

PE NUMBER: 0605604A

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PE TITLE: Survivability/Lethality Analysis

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

COST (In Thousands)	FY 1997 Actual	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	Cost to Complete	Total Cost
Total Program Element (PE) Cost	29362	31308	30498	16363	18744	19467	20256	Continuing	Continuing
D670 Emerging Technology Systems	4568	5115	5759	2583	3055	3171	3298	Continuing	Continuing
D671 Air Defense/Missile Defense Systems	5443	5742	5779	3220	3643	3785	3940	Continuing	Continuing
D672 Aviation Systems	3507	3220	3174	1877	2027	2104	2188	Continuing	Continuing
D675 Force XXI and C4I/IEW Systems	4709	4362	4033	2227	2625	2728	2841	Continuing	Continuing
D677 Ground Combat Systems	5007	5030	5403	2920	3376	3510	3656	Continuing	Continuing
D678 Munitions Systems	5365	5440	5615	3115	3569	3706	3855	Continuing	Continuing
D679 Soldier Systems	763	800	735	421	449	463	478	Continuing	Continuing
D734 Survivability Evaluation	0	1599	0	0	0	0	0	Continuing	Continuing

NOTE: Starting in FY 1999 funding for Project D734 Survivability Evaluation has been transferred to newly established PE 0605716A Army Evaluation Center under US Army Operational Test and Evaluation Command (OPTEC) to perform the Army's newly consolidated developmental and operational evaluation function in support of the materiel acquisition process.

Mission Description and Budget Item Justification: This Program Element (PE) funds activities and functions to conduct objective and integrated survivability and lethality analyses (SLA) for all major and designated non-major Army systems. The analyses quantify the effects of electronic warfare (EW), ballistic, nuclear, chemical, and biological 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 smokes and obscurants, passive countermeasures, tactics, lasers, high-power microwave, electro-optical/radio frequency (EO/RF) jammers, electromagnetic environment effects (E3), information warfare (IW), decoys, conventional ballistics and nuclear/biological/chemical (NBC) effects on Army soldiers and systems. The PE work efforts provide U.S. Army decision makers, materiel and combat developers,

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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 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. Effective in FY 1998, all ARL Survivability/Lethality Analysis Directorate (SLAD) evaluation functions in support of survivability/lethality testing will be financed through Project D734 under the direction of OPTEC. This PE supports Headquarters, Department of the Army (HQDA), Program Executive Offices (PEOs), Program Managers (PMs), and independent evaluators with EW, chemical, biological, nuclear, and ballistic expertise to conduct special studies, support Test Integration Working Groups (TIWG) and program reviews, review acquisition documentation, provide government testers with technical support, and support milestone decision reviews; and is appropriately funded in Budget Activity 6.

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PROJECT
D670

COST (In Thousands)	FY 1997 Actual	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	Cost to Complete	Total Cost
D670 Emerging Technology Systems	4568	5115	5759	2583	3055	3171	3298	Continuing	Continuing

A. Mission Description and Justification: Project D670 - Emerging Technology Systems: This project performs integrated survivability/lethality analyses for the category of systems which include Horizontal Technology Integration systems, Advanced Technology Demonstration initiatives, and proposed survivability enhancements to weapon platforms. Survivability deficiencies are identified, and recommendations are made to Program Executive Officers and Program Managers (PEOs/PMs) to provide hardening fixes early in program development. Work is accomplished through threat research, theoretical & engineering analyses, laboratory experiments, models, simulations, and field investigations. This effort also supports HQDA, independent evaluators, and PEOs/PMs with technical expertise in electronic warfare (EW), ballistics, chemical/biological contamination & decontamination, and meteorology to conduct special studies and to support Test Integration Working Groups (TIWGs), weapon system program reviews, acquisition documentation reviews, and Government testers. This project also provides oversight of the Army's Electromagnetic Environmental Effects (E3) Program. Horizontal Technology Integration systems include 2nd Generation FLIR (2nd GEN FLIR), Battlefield Combat Identification System (BCIS), Global Positioning System (GPS), and Enhanced Position Location Reporting System (EPLRS). Advanced Technology Demonstration initiatives include Battlefield Combat Identification (BCID), Composite Armored Vehicle (CAV), Target Acquisition, Hit Avoidance, Direct Fire Lethality, and Future Scout & Cavalry System (FCSC). Proposed survivability enhancements to weapon platforms include advanced armament technologies, defensive aide suites (DAS), missile countermeasure devices (MCD), emerging propellant technologies, advanced propulsion systems, advanced electronics, and improved spall liners in combat vehicles.

