Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army										DATE: February 2012	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 6: *RDT&E Management Support*				R-1 ITEM NOMENCLATURE PE 0605604A: *Survivability/Lethality Analysis*							
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	42.320	43.414	44.753	-	44.753	43.280	41.736	41.350	41.616	Continuing	Continuing
675: *Army Survivability Analysis & Evaluation Support*	42.320	43.414	44.753	-	44.753	43.280	41.736	41.350	41.616	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project funds analytical products necessary for inherently-governmental Army Test & Evaluation Command/Army Evaluation Center's (ATEC/AEC) mission. Products result from investigating, analyzing, assessing, and reporting on the survivability of Soldiers, and on the survivability, lethality and vulnerability (SLV) of the highest priority Army systems whether those systems are employed during stability, support, defensive, or offensive missions. Developed through measurement, experiment, test support, and modeling and simulation (M&S), the products funded by this project are used in many ways to make the Army force more survivable. The project provides quantitative lethality and survivability analyses and data for fielded and developmental systems as the Army makes the required choices to decisively transform into a modular Brigade Combat Team (BCT) based organization. Specific survivability analysis products include assessments of systems such as WIN-T, Mine Resistant Ambush Protected (MRAP), Stryker, Ground Combat Vehicle (GCV), Army fire support systems, direct fire munitions; Army air defense and missile defense systems; Army aviation systems including Unmanned Aerial Vehicles; network communications and other network enabled battle command systems communication systems; and selected joint services systems particularly relevant to the Army's joint and expeditionary role. Products also include analysis and data concerning individual Soldier items including protective equipment such as helmets and vests. These survivability products are leveraged into rapid-equipping initiatives and other technical support for operational forces involved in the current fight. Continued development of these products also guarantees preservation of the Army's vitally needed technical corporate memory for expert survivability advice.

Survivability analyses funded by this project are conducted across the spectrum of battlefield threats to include guns, missiles, mines and other methods of inflicting physical damage; jammers, countermeasures, and other electronic warfare techniques; information assurance and computer network operations; and directed energy weapons. This survivability information enables developers, users, and decision makers to perform credible survivability tradeoffs for both Soldiers and materiel. These technical survivability details enable properly informed decisions concerning systems and tactics that maximize both the combat power and survivability of Army forces. Survivability data and analysis results funded by this project are efficiently leveraged for many different Army uses, reducing total cost to the Army by eliminating the need for duplicative capabilities funded by individual system developers. Central funding of this mission assures the Army accurate and consistent treatment of survivability across all classes of systems, across all formal system Evaluations, and across the Army's AR 5-5 studies process. Work program is prioritized principally by the ATEC/AEC and is used by them in the Army's formal Evaluation process in such a way that ATEC can comply with its legally mandated responsibility to assess system survivability along with effectiveness and suitability. Program Managers (PM) and the Program Executive Officers (PEO) use the survivability analyses and data funded by this project to make design decisions that are optimized for survivability, to direct specific weapon system development efforts that are needed for survivability enhancement, and to structure product improvement programs. Soldier survivability data and analysis is leveraged to support the survivability portion of the HQDA G1 MANPRINT program. TRADOC combat developers exploit the survivability products funded by this project to initiate and improve survivability/lethality requirements, and to develop and refine doctrine and tactics. Also, the quantitative analytical results funded by the project are leveraged as core inputs to formal AR 5-5 studies and other studies as directed by Army leaders. While the Army is at war, analytical results funded by this project are also directly

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APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 6: *RDT&E Management Support*	**R-1 ITEM NOMENCLATURE** PE 0605604A: *Survivability/Lethality Analysis*

leveraged for survivability support to current operations. Finally, for particularly urgent or controversial survivability issues, data and analysis funded by this project are used directly by senior Army decision makers to assure technically sound program/production decisions.

This project also supports highly technical specialized information assurance and computer network defense survivability analysis of Army battle command/networked systems as well as Army network architectures and technology. Supports ATEC and other electronic warfare vulnerability testers and evaluators by developing and providing highly technical specialized field countermeasure environments that threat forces may employ against Army communications networks, air defense and other systems. In conjunction with PMs and Army intelligence agencies, anal

B. Program Change Summary ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total
Previous President's Budget	41.812	43.483	44.598	-	44.598
Current President's Budget	42.320	43.414	44.753	-	44.753
Total Adjustments	0.508	-0.069	0.155	-	0.155
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.456	-			
• Adjustments to Budget Years	-	-	0.155	-	0.155
• Other Adjustments 1	0.964	-0.069	-	-	-

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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
675: *Army Survivability Analysis & Evaluation Support*	42.320	43.414	44.753	-	44.753	43.280	41.736	41.350	41.616	Continuing	Continuing
Quantity of RDT&E Articles											

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leveraged for survivability support to current operations. Finally, for particularly urgent or controversial survivability issues, data and analysis funded by this project are used directly by senior Army decision makers to assure technically sound program/production decisions.

