Planned Programs Subtotals	16.138	13.621	14.702	0.000	14.702

Exhibit R-2A, PB 2011 Army RDT&E Project Justification		DATE: February 2010
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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, PB 2011 Army RDT&E Project Justification			DATE: February 2010
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COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	Base FY 2011 Estimate	OCO FY 2011 Estimate	Total FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
1AA: *Tactical Computer Science Demonstrations (CA)*	3.587	4.974	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Tactical Computer Science advanced technology development.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Program #1	0.797	0.000	0.000	0.000	0.000
Software Lifecycle Affordability Management Phase II (SLAM II): In FY09, this Congressional Interest Item improved the software acquisition process while adhering to DoD initiatives to develop enterprise architectures that are capable of meeting changing and growing customer demands. *FY 2009 Accomplishments:* FY 2009 *FY 2010 Plans:* FY 2010 *Base FY 2011 Plans:* FY 2011 Base *OCO FY 2011 Plans:* FY 2011 OCO					
Program #2	1.993	1.393	0.000	0.000	0.000

Exhibit R-2A, PB 2011 Army RDT&E Project Justification		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
VideoArgus: In FY09, this Congressional Interest Item developed and optimized salience based compression techniques to support warfighter requirements to more efficiently manage bandwidth utilization and provide actionable intelligence products at the same time. *FY 2009 Accomplishments:* FY 2009 *FY 2010 Plans:* FY 2010 *Base FY 2011 Plans:* FY 2011 Base *OCO FY 2011 Plans:* FY 2011 OCO					
Program #3 Embedding Iris Recognition Technology On-board Warfighter Personal Equipment: In FY09, this Congressional Interest Item conducted testing and performed evaluations to assess the feasibility of IRIS Recognition Technology embedded in soldier equipment. *FY 2009 Accomplishments:* FY 2009 *FY 2010 Plans:* FY 2010	0.797	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Base FY 2011 Plans: FY 2011 Base *OCO FY 2011 Plans:* FY 2011 OCO					
Program #4 Optimizing Natural Language Processing of Open Source Intelligence. This is a Congressional Interest Item. *FY 2009 Accomplishments:* FY 2009 *FY 2010 Plans:* FY 2010 *Base FY 2011 Plans:* FY 2011 Base *OCO FY 2011 Plans:* FY 2011 OCO	0.000	1.194	0.000	0.000	0.000
Program #5 SharedVision. This is a Congressional Interest Item. *FY 2009 Accomplishments:* FY 2009	0.000	2.387	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
FY 2010 Plans: FY 2010 *Base FY 2011 Plans:* FY 2011 Base *OCO FY 2011 Plans:* FY 2011 OCO					
Accomplishments/Planned Programs Subtotals	3.587	4.974	0.000	0.000	0.000

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.

Exhibit R-2A, PB 2011 Army RDT&E Project Justification			DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603772A: *Advanced Tactical Computer Science and Sensor Technology*	PROJECT 1AB: *SENSOR DEMONSTRATIONS (CA)*	

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	Base FY 2011 Estimate	OCO FY 2011 Estimate	Total FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
1AB: *SENSOR DEMONSTRATIONS (CA)*	10.366	10.744	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Sensor advanced technology development.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Program #1	2.392	0.000	0.000	0.000	0.000
HYPERSAR Radar: In FY09, this Congressional Interest Item integrated HYPERSAR and synthetic aperture radar (SAR) on a manned aircraft; conducted flight testing; demonstrated onboard processing in all radar modes; modified and improved the HYPERSAR software; performed data analysis and data reduction on the collected data. *FY 2009 Accomplishments:* FY 2009 *FY 2010 Plans:* FY 2010 *Base FY 2011 Plans:* FY 2011 Base *OCO FY 2011 Plans:* FY 2011 OCO					
Program #2	0.797	0.795	0.000	0.000	0.000

Exhibit R-2A, PB 2011 Army RDT&E Project Justification		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Advanced Radar Transceiver Integrated Circuits Development: In FY09, this Congressional Interest Item developed architecture for bandpass analog to digital converter for use in a direct radio frequency sampling radar receiver in support of an innovative digital array architecture. *FY 2009 Accomplishments:* FY 2009 *FY 2010 Plans:* FY 2010 *Base FY 2011 Plans:* FY 2011 Base *OCO FY 2011 Plans:* FY 2011 OCO					
Program #3 Radar Tag Emitters: In FY09, this Congressional Interest Item developed radar software to improve probability of detection and identification; developed software for radar tags to verify and respond only to authorized interrogators; developed software for APG 66 radar to improve pilot utility for radar responsive tags; demonstrated tags capability in different scenarios and obtained user feedback. *FY 2009 Accomplishments:* FY 2009 *FY 2010 Plans:* FY 2010	2.392	0.000	0.000	0.000	0.000