FY 1997 Accomplishments:

- 2306 Conducted EW vulnerability assessments to support integrated survivability and lethality analyses of emerging technology systems and horizontal technology applications. Developed necessary test beds to conduct laboratory and field investigations, and prepare interim survivability analysis reports. Supported the Army's E3 program.
 - 1382 Conducted ballistic effects investigations, developed system description models, performed damage simulations, and collected experimental data to support integrated survivability and lethality analysis reports.
 - 880 Conducted engineering investigations addressing nuclear hardening and survivability, chemical and biological warfare contamination and decontamination, and dirty battlefield conditions to support integrated survivability/lethality analyses of emerging technology systems and horizontal technology applications. Developed necessary test beds to conduct laboratory and field investigations, and prepared interim survivability analysis reports.
- Total 4568

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PROJECT
D670

FY 1998 Planned Program:

- 2512 Perform integrated EW survivability and lethality investigations and analyses of emerging technology systems, including performance predictions of hit avoidance concepts (laser/missile warning receivers, decoys, obscurants) & the effect of obscured atmosphere on the propagation of missile plume signatures for defensive aided suites, and recommendations for Electronic Counter Counter Measure (ECCM) enhancements. Support the Army's E3 program, and provide E3 shielding implications for composite materials for a ground system in development.
 - 1370 Perform ballistic effects investigations and survivability/lethality analyses of emerging technology systems, including the residual aerodynamic & structural properties of damaged composite rotary blades, the residual performance of novel vehicle drive trains & electro-optical components, blast effects of select mines, and vulnerabilities with Army's air fleet's transition to JP-8 fuel.
 - 1105 Provide engineering-based predictions of chemical and biological warfare contamination & decontamination and dirty battlefield conditions to support integrated survivability/lethality analyses of emerging technology systems and horizontal technology applications. Complete model to predict chemical infiltration hazards to crew & equipment inside a combat vehicle, and predict the effects of chemical agents & decontaminates on materials to obviate the need for testing all new candidate materials.
 - 128 Small Business Innovative Research/Small Business Technology Transfer Programs
- Total 5115

FY 1999 Planned Program:

- 3047 Conduct EW vulnerability investigations and analyses to support integrated survivability and lethality analyses of advanced 2nd and 3rd generation emerging technology and horizontal technology applications. Prepare interim survivability analysis reports
 - 1463 Perform ballistic effects investigations and survivability/lethality analyses of candidate emerging technologies most influential on future system designs, including advanced armors (such as active protection systems), advanced armaments (such as electric armaments and electro thermal chemical), advanced propellants, and advanced vehicle propulsion. Prepare interim survivability analysis reports.
 - 1249 Conduct vulnerability analysis of Army's digitized battlefield systems to radio frequency (RF) weapons. Identify possible countermeasure to threat RF weapons. Support the Army E3 program, and expand E3 predictive capabilities for other composite materials.
- Total 5759

B. Project Change Summary

	<u>FY 1997</u>	<u>FY 1998</u>	<u>FY 1999</u>
FY 1998/1999 President's Budget	4776	5278	4759
Appropriated Value	4879	5278	
Adjustments to Appropriated Value	-311	-163	
FY 1999 President's Budget	4568	5115	5759

Change Summary Explanation: Funding - FY 99 Funds (+1000) - funding provides support for vulnerability analysis of digitized force against Radio Frequency Weapons.

