Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army											Date: February 2018	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 6: *RDT&E Management Support*					R-1 Program Element (Number/Name) PE 0605604A / *Survivability/Lethality Analysis*							
COST ($ in Millions)	**Prior Years**	**FY 2017**	**FY 2018**	**FY 2019 Base**	**FY 2019 OCO**	**FY 2019 Total**	**FY 2020**	**FY 2021**	**FY 2022**	**FY 2023**	**Cost To Complete**	**Total Cost**
Total Program Element	-	38.245	41.843	40.496	-	40.496	41.075	41.881	42.872	42.037	0.000	288.449
675: *Army Survivability Analysis & Evaluation Supp*	-	38.245	41.843	40.496	-	40.496	41.075	41.881	42.872	42.037	0.000	288.449

A. Mission Description and Budget Item Justification

This Program Element (PE) funds analytical products necessary for the inherently-governmental Army Test & Evaluation Command/Army Evaluation Center (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. While the Army is at war, analytical results funded by this PE are also directly leveraged for survivability support to current operations.

Developed through measurement, experiment, test support, and modeling and simulation (M&S), ATEC uses the products funded by this PE in many ways to make the Army force more survivable. This PE provides quantitative lethality and survivability analyses and data for fielded and developmental systems as the Army makes the required choices to transform into a modular Brigade Combat Team (BCT) based organization. Products concern: 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 and 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 PE 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; Cybersecurity 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 PE 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 Army Regulation (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 PE 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 Headquarters' Department of the Army (HQDA) Deputy Chief of Staff, Personnel (G1) Human Systems Integration (HSI) program. United States (U.S.) Army Training and Doctrine Command (TRADOC) combat developers exploit the survivability products funded by this PE to initiate and improve survivability/lethality requirements, and to develop and refine doctrine and tactics. Also, the quantitative analytical results funded by the PE are leveraged as core inputs to formal AR 5-5 studies and other

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studies as directed by Army leaders. Finally, for particularly urgent or controversial survivability issues, data and analysis funded by this PE are used directly by senior Army decision makers to assure technically sound program/production decisions.

This PE also supports Cybersecurity 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, this PE also analyzes technical vulnerabilities of foreign weapons, network related systems, and intelligence Electronic Warfare (EW) systems to U.S. Army EW systems.

B. Program Change Summary ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	38.571	41.843	33.341	-	33.341
Current President's Budget	38.245	41.843	40.496	-	40.496
Total Adjustments	-0.326	0.000	7.155	-	7.155
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.322	-			
• Adjustments to Budget Years	-	-	7.155	-	7.155
• FFRDC Transfer	-0.004	-	-	-	-

Change Summary Explanation

Fiscal Year (FY) 2019 increase of $7.155M is the result of a technical requirement update for modernization investments in combination with revised civilian pay and inflation rate assumptions.

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018
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COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
675: *Army Survivability Analysis & Evaluation Supp*	-	38.245	41.843	40.496	-	40.496	41.075	41.881	42.872	42.037	0.000	288.449
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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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; cybersecurity 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 regulation (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 Human Systems Integration (HIS) program. United States (U.S.) Army Training and Doctrine Command (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. When 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.