Exhibit R-2A, PB 2011 Army RDT&E Project Justification		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Base FY 2011 Plans: FY 2011 Base *OCO FY 2011 Plans:* FY 2011 OCO					
Program #4 Foliage Penetrating Reconnaissance, Surveillance, Tracking and Engagement Radar (FORESTER): In FY09, this Congressional Interest Item performed a trade study for design; developed radar upgrades/improvements and selected upgrades to be integrated into three FORESTER systems; improved detection performance, geolocation performance, mode flexibility, system usability and reduced weight. *FY 2009 Accomplishments:* FY 2009 *FY 2010 Plans:* FY 2010 *Base FY 2011 Plans:* FY 2011 Base *OCO FY 2011 Plans:* FY 2011 OCO	3.190	1.592	0.000	0.000	0.000
Program #5 CERDEC Airborne and Ground Wideband Digital Communications and Antenna Testbed: In FY09, this Congressional Interest Item developed program plan; identified architecture for a test and evaluation laboratory; conducted preliminary investigation of user antenna requirements.	1.595	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
FY 2009 Accomplishments: FY 2009 *FY 2010 Plans:* FY 2010 *Base FY 2011 Plans:* FY 2011 Base *OCO FY 2011 Plans:* FY 2011 OCO					
Program #6 Mobile Localization. This is a Congressional Interest Item. *FY 2009 Accomplishments:* FY 2009 *FY 2010 Plans:* FY 2010 *Base FY 2011 Plans:* FY 2011 Base *OCO FY 2011 Plans:* FY 2011 OCO	0.000	1.194	0.000	0.000	0.000
Program #7	0.000	1.592	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Intelligence, Surveillance and Reconaissance (ISR) Simulation Integration Laboratory. This is a Congressional Interest Item. *FY 2009 Accomplishments:* FY 2009 *FY 2010 Plans:* FY 2010 *Base FY 2011 Plans:* FY 2011 Base *OCO FY 2011 Plans:* FY 2011 OCO					
Program #8 CERDEC Integrated Tool Control System. This is a Congressional Interest Item. *FY 2009 Accomplishments:* FY 2009 *FY 2010 Plans:* FY 2010 *Base FY 2011 Plans:* FY 2011 Base *OCO FY 2011 Plans:* FY 2011 OCO	0.000	1.592	0.000	0.000	0.000

Exhibit R-2A, PB 2011 Army RDT&E Project Justification		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Program #9	0.000	3.979	0.000	0.000	0.000
Reduced Manning Situational Awareness. This is a Congressional Interest Item. *FY 2009 Accomplishments:* FY 2009 *FY 2010 Plans:* FY 2010 *Base FY 2011 Plans:* FY 2011 Base *OCO FY 2011 Plans:* FY 2011 OCO					
Accomplishments/Planned Programs Subtotals	10.366	10.744	0.000	0.000	0.000

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.

Exhibit R-2A, PB 2011 Army RDT&E Project Justification			DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603772A: *Advanced Tactical Computer Science and Sensor Technology*	PROJECT 243: *Sensors and Signals Processing*	

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	Base FY 2011 Estimate	OCO FY 2011 Estimate	Total FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
243: *Sensors and Signals Processing*	30.929	27.723	10.171	0.000	10.171	12.611	14.572	15.859	20.094	Continuing	Continuing