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PROJECT
D671

COST (In Thousands)	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	Cost to Complete	Total Cost
	Actual	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate		
D671 Air Defense/Missile Defense Systems	5443	5742	5779	3220	3643	3785	3940	Continuing	Continuing

A. Mission Description and Justification: Project D671 - Air Defense/Missile Defense Systems: Provides the survivability/lethality analysis of U.S. Army air defense and missile defense systems to the full spectrum of battlefield threats and recommends fixes to improve their battlefield survivability. 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. Anti-Radiation Missile (ARM) Counter-Arm efforts assess threat technologies against, THAAD and National Missile Defense (NMD), PATRIOT, Medium Extended Air Defense System (MEADS), and FAAD-C21 ground based sensors. Also funds salaries, travel, equipment/facilities, and management/administrative support needed to execute the program.

FY 1997 Accomplishments:

- 3025 Conducted electronic warfare vulnerability assessments for PATRIOT, Stinger, Sentinel, LINEBACKER, THAAD and National Missile Defense (NMD) in development, undergoing P3I, or have been recently fielded.
 - 755 Conducted chemical, biological, nuclear, and atmospheric effects survivability analysis for U.S. Army air defense and missile defense systems.
 - 864 Conducted ballistic survivability/lethality analysis for U.S. Army air defense and missile defense systems.
 - 250 Provided integrated survivability/lethality analyses to support scheduled air defense/missile defense program decision milestones in FY 97.
 - 549 Supported Consolidated Army Evaluation Function.
- Total 5443

FY 1998 Planned Program:

- 3507 Conduct electronic warfare vulnerability/survivability analysis and assessment of U.S. Army air defense and missile defense systems that are in development, undergoing P3I, or have been recently fielded to include PATRIOT, MEADS, Stinger, GBS, LINEBACKER, THAAD, and NMD.
 - 761 Conduct chemical, biological, nuclear, and atmospheric effects survivability analysis for U.S. Army air defense and missile defense systems.
 - 955 Conduct ballistic survivability/lethality analysis for U.S. Army air defense and missile defense systems.
 - 375 Provide integrated survivability/lethality analyses to support scheduled air defense/missile defense program decision milestones in FY 98.
 - 144 Small Business Innovative Research/Small Business Technology Transfer Programs
- Total 5742

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 EXHIBIT)

PROJECT
D671

FY 1999 Planned Program:

- 3629 Conduct electronic warfare vulnerability assessments for developmental U.S. Army air defense and missile defense systems, pre-planned product improvements of current systems, and recently fielded systems. Provide interim susceptibility reports. Recommend ECCM enhancements.
 - 900 Conduct chemical, biological, nuclear, and atmospheric effects survivability analysis for U.S. Army air defense and missile defense systems.
 - 950 Conduct ballistic survivability/lethality analysis for U.S. Army air defense and missile defense systems.
 - 300 Provide integrated survivability/lethality analyses to support scheduled air defense/missile defense program decision milestones in FY 99.
- Total 5779

B. Project Change Summary

	<u>FY 1997</u>	<u>FY 1998</u>	<u>FY 1999</u>
FY 1998/1999 President's Budget	5687	5950	5779
Appropriated Value	5818	5950	
Adjustments to Appropriated Value	-375	-208	
FY 1999 President's Budget	5443	5742	5779

Change Summary Explanation: Funding: FY1998 funds decreased (-208) for undistributed Congressional reductions.

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PROJECT
D672

COST (In Thousands)	FY 1997 Actual	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	Cost to Complete	Total Cost
D672 Aviation Systems	3507	3220	3174	1877	2027	2104	2188	Continuing	Continuing

A. Mission Description and Justification: Project D672 - Aviation Systems: Project investigates the Survivability/Lethality/Vulnerability (SLV) of Army aviation systems to the full spectrum of battlefield threats. Aircraft SLV deficiencies are identified and hardening recommendations identified as appropriate. SLV analysis directly supports major decision milestone reviews, acquisition documentation, test and evaluation master plans, and cost/operational effectiveness analyses.