This project also supports highly technical specialized information assurance and computer network defense survivability analysis of Army battle command/networked systems as well as Army network architectures and technology. Supports ATEC and other electronic warfare vulnerability testers and evaluators by developing and providing highly technical specialized field countermeasure environments that threat forces may employ against Army communications networks, air defense and other systems. In conjunction with PMs and Army intelligence agencies, analyzes technical vulnerabilities of foreign weapons, network related systems, and intelligence Electronic Warfare (EW) systems to U.S. Army EW systems. Without the survivability products funded by this project, ATEC would not have a technically credible account of survivability issues at milestone decision points and systems could be fielded with unknown vulnerabilities leading to unnecessary US casualties. PMs would make design choices that failed to properly optimize survivability, TRADOC would generate requirements that were not technically credible, and the Army studies process would rest on an inaccurate and inconsistent basis.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2011	FY 2012	FY 2013
Title: Survivability, Lethality, Vulnerability (SLV) Analyses	20.603	20.576	20.768
Articles:	0	0	

Description: Conduct integrated survivability, lethality and vulnerability assessments for developmental ground, soldier and munition systems including Tactical Wheel Vehicles (TWV), Joint Light Tactical Vehicle (JLTV), Mine Resistant Ambush Protected (MRAP) Vehicles, Ground Combat Vehicle (GCV) , Paladin Integrated Management (PIM) Vehicle, and Stryker. Solder systems include Nett Warrior and Mounted Soldier System. Munition systems include Excaliber, Joint Air and Ground Missile (JAGM) and the Guided Multiple Launch Rocket System (GMLRS). Analyses include pre-shot predictions and post shot damage assessments for each live fire shot, behind armor debris (BAD) and crew survivability assessments and providing SLV input for the preparation of the ATEC formal evaluation reports supporting milestone events. Additionally, Soldier Survivability Assessments are prepared in preparation for a system overall MANPRINT Assessment for milestone events.

FY 2011 Accomplishments:
Conducted pre-shot predictions and post shot damage assessments for live fire shots conducted on the Stryker Mobile Gun System , NBC Reconnaissance Vehicle and Double V Hull (DVH), Tactical Wheeled Vehicles and also the Joint Light Tactical Vehicle. Conducted electronic warfare assessments on the Stryker. Initiated the Ground Combat Vehicle (GCV) Analysis of Alternatives (AoA) Dynamic Update as required by the OSD Acquisition Decision Memorandum (ADM). Conducted crew casualty assessments on the MRAP variants. Conducted a Soldier Survivability and electronic warfare assessment of the Mounted Soldier System. Conducted planning of the Excalibur System Engineering Test (SET) and the Initial Operational Test and Evaluation (IOTE).

FY 2012 Plans:
Complete the GCV AoA Dynamic Update (Bradley variants, Technology Development contractor designs and Non-developmental vehicles) in support of the GCV MS B. Provide lethality analysis for the Excalibur 1b MS C. Conduct pre-shot predictions and

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2011	FY 2012	FY 2013
crew casualty assessments for MRAP vehicle design improvements. Conduct a Soldier Survivability assessment for the Nett Warrior MS C. Continue live fire shot activities (pre-shot predictions and post shot damage assessments) on the Stryker Mobile Gun System, NBC Reconnaissance Vehicle and Double V Hull (DVH). Develop crew survivability methodology for the high voltage (600v) driven Paladin PIM turret. Complete Mission based Test and Evaluation (MBTE) activities for the Joint Light Tactical Vehicle (JLTV) prototypes. ***FY 2013 Plans:*** Will conduct survivability/vulnerability assessments of the RPG Protection and Underbody Blast Protection demonstrators provided by the GCV Technology Development contractors. Will initiate the Paladin Improvement Management (PIM) vehicle Component Ballistic Tests.			
Title: C4ISR System Survivability Assessments	14.700	15.100	15.805
Articles:	0	0	
Description: This effort produces assessments of the survivability of C4ISR systems in Electronic Warfare (EW) and Information Warfare (IW) threat environments. Conducts Information Assurance (IA) analysis and electronic warfare studies on systems and networks which identify critical vulnerabilities in C4ISR systems. This work also defines, demonstrates, and recommends mitigation options to proponents and evaluators of C4ISR systems. An IA vulnerability database is maintained for the benefit of the Army community. ***FY 2011 Accomplishments:*** Conducted priority EW/IA vulnerability modeling, testing and analyses of systems such as Joint Tactical Radio System (JTRS) waveforms and hardware, Warfighter Information Network-Tactical (WIN-T) Increment 2, Distributed Common Ground System-Army (DGCS-A), SINCGARS, and rapid acquisition radio projects. IA testing and analysis was conducted on systems during Capability Set/Software blocking events. Performed EW and IA testing and analysis during NIE events. Developed modeling and simulation tools as required to enhance analysis capabilities especially to simulate and evaluate mobile ad-hoc networks which are critical to future Army mobile networks. Conducted SoS Network Vulnerability Assessments for CIO Army G6. Completed C4ISR Soldier Survivability Assessment (SSvA) and report for Milestone Decision Reviews technical areas of concern for - Enhanced Medium Altitude Reconnaissance and Surveillance System (EMARSS), AN/TPQ-50 Lightweight Counter Mortar Radar (LCMR), Enhanced AN/TPQ-36 (EQ-36) Counterfire Target Acquisition Radar System, and Distributed Common Ground Station-Army Mobile Basic. ***FY 2012 Plans:*** Continue to conduct priority EW/IA modeling, testing and analyses of Joint Tactical Radio System (JTRS) waveforms and hardware, Warfighter Information Network-Tactical (WIN-T) increment 2. Will provide verification and validation data in EW modeling and simulation to support AEC accreditation decision. Develop modeling and simulation tools as required. Continue to			