A. Mission Description and Budget Item Justification

Efforts in this project mature and demonstrate improved radar, sensor fusion, and correlation technologies for wide area reconnaissance, surveillance, tracking, and targeting of platforms and individuals in all terrain including complex and urban environments. Sensor fusion efforts mature and demonstrate sensor management and data correlation, and relationship discovery services of a multi-INT fusion system. Sensor and simulated sensor candidates may include moving-target-indicator (MTI)/synthetic aperture radar (SAR), electro-optical/infrared (EO/IR), signals intelligence (SIGINT), measurements and signatures intelligence (MASINT), Human Intelligence (HUMINT), and biometrics technologies. Technologies are matured with significant leveraging of achievements from industry, Defense Advanced Research Projects Agency (DARPA), and other Services. 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, Development, and Engineering Command, Communications - Electronics Research, Development, and Engineering Center (CERDEC), Fort Monmouth NJ and Aberdeen Proving Ground, MD.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Program #1	19.340	16.230	2.963	0.000	2.963
Foliage Penetrating (FOPEN) Radar for Unmanned Aerial Systems (UASs): This effort matures and demonstrates a FOPEN radar capability to meet the size, weight, and power requirements for a Class IV UAS. Advancements in both radar and exploitation processing technology enable increased radar performance to include ground and non-metallic building penetration for detection of hidden roadside target/weapons caches. In FY09, completed development of second system; completed air worthiness release documentation and flight testing of second system on manned surrogate UAS platform; matured algorithms for increased detection of targets of interest, developed specifications and performed required analysis for testing on target UAS platform; began radar integration on target UAS. In FY10, obtain UAS test bed platform; complete development of second system; continue integration data link with radar for remote operation and data dissemination; continue conduction of environmental and ground end-to-end acceptance tests; conduct and complete radar performance flight testing on a manned surrogate UAS platform; complete first system radar integration on target UAS; conduct UAS flight					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
testing on first system; and begin second system radar integration on target UAS. In FY11, will complete second system radar integration on target UAS and conduct UAS flight testing on second system. *FY 2009 Accomplishments:* FY 2009 *FY 2010 Plans:* FY 2010 *Base FY 2011 Plans:* FY 2011 Base *OCO FY 2011 Plans:* FY 2011 OCO					
Program #2 Ground Moving Target Indicator (GMTI) and Imaging Surveillance Radar: This effort demonstrates an all-weather GMTI and Synthetic Aperture Radar (SAR) for all-terrain (foliated and open) detection and tracking of mounted and dismounted threats in a package form-fit-function compatible with a Class IV rotary wing UAS. This effort is maturing DARPA investments in GMTI and synthetic aperture radar and applying lessons learned to build a multi-function radar system that will satisfy Class IV UAS size, weight and power requirements. In FY09, completed radar development and tower testing; integrated system onto a manned surrogate platform and initiated flight testing; collected tower and flight test data to support development of adaptive MTI processing algorithms, advanced motion compensation techniques and advanced exploitation and evaluation tools. In FY10, complete development and demonstrate advanced tracking and exploitation algorithms, techniques and tools; demonstrate payload on a manned surrogate platform (UH-60 Blackhawk).	4.816	4.920	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
FY 2009 Accomplishments: FY 2009 *FY 2010 Plans:* FY 2010 *Base FY 2011 Plans:* FY 2011 Base *OCO FY 2011 Plans:* FY 2011 OCO					
Program #3 Measurement and Signature Intelligence Technologies (MASINT) for clandestine tagging, tracking, and locating (TTL): This effort matures and demonstrates MASINT technologies capable of detecting, tracking, and/or identifying human activities and/or infrastructures. The emphasis is to identify appropriate technical approaches, demonstrate embedded processing, and mature algorithms for multi-mode fusion of sensor data. Candidate technologies include: fiber optic seismic/magnetic technologies (highly sensitive for detection of walking personnel with/without weapons and/or tunneling detection); air deployable (air droppable) networked sensor system for a jungle environment (integration of seismic/acoustic sensor with jungle canopy relay); human infrastructure detection technologies (algorithms, sensors, etc); radio frequency MASINT detector, ultra-light multi-target indicator radar for unattended ground sensors and unmanned air vehicles. In FY09, enhanced demonstrators and evaluated new candidate technologies for near-term development; integrated selected Electronic Support technologies for a modern communication emitter geo-location capability to direct, identify and precisely locate for targeting, emitters of interest into a system demonstrator; demonstrated/tested selected technologies for potential spiral transition to the user community. In FY10, mature and down-select candidate technologies for TTL based on updated guidance from user community and conduct demonstrator integration. In FY11, will demonstrate/test brassboard for potential spiral transition to the user community; will investigate	3.372	1.908	1.955	0.000	1.955

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
new TTL technologies to address emerging TTL user requirements. Related work is also accomplished under PE 0602120A/project H16. *FY 2009 Accomplishments:* FY 2009 *FY 2010 Plans:* FY 2010 *Base FY 2011 Plans:* FY 2011 Base *OCO FY 2011 Plans:* FY 2011 OCO					
Program #4 Weapon-Locating (Ground) radar technologies: This effort matures and demonstrates medium-range sensor technologies for locating indirect fire weapons and extending traditional counter-fire target acquisition to shooters operating into or from within natural and urban canyons and firing in improvised fashions (tracks rocket, artillery and mortar targets). In FY10, mature radar beam forming technologies and multi-aperture/multi-spectral unconventional signal processing (non-Fourier frequency transforms and non-Gaussian clutter estimates) techniques. In FY11, will develop improved clutter mitigation and discrimination algorithms to accommodate increased occurrence of ground clutter expected with additional radar coverage area. *FY 2009 Accomplishments:* FY 2009	0.000	1.982	2.628	0.000	2.628