FY 1997 Accomplishments:

- 1894 Conducted electronic warfare (EW) and countermeasures vulnerability assessment AH-64D Longbow Apache, OH-58D Kiowa Warrior, MH-60K & MH-47E Special Operations Aircraft (SOA) which are in development, undergoing P3I, or have been recently fielded. Conducted assessment of RAH-66 Comanche to projected EW threats.
 - 510 Completed ballistic survivability/lethality analysis for Longbow Apache and SOA.
 - 555 Conducted chemical, biological, nuclear, and atmospheric effects survivability analysis for Comanche, MH-60K, SOA, and Kiowa Warrior.
 - 548 Supported Consolidated Army Evaluation Function with Live Fire strategy formulation.
- Total 3507

FY 1998 Planned Program:

- 1776 Perform electronic warfare vulnerability analysis and assessment of U.S. Army aviation systems and aviation support equipment to include: AH-64D Longbow Apache; RAH-66 Comanche; Suite of Integrated RF Countermeasures; Suite of Integrated IR Countermeasures.
 - 690 Complete ballistic survivability/lethality analysis of UH-60Q Ambulance and Comanche. Conduct ballistic vulnerability analysis of Improved Cargo Helicopter (ICH)
 - 673 Conduct the chemical, biological, nuclear, and atmospheric effects survivability analysis for Comanche and Longbow Apache.
 - 81 Small Business Innovative Research/Small Business Technology Transfer Programs
- Total 3220

FY 1999 Planned Program:

- 1695 Continue electronic warfare vulnerability assessment for aviation systems and aviation support equipment that are in development, undergoing P3I, or have been recently fielded, including AH-64D Longbow Apache, RAH-66 Comanche, CH-47D Chinook, Suite of Integrated RF Countermeasures, and Suite of Integrated IR Countermeasures. Provide susceptibility reports. Provide electronic counter-countermeasures recommendations.
- 798 Conduct the ballistic survivability/lethality analysis for Comanche and ICH.
- 681 Complete chemical, biological, nuclear, and atmospheric effects survivability analysis for Comanche and aviation support systems.

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PROJECT
D672

Total 3174

B. Project Change Summary

	<u>FY 1997</u>	<u>FY 1998</u>	<u>FY 1999</u>
FY 1998/1999 President's Budget	3660	3323	3174
Appropriated Value	3739	3323	
Adjustments to Appropriated Value	-232	-103	
FY 1999 President's Budget	3507	3220	3174

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

PROJECT
D675

COST (In Thousands)	FY 1997 Actual	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	Cost to Complete	Total Cost
D675 Force XXI and C4I/IEW Systems	4709	4362	4033	2227	2625	2728	2841	Continuing	Continuing

A. Mission Description and Justification: Project D675 – Force XXI & C4I/IEW Systems: Supports survivability analysis, information warfare, and information operations of Army communications, electronic equipment and Digitized Force against the full spectrum of 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 the full spectrum of battlefield threats, including information warfare. Provides analysis for understanding potential vulnerabilities of digitized Force XXI developmental systems. Supports Army Warfighting Experiments and associated Information Operations Vulnerability Assessments for Force XXI Architecture.

FY 1997 Accomplishments:

- 1421 Conducted integrated electronic, ballistic, and chemical/biological/nuclear/atmospheric effects survivability analysis for U.S. Army command and control systems. This effort supported the Advanced Field Artillery Tactical Data System, Common Hardware and Software, Maneuver Control System, FAAD-C2I, Standard Integrated Command Post Shelter, All Source Analysis System, Combat Service Support Control System and Force Battle Command Brigade and Below (FBCB2) (Applique).
 - 1330 Conducted integrated electronic, ballistic, and chemical/biological/nuclear/atmospheric effects survivability analysis for U.S. Army communications systems on SINCGARS, EPLRSGPS, Mobile Subscriber Equipment, Single Channel Anti-jam Man Portable radio, Secure Mobile Anti-jam Reliable Tactical Terminal, Next Tactical Data Radio, and Enhance Manpack UHF Terminal.
 - 1433 Conducted integrated electronic, ballistic, and chemical/biological/nuclear/atmospheric effects survivability analysis for U.S. Army IEW systems -- BCIS, Joint Surveillance Target Attack Radar System/Ground Station Module, improved FLIR, and enhanced Firefinder radar.
 - 113 Provided integrated survivability/lethality analyses to support OPTEC for scheduled C4I/IEW systems program decision milestones in FY 97.
 - 412 Supported Consolidated Army Evaluation Function.
- Total 4709

