

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2 Exhibit)

February 2002

BUDGET ACTIVITY
6 - Management support

PE NUMBER AND TITLE
0605604A - Survivability/Lethality Analysis

COST (In Thousands)	FY 2001 Actual	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
Total Program Element (PE) Cost	38326	34514	39200	42174	45324	38916	46136	Continuing	Continuing
670 EMERGING TECH SYSTEMS	8251	7481	382	336	331	321	311	0	38310
671 AIR DEF/MSL DEF SYSTEM	5790	5325	459	411	405	393	381	0	39172
672 AVIATION SYSTEMS	2753	2977	274	239	237	230	222	0	22048
675 ARMY SURVIVABILITY ANALYSIS & EVALUATION SUPPORT	11954	8487	37214	40402	43574	37218	44491	Continuing	Continuing
677 GROUND COMBAT SYSTEMS	4381	4698	373	330	326	317	308	0	36011
678 MUNITIONS SYSTEMS	4744	5065	448	410	406	393	381	0	35777
679 SOLDIER SYSTEMS	453	481	50	46	45	44	42	0	4372

A. Mission Description and Budget Item Justification: This Program Element (PE) funds activities and functions to conduct objective and integrated survivability and lethality analyses (SLA) on systems of the Interim and Objective Forces of Army Transformation and other major and designated non-major Army systems as appropriate. The analyses quantify the effects of electronic warfare (EW) and ballistic battlefield threats and meteorological conditions on Army individual soldiers and systems. This PE also funds vulnerability assessments of digitized systems for Force XXI. The work is accomplished through threat research, theoretical and engineering analyses, signature measurements, modeling, simulations, laboratory experiments, and field investigations. Activities in progress include assessment of the effects of atmospheric, passive countermeasures, tactics, lasers, high-power microwave, electro-optical/radio frequency (EO/RF) jammers, electromagnetic environment effects (E3), information warfare (IW), decoys, and conventional ballistics on Army soldiers and systems. The PE work efforts provide U.S. Army decision makers, materiel and combat developers, system users, and independent evaluators critical soldier and system survivability analyses that quantify the soldier/system's survivability effectiveness in battlefield threat environments. Recommendations are provided to the materiel and combat developers on how to mitigate soldier/system deficiencies and enhance their survivability. This survivability/lethality engineering analyses is required to support the Army's vision to move to lighter more deployable systems while maintaining effectiveness. The analysis is required to properly down-select the appropriate mix of technologies for future platforms of the Transformed Forces. The proper mix of lethality and survivability provides the required force effectiveness for the Transformation Force. This PE funds civilian salaries, travel, development and maintenance of equipment and facilities, general management, administrative and contractor support required for program execution. The U.S. Army Research Laboratory (ARL) Survivability/Lethality Analysis Directorate (SLAD) conducts this effort.

This PE provides support for all transition paths of the Transformation Campaign Plan (TCP).

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<u>B. Program Change Summary</u>	FY 2001	FY 2002	FY 2003
Previous President's Budget (FY2002 PB)	36905	27794	34558
Appropriated Value	37248	34794	0
Adjustments to Appropriated Value	0	0	0
a. Congressional General Reductions	0	-280	0
b. SBIR / STTR	-680	0	0
c. Omnibus or Other Above Threshold Reductions	0	0	0
d. Below Threshold Reprogramming	2100	0	0
e. Rescissions	-342	0	0
Adjustments to Budget Years Since FY2002 PB	0	0	4642
Current Budget Submit (FY 2003 PB)	38326	34514	39200

Change Summary Explanation: Funding: FY 2003 - Army funding increase provides survivability analysis support for Transformation Campaign Plan (+2204). Funding increase implements legislative change directing each agency to pay the full Government share of the accruing retirement costs of current Civil Service Retirement System (CSRS) employees and the accruing health care costs of all future Federal retirees (+2438).