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
FY 2010 Plans: FY 2010 *Base FY 2011 Plans:* FY 2011 Base *OCO FY 2011 Plans:* FY 2011 OCO					
Program #5 Omni-directional Situational Awareness (SA) (Airborne) radar technologies: This effort matures and demonstrates coupled radar-Electro-Optical (EO)/Infrared (IR) SA technologies for small unmanned aerial systems (UAS) to improve sensing and detection capabilities in support of wide-area persistence surveillance. In FY10, develop and mature a Ground Moving Target Indicator (GMTI) radar sensor weighing less than one pound with 360-degree field-of-view and investigate integration with an existing EO/IR payload including control and display software integration techniques necessary to facilitate efficient cueing and complementary usage of GMTI and EO/IR sensors. In FY11, will mature sensor payload to reduce size weight and power requirements; will mature antenna design and processing techniques to support multi-sensor capability. *FY 2009 Accomplishments:* FY 2009 *FY 2010 Plans:* FY 2010 *Base FY 2011 Plans:* FY 2011 Base	0.000	1.985	2.625	0.000	2.625

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
OCO FY 2011 Plans: FY 2011 OCO					
Program #6 Sensor Fusion: This effort matures and demonstrates automated tools to mitigate the fusion, exploitation, and sensor management/cross-cueing problems associated with prosecuting and tracking individuals, recognizing their patterns of association, and thereby, being able to track the organizations they form. This effort allows the commander to target significant individuals and to understand the organizations exerting influence in his area of operation sufficiently to disrupt or attack the organizational infrastructure. In FY09, finalized services development and integration and tested in the integration lab; demonstrated mature software services in Army or Joint experiments; conducted final high fidelity lab experiments and demonstrations of fusion automation and answering capabilities, and transitioned to PM Distributed Common Ground System Army (DCGS-A). Related work is also accomplished under PE 0602120A/project H15, PE 0602270A/project 442, and PE 0602270A/project 906. *FY 2009 Accomplishments:* FY 2009 *FY 2010 Plans:* FY 2010 *Base FY 2011 Plans:* FY 2011 Base *OCO FY 2011 Plans:* FY 2011 OCO	3.401	0.000	0.000	0.000	0.000
Program #7	0.000	0.698	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Small Business Innovative Research/Small Business Technology Transfer Programs *FY 2009 Accomplishments:* FY 2009 *FY 2010 Plans:* FY 2010 *Base FY 2011 Plans:* FY 2011 Base *OCO FY 2011 Plans:* FY 2011 OCO					
Accomplishments/Planned Programs Subtotals	30.929	27.723	10.171	0.000	10.171

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 2009 Actual	FY 2010 Estimate	Base FY 2011 Estimate	OCO FY 2011 Estimate	Total FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
VR2: *VADER-GMTI*	30.706	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

Efforts in this project mature, demonstrate and evaluate an advanced Ground Moving Target Indicator (GMTI) and Synthetic Aperture Radar (SAR) that detects dismounts and vehicles from manned and Unmanned Aerial Systems (UASs). Efforts are being coordinated with the Joint Intelligence Surveillance Reconnaissance Task Force and significantly leverage efforts from the DARPA/JIEDDO Vehicle and Dismount Exploitation Radar (VADER) program.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, Development, and Engineering Command, Communications - Electronics Research, Development, and Engineering Center (CERDEC), Fort Monmouth NJ.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
Program #1	30.706	0.000	0.000	0.000	0.000
Vehicle and Dismount Exploitation Radar (VADER) demonstration on a manned aircraft: This effort matures, demonstrates and performs an in-theater demonstration and evaluation of an advanced Ground Moving Target Indicator (GMTI) and Synthetic Aperture Radar (SAR) that detects and tracks dismounts and vehicles from slow flying manned aircraft or UASs. In the fourth quarter fiscal year 2009 these VADER funds were reprogrammed into 0603772A via prior approval reprogramming. In FY10, integrate and test an existing VADER system, with the tactical communications, Tactical Common Data link, and other theater required hardware and software systems; demonstrate system operation (includes test of mode parameters, mission planning, data link functions, detection/false alarm performance, calibration, built-in-test, perform DOD Information Assurance Certification and Accreditation Process, and complete air worthiness release documentation and testing for Twin Otter platform including integrated operation with the exploitation system; conduct radar performance flight testing on manned platform; quantify, document, and assess system performance in an operationally relevant location in April; develop tactics, processing, exploitation and dissemination techniques for this new sensor.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	Base FY 2011	OCO FY 2011	Total FY 2011
FY 2009 Accomplishments: FY 2009 *FY 2010 Plans:* FY 2010 *Base FY 2011 Plans:* FY 2011 Base *OCO FY 2011 Plans:* FY 2011 OCO					
Accomplishments/Planned Programs Subtotals	30.706	0.000	0.000	0.000	0.000

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.