

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

February 2008

BUDGET ACTIVITY		PE NUMBER AND TITLE					PROJECT	
6 - Management support		0605604A - Survivability/Lethality Analysis					675	
COST (In Thousands)	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	
675 Army Survivability Analysis & Evaluation Support	42769	41681	41066	42456	39074	39944	40844	

A. Mission Description and Budget Item Justification: This project funds the investigation of the survivability, lethality and vulnerability (SLV) of designated Army systems to all battlefield threats. It supports transforming the Army to a highly effective mobile force depending on symmetry between Survivability, Lethality, Mobility, Manpower and Personnel Integration (MANPRINT), Deployability, and Sustainability. The challenge of the Army Transformation is to examine holistically the contribution of platforms to force effectiveness. This project provides lethality and survivability data of potential systems in the Stryker and Future Forces to achieve symmetric mix of force effectiveness. The analysis is integrated across all battlefield threats (i.e., conventional ballistic, electronic warfare, information warfare and directed energy). The results are used by each Program Manager (PM) and the Program Executive Officer (PEO) to direct weapon system development efforts and structure product improvement programs; by the Army Test and Evaluation Command's Army Evaluation Center (ATEC/AEC) when they provide system evaluations in support of milestone decisions; by the user to develop survivability/lethality requirements, doctrine and tactics; and by decision makers in formulating program/production decisions.

Additionally this project supports specialized survivability analysis, information warfare (IW), and information operations (IO) of Army communications, electronic equipment and digitized forces against friendly and enemy threats. Provides field threat environment support for Electronic Warfare Vulnerability Analysis (EWVA). Analyzes vulnerabilities of foreign threat weapons and command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) and Intelligence Electronic Warfare (IEW) systems to U.S. Army Electronic Warfare (EW) systems. Provides threat weapon electronic design data to countermeasure developers and technical capability information to the intelligence community. Supports Army initiatives in vulnerability reduction of C4I/IEW systems against battlefield threats, including IW. Provides analysis for understanding potential vulnerabilities of Digitized Force developmental systems. Supports Army Warfighting Experiments and associated Information Operations Vulnerability Assessments for Digitized Force Architecture. Supports vulnerability analysis of situational awareness data of the Transformation Force.

Analysis includes survivability and vulnerability analysis of ground systems of the Stryker and Future Force for Army Transformation and other Army ground combat systems; Army air defense and missile defense systems; Army aviation systems and Unmanned Aerial Vehicles (UAV); Army fire support weapons (smart and conventional); Horizontal Technology Integration systems, Advanced Technology Demonstration initiatives, and proposed survivability enhancements to weapon platforms.

<u>Accomplishments/Planned Program:</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>
Completed non-ballistic survivability/lethality analysis for Stryker variants/configurations. Conduct Stryker Mobile Gun System and Nuclear, Biological and Chemical Reconnaissance vehicle Live Fire Test and Evaluation (LFT&E) and non-ballistic survivability analysis. For these two variants, provide pre-shot predictions, perform damage assessments after live fire tests, post-shot analyses and provide technical data required by ATEC for the Systems Evaluation reports. Completed baseline crew survivability analysis for Tactical Wheeled Vehicle (TWV) variants/configurations. Conduct crew survivability analysis for Tactical Wheeled Vehicle variants/configurations in support of the Long Term Armor Strategy (LTAS) Live Fire Test and Evaluation (LFT&E). For the TWV variants, provide pre-shot predictions, perform damage assessments after live fire tests, post-shot analyses and provide technical data required by ATEC for the Systems Evaluation Reports. Conducted integrated survivability, lethality, and vulnerability analyses for Army			

