Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Army										DATE: February 2011	
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 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	44.728	41.812	43.483	-	43.483	44.598	43.550	42.368	42.674	Continuing	Continuing
675: *Army Survivability Analysis & Evaluation Support*	44.728	41.812	43.483	-	43.483	44.598	43.550	42.368	42.674	Continuing	Continuing

Note

FY12 increase supports technical analyses for estimating the effects to personnel in ground vehicles subjected to an under-body blast event.

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 Mine Resistant Ambush Protected (MRAP), Stryker, Brigade Combat Team Modernization (BCTM) 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; communications and other systems enabling network enabled battle command and computer network operations (CNO); 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 analysis products funded by this project are integrated 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 warfare attacks; and high and low power directed energy weapons. This survivability information permits developers, users, and decision makers to fully understand the technical details of the most important survivability tradeoffs for both systems and Soldiers. 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 G2 MANPRINT program. TRADOC combat developers exploit the survivability products funded by this

Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Army	DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 6: *RDT&E Management Support*	**R-1 ITEM NOMENCLATURE** PE 0605604A: *Survivability/Lethality Analysis*

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 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 warfare and information operations survivability analysis of Army communications and electronic equipment and communications architectures essential to network enabled battle command. Supports ATEC and other electronic warfare vulnerability testers by developing and providing highly technical specialized field countermeasure environments that threat forces may employ against Army air defense and oth

B. Program Change Summary ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Previous President's Budget	44.782	41.812	42.273	-	42.273
Current President's Budget	44.728	41.812	43.483	-	43.483
Total Adjustments	-0.054	-	1.210	-	1.210
• Congressional General Reductions		-			
• Congressional Directed Reductions		-			
• Congressional Rescissions	-	-			
• Congressional Adds		-			
• Congressional Directed Transfers		-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.054	-			
• Adjustments to Budget Years	-	-	1.210	-	1.210

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army			DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 6: *RDT&E Management Support*	R-1 ITEM NOMENCLATURE PE 0605604A: *Survivability/Lethality Analysis*	PROJECT 675: *Army Survivability Analysis & Evaluation Support*	

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
675: *Army Survivability Analysis & Evaluation Support*	44.728	41.812	43.483	-	43.483	44.598	43.550	42.368	42.674	Continuing	Continuing
Quantity of RDT&E Articles											

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 Mine Resistant Ambush Protected (MRAP), Stryker, Brigade Combat Team Modernization (BCTM), 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; communications and other systems enabling network enabled battle command and computer network operations (CNO); 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 analysis products funded by this project are integrated 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 warfare attacks; and high and low power directed energy weapons. This survivability information permits developers, users, and decision makers to fully understand the technical details of the most important survivability tradeoffs for both systems and Soldiers. 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 G2 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

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 6: *RDT&E Management Support*	R-1 ITEM NOMENCLATURE PE 0605604A: *Survivability/Lethality Analysis*	PROJECT 675: *Army Survivability Analysis & Evaluation Support*

project are also directly 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 warfare and information operations survivability analysis of Army communications and electronic equipment and communications architectures essential to network enabled battle command. Supports ATEC and other electronic warfare vulnerability testers by developing and providing highly technical specialized field countermeasure environments that threat forces may employ against Army 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 2010	FY 2011	FY 2012
Title: Survivability, Lethality, Vulnerability (SLV) Analyses	21.724	20.095	20.645
Articles:	0	0	

Description: Conduct integrated survivability, lethality, vulnerability analyses for developmental aviation, ground, soldier and munition systems including Joint Cargo Aircraft (JCA), MRAP, Stryker, Ground Soldier System, Excalibur, and Intelligent Mine System (IMS). Completed ballistic survivability/vulnerability analysis for MRAP T&E, Guided Multiple Launch Rocket system (GMLRS) Unitary IOT&E and Excalibur LFT&E Systen Engineering Test-P1 test events, which included providing pre-shot predictions, performing damage assessments after each live fire test, completing post-shot analyses, behind armor debris (BAD) test/analyses, and crew survivability analysis and providing technical data required by ATEC for the Systems Evaluation Reports. Additionally, results and recommendations from our crosswalk of MRAP LFT&E assessed casualty/selected Theater casualty incidents were briefed to MRAP PM & vendors, ATEC, HQDA and DOT&E resulting in vehicle design improvements for MRAP platforms.

FY 2010 Accomplishments:
Conducted engineering and crew casualty analyses for MRAP All Terrain Vehicle (ATV), Joint Light Tactical Vehicle (JLTV) and Paladen Integrated Management (PIM) LFT&E test events.

FY 2011 Plans:
Conduct Low Bow Apache Block III LFT&E test events and conduct Hardware in the Loop (HWIL) investigations on LB Apache Block III. Conduct EW vulnerability assessments for IMS, Excalibur and Joint Air to Ground Missile (JAGM). Conduct ballistic survivability/lethality analysis for Excalibur, JAGM, GMLRS Alternate Warhead Program (AWP) and Excalibur Increment 1b. Provide ballistic and non-ballistic survivability/vulnerability/lethality analysis support to new Army carbine program and provide technical data required by ATEC for the Systems Evaluation Report. Provide ballistic survivability/vulnerability analysis support to Army studies. Provide ballistic vulnerability analysis for JLTV test events and Kiowa Warrior Cockpit and Sensor Upgrade