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2011	FY 2012	FY 2013
develop capabilities to simulate and evaluate mobile ad-hoc networks which are critical to future Army mobile networks. Conduct IA and EW modeling, testing and analysis to determine the survivability of systems evaluated during NIE 12.1 and 12.2. Perform SoS Network Vulnerability Assessments. Support C4ISR Quick Reaction Capability / Urgent Material Requirements (QRC/UMR) systems survivability test verification and validation of performance to include for example: live fire pretest analysis and test preparation, LFT&E planning and participation, EW modeling and simulation (M&S) to assess limitations of platform communication capability, conduct IA/CNO, and Document analyses in technical reports. Analyze the evolving EW threat environment to Army C4ISR and GPS embedded in weapons systems such as the Fire Support Element and determine mitigation approaches. ***FY 2013 Plans:*** EW and IA/CND modeling and analysis results will be provided to AEC for their evaluation reports. Will continue conducting EW and IA modeling, testing and analysis of systems evaluated in NIE events. Support C4ISR systems survivability EW/IA modeling, analysis and test verification and validation of performance, for example, multi-spectral signature measurements. Conduct C4ISR system IO/EW/EA/ES assessment. At the completion of the survivability assessment; if warranted, ARL/SLAD, Product Manager and Combat Developer in concert with the intelligence community should consider the initiation of a product improvement program (P3I strategy) to develop and field additional survivability enhancement measures [Electronic Protect/CND] to address future threat capabilities which may place the Army C4ISR system at risk to enemy targeting in the evolving EW threat environment during Army RESET.			
Title: Survivability, Lethality, Vulnerability (SLV) Analyses for Developmental Air and Missile Defense Systems	5.517	5.938	6.230
Articles:	0	0	
Description: Conduct integrated SLV analyses for developmental air and missile defense systems, pre-planned product improvements of current systems, and recently fielded systems. These systems include the Ballistic Missile Defense System (BMDS), Terminal High Altitude Air Defense (THAAD), PATRIOT, Surface-Launched Advanced Medium Range Air-to-Air Missile (SLAMRAAM), Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System (JLENS), and Sentinel. ***FY 2011 Accomplishments:*** Developed and provided electronic attack environment to support PATRIOT PDB-7 contractor verification test and DTE events. Provided target simulator support to JLENS DT testing. Provided BMDS Operational Test Agency with CNO assessments. ***FY 2012 Plans:*** Provide engineering analysis and computer network operations testing and assessment to support PDB-7 limited user test. Begin mobile Flight Mission Simulation (mFMS) Advanced Electronic Attack (AEA) upgrade. Provide electronic counter measure ground support to JLENS DT testing. ***FY 2013 Plans:***			

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2011	FY 2012	FY 2013
Will continue FMS AEA upgrade for Patriot. Will prepare for PDB-8 testing. Will provide electronic countermeasures ground support to JLENS Limited User Test (LUT) testing and provide JLENS computer network operations testing and assessment to ATEC.			
Title: System-of-systems survivability simulation (S4) ***Articles:*** ***Description:*** SLV analyses in a system-of-systems environment. ***FY 2011 Accomplishments:*** Demonstrated S4 capability to support acquisition decisions and evaluation analysis for PEO-Integration and ATEC. ***FY 2012 Plans:*** Conduct evaluation study for ATEC on select communications programs of record. ***FY 2013 Plans:*** Will conduct system-of-systems analyses to support major program decisions in support of ATEC formal evaluations.	1.500 0	1.800 0	1.950
Accomplishments/Planned Programs Subtotals	42.320	43.414	44.753

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.