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Future Combat Systems. More information continued into the next box of text below...			
continued from above... Initiate modeling, analysis and simulation efforts supporting the FCS program, to include Active Protection Systems and FCS Lethality. Contribute to the Development of the System of Systems analysis methodology for Unit of Action survivability. Investigate the vulnerability/survivability implications of FCS advanced technologies including new armors and hybrid electric propulsion systems. Develop the methodologies necessary to support the characterization and assessment of FCS platforms equipped with these systems. Aid FCS platform designers and technology suppliers to enhance the survivability of these technologies. Identify and manage Soldier Survivability related issues during FCS system design to include fratricide prevention and crew protection. Support the planning and execution of the ballistic vulnerability and Title 10 LFT&E programs on the FCS, in conjunction with ATEC and Director, Operational Test & Evaluation (DOT&E). Provided survivability analysis for the functional analysis/functional decomposition effort for development of the FCS system of system specification. Provided analytical data and expertise for the system functional review and the initial preliminary design review. In FY07, produced vulnerability data for Manned Ground Vehicle (MGV), Armed Recovery Vehicle (ARV) and UAVs to support the Army Materiel Systems Analysis Activity certification of the Design Concept Baseline, and provided real-time integrated support and teaming with the FCS MGV engineering design team to insure appropriate vulnerability reduction measures are implemented during the preliminary design process. In FY08 continue FCS MGV engineering design team support and participate in the Preliminary Design Review, provide analytical input in support of the TEMP Update, continue support to the network analysis effort. In FY09, support LFTE armor coupon testing continue FCS MGV engineering design team support and continue network analysis support.	12703	12518	12900
Conduct integrated survivability, lethality, and vulnerability analyses for aviation systems. Complete CH-47F LFT&E survivability evaluation. Prepare multi-threat survivability analysis data for CH-47F milestone C decision. Provide Blackhawk and Apache LFT&E support. Conduct EW vulnerability assessments for developmental U.S. Army munition systems such as Advanced Precision Kill Weapon System (APKWS), Intelligent Munition System (IMS) and Mid-Range Munition (MRM). Conduct ballistic survivability/lethality analysis for U.S. Army munitions systems to include APKWS, Spider, XM 982 Excalibur, MRM, Precision Guided Mortar Munition (PGMM), Guided Multiple Launch Rocket System (GMLRS) w/Dual Purpose Improved Conventional Munitions (DPICM), GMLRS Unitary, Compact Kinetic Energy Missile (CKEM) and Javelin pre-planned product improvement. Provide Global Positioning System jamming analysis for U.S. Army munition systems to include Excalibur, GMLRS w/DPICM and GMLRS Unitary. Conduct obscure and atmospheric effects survivability analysis for U.S. Army munitions systems.	6900	6900	6900
Conduct integrated electronic and IW effects survivability analysis on command and control systems, and various Army weapon platforms as they integrate C4ISR components with internal information/computer processors controlling automotive, flight, fire control and sensor functions. This effort supports the full set of Army Battle Command Systems: Force XXI Battle Command, Brigade & Below, Advanced Field Artillery Tactical Data System, Maneuver Control System, Forward Area Air Defense-C2I, All Source Analysis System, Combat Service Support Control System, and Advanced Missile Defense Warning System. Continue to expand IW vulnerability assessment program to determine exploitable weaknesses in the Digitized Forces (including FCS) and recommend mitigating solutions. Focus on processor components of the Stryker Force to determine the limitations of system performance in an IW threat environment. Conduct integrated electronic and IO survivability analysis for Army communications systems such as Warfighter Information Network-Tactical (WIN-T), the Near Term Digital Radio, Joint Tactical Radio System (JTRS), Single Channel Anti-Jam Man-Portable Terminal, Secure Mobile Anti-Jam Reliable Tactical Terminal and Single Channel Ground and Airborne Radio System Advanced System Improvement Program. Conduct integrated electronic and IO survivability analysis for C2 systems integral to air and missile defense systems. Conduct integrated electronic and IO survivability analysis for Global Positioning System components as they are integrated into Army munitions systems. Includes update of information warfare vulnerability database, and vulnerability analyses of Tactical Internet components to	13379	13528	14205

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radio frequency directed energy weapons (RFDEW). Develop modeling and simulation to examine impacts of EW and IW attacks on the survivability of FCS. Conduct EW and IW investigations of the HTRS design via supplied simulations and emulations.				
Conduct System of Systems Concept of Employment (SoSCOE) assessment and third assessment of JNN. BY 08 conduct EW & IO survivability testing and analysis of JTRS/WIN-T. By 09 perform analysis of preliminary survivability analysis of FCS networks. Conduct integrated survivability, lethality, vulnerability analyses for developmental air defense and missile defense systems, pre-planned product improvements of current systems, and recently fielded systems. Systems to be addressed include Ballistic Missile Defense System (BMDS), Terminal High Altitude Area Defense (THAAD), Patriot, Medium Extended Air Defense System (MEADS), Surface-Launched Advanced Medium-Range Air-to-Air Missile (SLAMRAAM), Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System (JLENS), and Sentinel. Provide interim survivability reports. Recommend survivability enhancements. Project also funds Anti-Radiation Missile (ARM) Counter-Arm efforts that assess threat technologies against THAAD and Ground-Based Midcourse Defense, Patriot, MEADS, and Forward Area Air Defense-C21 (FAAD-C21) ground based sensors. Includes work on Focal Plane Array Countermeasures (FPACM) (Project Agreement Partner: United Kingdom): Produce final assessment report for FPACM. Assist in transitioning to new FPACM agreement with the Air Force. Continue support of Missile Defense Agency's (MDA) Ballistic Missile Defense System (BMDS) through MDA Black Team participation which includes postulation of potential countermeasure threats, assessment of countermeasure impacts on BMDS systems and providing communications jamming and Information Assurance inputs to the Adversary Capability Document. Support development of BMDS Test Bed. Design and develop hardware to support the software research and development for the Patriot Advanced Capability-3 Seeker electronic countermeasures/electronic counter-countermeasures algorithms.	5337	5400	5500	
System of Systems Survivability Simulation - develop a System of Systems Survivability engineering model used with the Combined Arms and Support Task Force Evaluation Model (CASTFOREM) and its successor, Combat XXI. The System of Systems Survivability model provides details of how combat outcomes are dependent on understanding the way quality of military decision-making is conditioned by information flow on the battlefield. This model will advance the understanding of Information Operations and Information Warfare.	1200	1238	1561	
Complete engineering design, site preparation work and concrete pad construction for rotorcraft Survivability Assessment Facility. This is a congressional add. Not a new start.	3250	1600		
SBIR/STTR (DA deductions)		497		
Total	42769	41681	41066	

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<u>B. Program Change Summary</u>	FY 2007	FY 2008	FY 2009	
Previous President's Budget (FY 2008/2009)	43544	40343	41111	
Current BES/President's Budget (FY 2009)	42769	41681	41066	
Total Adjustments	-775	1338	-45	
Congressional Program Reductions		-262		
Congressional Rescissions				
Congressional Increases		1600		
Reprogrammings	-180			
SBIR/STTR Transfer	-595			
Adjustments to Budget Years			-45	

FY08 Congressional increase for Rotorcraft Survivability Assessment Facility (\$1.6 million).