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 6: *RDT&E Management Support*	R-1 ITEM NOMENCLATURE PE 0605604A: *Survivability/Lethality Analysis*	PROJECT 675: *Army Survivability Analysis & Evaluation Support*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2010	FY 2011	FY 2012
program. Provide the Army's Increment 1 Brigade Combat Team stakeholders with comprehensive survivability, lethality, and vulnerability assessments and vulnerability reduction recommendations that will enhance these attributes of the system-of-systems. Advanced technologies such as Active Protection Systems, hybrid propulsion, and advanced armors are evaluated through precision experimentation and modeling and simulation. Perform methodology enhancements for simulation of new emerging technologies and system-of-systems operational constructs. Survivability based functional analysis and functional decomposition contributed to the development of the system-of-systems specification. Perform planning and execution of congressionally mandated LFT&E programs in conjunction with ATEC and OSD DOT&E including armor coupon testing. Conduct ballistic vulnerability analysis of the Increment 3 Brigade Combat Team in support of planned Critical Design Reviews, LFT&E activities, and initial qualification tests. ***FY 2012 Plans:*** Will provide survivability, lethality and vulnerability assessments of competing prototypes to inform downselect decision for upcoming MS ?B?. Findings and recommendations for survivability enhancements will be disseminated to appropriate Army stakeholders. Will produce a set of tools/methodologies for predicting personnel incapacitation from lower leg and lower spine injuries caused by an under-body blast event, as well as generate experimental validation data for limited accreditation of these tools for test and evaluation.			
Title: C4ISR System Survivability Assessments	14.898	14.700	15.100
Articles:	0	0	
Description: This effort produces assessments of the survivability of C4ISR systems in Electronic (EW) and Information Warfare (IW) threat environments and conducts Information assurance (IA) projects that reveal critical vulnerabilities in C4ISR systems. It also defines, demonstrates, and recommends mitigation options to proponents and evaluators of C4ISR. An IW vulnerability database is maintained for the benefit of the community. ***FY 2010 Accomplishments:*** Conducted priority testing and analyses including EW/IA modeling, Joint Tactical Radio System (JTRS) waveforms and hardware, Warfighter Information Network-Tactical (WIN-T) increment 2 and 3, Aerial Common Sensor, Distributed Common Ground System?Army (DGCS-A), Increment 1 Brigade Combat Team, and software blocking. Developed modeling and simulation tools as required. Analyzed the evolving EW threat to GPS as integrated into Army weapons. Developed capabilities to simulate and evaluate mobile ad-hoc networks which are critical to future Army mobile networks to analyze Army networks and enhance their survivability. This included vulnerability analyses of tactical internet components to radio frequency directed energy weapons (RFDEW). Conducted System-of-Systems Common Operating Environment (SoSCOE) assessments. ***FY 2011 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 6: *RDT&E Management Support*	R-1 ITEM NOMENCLATURE PE 0605604A: *Survivability/Lethality Analysis*	PROJECT 675: *Army Survivability Analysis & Evaluation Support*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2010	FY 2011	FY 2012
Continue to conduct priority testing and analyses including EW/IA modeling, Joint Tactical Radio System (JTRS) waveforms and hardware, Warfighter Information Network-Tactical (WIN-T) increment 2 and 3, Aerial Common Sensor, Distributed Common Ground System?Army (DGCS-A), Increment 1 Brigade Combat Team , and software blocking. Develop modeling and simulation tools as required. Continue to analyze the evolving EW threat to GPS as integrated into Army weapons. Develop capabilities to simulate and evaluate mobile ad-hoc networks which are critical to future Army mobile networks used to analyze Army networks and enhance their survivability, to include vulnerability analyses of tactical internet components to radio frequency directed energy weapons (RFDEW). Conduct System-of-Systems Common Operating Environment (SoSCOE) assessments. ***FY 2012 Plans:*** EW and IA/CNO modeling and analysis results will be provided to AEC for their evaluation report. Will provide verification and validation data in EW modeling and simulation to support AEC accreditation decision.			
Title: Survivability, Lethality, Vulnerability (SLV) Analyses for Developmental Air and Missile Defense Systems ***Articles:*** ***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 2010 Accomplishments:*** Provided the BMDS Operational Test Agency with Computer Network Operations (CNO) assessments, providing target simulator support to JLENS DT testing and countermeasure support of PATRIOT (PDB-7) DT/OT testing. ***FY 2011 Plans:*** Provide the BMDS Operational Test Agency with Computer Network Operations (CNO) assessments, providing target simulator support to JLENS DT testing and countermeasure support of PATRIOT (PDB-7) DT/OT testing. ***FY 2012 Plans:*** Will provide survivability input to AEC for THAAD materiel release review board milestone assessment, provide IA/CNO and EW support to Patriot Advanced Capability-3 supporting contractor verification test and developmental test and evaluation (DTE), and provide ongoing EW support to JLENS DTE.	6.106 0	5.517 0	5.938
Title: System-of-systems survivability simulation (S4) ***Articles:*** ***Description:*** Provide S4 to support SLV analyses	2.000 0	1.500 0	1.800

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 6: *RDT&E Management Support*	R-1 ITEM NOMENCLATURE PE 0605604A: *Survivability/Lethality Analysis*	PROJECT 675: *Army Survivability Analysis & Evaluation Support*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2010	FY 2011	FY 2012
FY 2010 Accomplishments: Demonstrated MUVES3 V/L service to S4; This capability will enable SLV analysis of the networked-enabled future force. ***FY 2011 Plans:*** Continue to improve capability to simulate IW and EW attacks on network-centric battle commands. ***FY 2012 Plans:*** Will support major program decisions (PEO Integration, ATEC, PEO System of system engineering (SoSE) with SoS analysis			
Accomplishments/Planned Programs Subtotals	44.728	41.812	43.483

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.