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COST (In Thousands)		FY 2001 Actual	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
675	ARMY SURVIVABILITY ANALYSIS & EVALUATION SUPPORT	11954	8487	37214	40402	43574	37218	44491	Continuing	Continuing

A. Mission Description and Budget Item Justification: Beginning in FY 2003 funding was transferred into this project from other projects internal to this PE in order to more efficiently fund holistic survivability analysis needed for the Army's Transformation Campaign Plan and therefore should not be perceived as an unjustified growth for this project. 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, 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 Interim and Objective Forces to achieve symmetric mix of force effectiveness. The analysis is integrated across all battlefield threats (i.e., conventional ballistic, electronic warfare, and directed energy). The results are used by each Project Manager (PM) and the Program Executive Officer (PEO) to direct weapon system development efforts and structure product improvement programs; by the independent evaluator 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 survivability analysis, information warfare, and information operations 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 and intelligence (C4I) and Intelligence Electronic Warfare (IEW) systems to U.S. Army 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 information warfare. 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 Interim and Objective Force for Army Transformation and other Army ground combat; 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.

This PE provides support for all transition paths of the Transformation Campaign Plan (TCP).

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PROJECT

675**FY 2001 Accomplishments:**

- 1153 Conducted integrated electronic and information operations effects survivability analysis for U.S. Army command and control systems. Conducted information operations vulnerability analysis. This effort supports the Advanced Field Artillery Tactical Data System, Common Hardware and Software, Maneuver Control System, FAAD-C2I, All Source Analysis System, Combat Service Support Control System, FBCB2 (Applique), and Advanced Missile Defense Warning System.
- 1487 Conducted integrated electronic and information operations survivability analysis for U.S. Army communications systems such as Warfighter Integrated Network- Terrestrial, Single Channel Anti-jam Man Portable radio, Secure Mobile Anti-jam Reliable Tactical Terminal, the Near Term Digital Radio, Joint Tactical Radio System, and SINGARS ASIP, EPLR-VHSIC, SPITFIRE, GBS, and ISYSCON.
- 750 Expanded the current information warfare vulnerability assessment program to determine exploitable weakness in the Defense Information Infrastructure Common Operating Environment
- 650 Conducted integrated electronic and NBC effects survivability analysis for U.S. Army IEW systems such as the Enhanced Firefinder radar, Navigational Warfare Ground Positioning System (NAVWAR), Defense Advanced GPS Receivers (DAGR) and Prophet. Conducted information operations vulnerability analysis for these systems.
- 2500 Expanded Information Operations Vulnerability Survivability Analysis (IOVSA) system assessments beyond electronic warfare, malicious codes and hackers to include survivability of the First Digitized Corp (FDC), Brigade Combat Team, and other Army systems to directed energy and unintentional radiation/emissions deterrence.
- 5414 Established an initial set of IOVSA analytical tools, techniques and methodologies to address the shortfall of current tools that focus only on the functionality of a system. Improved tools and techniques will provide a rigorous approach to consider the impact of the threat not only on the physical system but also on decisions being made with the information that the system is providing.

Total 11954

FY 2002 Planned Program

- 4000 A new set of analytical tools, techniques and methodologies are being developed to address a shortfall in current IOVSA methodologies. Instead of focusing on only the IO threat to the functionality of a system, the new approach considers the impact of the threat on decisions being made with data that the information systems generates. These funds develop the format and logic content for the decision-making processes for each of the following: C2 node, DF weapons node, sensor node, and red tank node. Additionally, define, develop, and test a set of vulnerability metrics that measure vulnerabilities and susceptibilities for given C2 strategies and scenarios.

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FY 2002 Planned Program (Continued)

- 2064 Conduct limited integrated electronic and information operations effects survivability analysis for U.S. Army command and control systems. Conduct information operations vulnerability analysis. This effort supports the FBCB2 System, Advanced Field Artillery Tactical Data System, Maneuver Control System, FAAD-C2I, All Source Analysis System, the Information System Controller, Advanced Missile Defense Warning System and ABCS Foundation Products development.
- 1298 Conduct integrated electronic and information operations survivability analysis for U.S. Army communications systems such as Warfighter Integrated Network- Terrestrial, the Near Term Digital Radio, Joint Tactical Radio System, and SINCGARS ASIP, EPLR-VHSIC, MIDS, and TACLANE
- 579 Conduct integrated electronic and ballistic effects survivability analysis for U.S. Army IEW systems such as the ICIDS, Joint Tactical Terminal and GPS. Conduct information operations vulnerability analysis for these systems.
- 546 Continue information warfare vulnerability assessment program to further determine exploitable weakness in the Digitized Forces to include FCS and to recommend mitigating solutions. Focus on components of the FDD/FDC and determines the limitations of system performance in information warfare (IW) threat environment. Update of information warfare vulnerability database, and perform vulnerability analyses of selected Tactical Internet components to radio frequency directed energy weapons (RFDEW).