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This Project also supports highly technical cyber 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. Provides survivability analysis to System of Systems Network Vulnerability Assessments, to Chief Information Office (CIO) G6, Network Integration Evaluation (NIE), to triad (the Brigade Modernization Command (BMC), ATEC, and the System of Systems Integration (SoSI) Directorate.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Title: Survivability, Lethality, Vulnerability Analyses (SLVA) for Ground, Aviation, Munitions, and Soldier Systems	14.654	19.468	18.621
Description: This activity provides integrated survivability, lethality, vulnerability analyses for developmental aviation, ground, soldier and munition systems including Stryker, Ground Soldier System, Excalibur, and Intelligent Mine System (IMS). Activity also provides ballistic survivability/vulnerability analysis for systems such as Mine Resistant Ambush Protected (MRAP) vehicle, Guided Multiple Launch Rocket system (GMLRS) Alternative Warhead, Excalibur Live Fire Test and Evaluation (LFT&E) System Engineering Test-P1 test events, the Joint Light Tactical Vehicle (JLTV), the Amphibious Assault Vehicle Survivability Upgrade (AAV-SU), and the BRADLEY M2A4. ***FY 2018 Plans:*** Conduct ballistic, cyber and EW SLVA on AEC's highest priority platform and weapon systems, supporting LFT&E pre-shot predictions, damage assessments, post-shot analysis, and crew survivability analysis and provide technical data for system evaluation reports. Provide vulnerability reduction recommendations to PMs for those systems supported. For systems analyzed, provide data to the Army Material Systems Analysis Agency (AMSAA) for support of Army Analyses of Alternatives. Make the necessary preparations for the start of full-up system-level LFT&E in FY18-20. Perform damage and crew casualty assessments as well as post-shot analyses during scheduled LFT&E programs. Collect data incorporated into the Director, Operational Test & Evaluation (DOT&E) live-fire report to Congress as well as the System Evaluation Reports prepared by ATEC. ***FY 2019 Plans:*** Will conduct ballistic and other needed SLVA on AEC's highest priority platform and weapon systems, supporting LFT&E pre-shot predictions, damage assessments, post-shot analysis, and crew survivability analysis and provided technical data for system evaluation reports. Will provide vulnerability reduction recommendations to PMs for those systems supported. For systems analyzed, will provide data to AMSAA for support of Army Analyses of Alternatives and other Army studies; will incorporate collected data into the DOT&E live-fire report to Congress as well as the System Evaluation Reports prepared by ATEC. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2019 adjustment reflects technical requirement update.			
Title: Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) System Survivability Assessments	22.037	20.761	20.274

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Description: This effort produces assessments of the survivability of C4ISR systems in EW and cyber threat environments and conducts Electronic Attack (EA) and cyber analyses that reveal critical vulnerabilities in C4ISR systems. It also defines, demonstrates, and recommends mitigation options to proponents and evaluators of C4ISR. A cyber vulnerability database is maintained for the benefit of the community. ***FY 2018 Plans:*** Analyze Electronic Protection (EP) and cybersecurity for systems under test and systems under investigation for FY17 NIEs and for additional highest priority technologies and developmental systems as specified by ATEC so as to reduce costs of downstream development by identifying and fixing vulnerabilities earlier and to assure that formal Army evaluations at Milestone decision points are fully informed on EP and cyber issues. Apply cyber-attack M&S tools so as to more accurately assess the operational impact of such attacks on small unit mission accomplishment. ***FY 2019 Plans:*** Will analyze EP and cybersecurity for systems under test and systems under investigation in future NIEs and other high priority tests and for additional highest priority technologies and developmental systems as specified by ATEC so as to reduce costs of downstream development by identifying and fixing vulnerabilities earlier and to assure that formal Army evaluations at Milestone decision points are fully informed on EP and cyber issues. Will mature and update cyber-attack M&S tools so as to more accurately assess the operational impact of such attacks on small unit mission accomplishment. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2019 adjustment reflects revised economic assumptions.			
Title: Survivability, Lethality, Vulnerability (SLV) Analyses for Developmental Air and Missile Defense Systems	1.554	1.614	1.601
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 2018 Plans:*** Design, develop, and employ advanced electronic attack countermeasures to assess Air and Missile Defense (AMD) system of systems. Provide advanced EA and cybersecurity testing for AMD user operational test events. Provide additional EA and cybersecurity analysis and experimentation on other AMD systems as needed by ATEC. ***FY 2019 Plans:***			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Will design, develop, and employ advanced electronic attack countermeasures to assess priority AMD systems and system of systems. Will develop and provide advanced EA and cybersecurity test support for highest priority operational and developmental test events. Will provide additional EA/EP and cyber analysis for other AMD systems as prioritized by ATEC. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2019 adjustment reflects revised economic assumptions.			
Accomplishments/Planned Programs Subtotals	38.245	41.843	40.496

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A