Total 8487

FY 2003 Planned Program

- 8143 Conduct integrated survivability, lethality, and vulnerability analyses on Army Transformation systems. Continue to support Interim Armored Vehicle (IAV) Live Fire Test and Evaluation (LFT&E) for the second set of variants/configurations (perform damage assessments, post-shot analyses and input to Independent Evaluation). Complete non-ballistic survivability/lethality analysis for the second group of IAV variants/configurations. Initiate LFT&E support for the third group of IAV variants/configurations (perform shot predictions, damage assessments, post-shot analyses and input to Independent Evaluation). Initiate survivability analyses for the third group of IAV variants/configurations. Initiate analysis of the Pre-Planned Product Improvements (P3I) of the IAVs.

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FY 2003 Planned Program (Continued)

- 10842 Conduct Information Operation Vulnerability Survivability Analysis. Conduct integrated electronic and information operations effects survivability analysis on command and control systems. This effort supports the full set of Army Battle Command Systems: FBCB2, Advanced Field Artillery Tactical Data System, Maneuver Control System, FAAD-C2I, All Source Analysis System, Combat Service Support Control System, and Advanced Missile Defense Warning System. Continue to expand information warfare vulnerability assessment program to determine exploitable weakness in the Digitized Forces (including FCS) and recommend mitigating solutions. Focus on components of the FDC and determine the limitations of system performance in information warfare (IW) threat environment. Conduct integrated electronic and information operations survivability analysis for U.S. Army communications systems such as Warfighter Integrated Network- Terrestrial, the Near Term Digital Radio, Joint Tactical Radio System, and SINCGARS ASIP, EPLR-VHSIC. Includes update of information warfare vulnerability database, and vulnerability analyses of Tactical Internet components to radio frequency directed energy weapons (RFDEW).
- 5511 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 Ground-based Missile Defense (GMD), Theater High Altitude Air Defense (THAAD), Patriot, Medium Extended Air Defense System (MEADS) and SHORAD. Provide interim survivability reports. Recommend survivability enhancements. Project also funds Anti-Radiation Missile (ARM) Counter-Arm efforts that assess threat technologies against THAAD and GMD, Patriot, MEADS, and Forward Area Air Defense-C21 (FAAD-C21) ground based sensors. Includes work on Focal Plane Array Countermeasures (FPACM) (Partner: United Kingdom): Continue characterization and assessment of advanced focal plane array missile seekers and develop electronic countermeasures (ECM) to defeat them through simulation, modeling and lab testing. Conduct lab and field investigations to refine countermeasure techniques.
- 7043 Conduct integrated survivability, lethality, and vulnerability analyses for Army Modernization/Recapitalization systems. Complete Abrams SEP Configuration laser susceptibility assessments. 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 electronic warfare vulnerability assessments for developmental U.S. Army munition systems such as ATACMS, BAT P3I, TOW Fire and Forget, Longbow Hellfire P3I, Modernized HELLFIRE/Common Missile, WAM PIP and TERM. Conduct ballistic survivability/lethality analysis for U.S. Army munitions systems to include BAT P3I, TOW Fire and Forget, TERM, LOSAT, Guided MLRS, Modernized HELLFIRE/Common Missile, WAM PIP and M829. Conduct obscurant and atmospheric effects survivability analysis for U.S. Army munitions systems.
- 5675 Conduct integrated survivability, lethality, and vulnerability analyses for Army Future Combat System (FCS) and Objective Force systems. Initiate modeling, analysis and simulation efforts supporting the second phase of FCS program, to include Active Protection Systems (APS), FCS Lethality, FCS Counter APS, FCS Materials Analysis, and ballistic projection of FCS new armors. Further support FCS program by providing documentation and briefings on survivability of concepts in support of the milestone B Defense Acquisition Board process. Continue Comanche Army qualification tests.

Total 37214