FY 1998 Planned Program:

- 1915 Conduct integrated electronic, ballistic, and chemical/biological/nuclear/atmospheric effects survivability analysis for U.S. Army command and control systems. Conduct information operations vulnerability analysis. This effort supports the Advanced Field Artillery Tactical Data System, Common Hardware and Software, Maneuver Control System, FAAD-C2I, Standard Integrated Command Post Shelter, All Source Analysis System, Combat Service Support Control System and FBCB2 (Applique).

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PROJECT
D675

FY 1998 Planned Program (continued)

- 1400 Conduct integrated electronic, ballistic, and chemical/biological/nuclear/atmospheric effects survivability analysis for U.S. Army communications systems such as SINCGARS, EPLRS, GPS, Mobile Subscriber Equipment, Single Channel Anti-jam Man Portable radio, Secure Mobile Anti-jam Reliable Tactical Terminal, and the Next Tactical Data Radio.
 - 738 Conduct integrated electronic, ballistic, and chemical/biological/nuclear/atmospheric effects survivability analysis for U.S. Army IEW systems such as the BCIS, Joint Surveillance Target Attack Radar System/Ground Station Module and 2nd Generation FLIR enhanced Firefinder radar.
 - 200 Provide integrated survivability/lethality analyses to support scheduled C4I/IEW systems program decision milestones in FY 98.
 - 109 Small Business Innovative Research/Small Business Technology Transfer Programs
- Total 4362

FY 1999 Planned Program:

- 1705 Conduct integrated electronic, ballistic, and chemical/biological/nuclear/atmospheric effects survivability analysis for U.S. Army command and control systems. Conduct information operations vulnerability analysis. This effort supports the Advanced Field Artillery Tactical Data System, Common Hardware and Software, Maneuver Control System, FAAD-C2I, Standard Integrated Command Post Shelter, All Source Analysis System, Combat Service Support Control System, and FBCB2 (Applique).
 - 1405 Conduct integrated electronic, ballistic, and chemical/biological/nuclear/atmospheric effects survivability analysis for U.S. Army communications systems such as Mobile Subscriber Equipment, Single Channel Anti-jam Man Portable radio, Secure Mobile Anti-jam Reliable Tactical Terminal, and the Next Tactical Data Radio.
 - 776 Conduct integrated electronic, ballistic, and chemical/biological/nuclear/atmospheric effects survivability analysis for U.S. Army IEW systems such as the BCIS, Joint Surveillance Target Attack Radar System/Ground Station Module, and enhanced Firefinder radar.
 - 147 Provide integrated survivability/lethality analyses to support scheduled C4I/IEW systems program decision milestones in FY 99.
- Total 4033

B. Project Change Summary

	<u>FY 1997</u>	<u>FY 1998</u>	<u>FY 1999</u>
FY 1998/1999 President's Budget	4921	4501	4033
Appropriated Value	5027	4501	
Adjustments to Appropriated Value	-313	-139	
FY 1999 President's Budget	4714	4362	4033

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PROJECT
D677

COST (In Thousands)	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	Cost to	Total Cost
	Actual	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Complete	
D677 Ground Combat Systems	5007	5030	5403	2920	3376	3510	3656	Continuing	Continuing

A. Mission Description and Justification: Project D677 - Ground Combat Systems: Project investigates the survivability and vulnerability of Army ground combat systems to the full spectrum of battlefield threats. Analysis will support weapon requirements, test and evaluation master plans, cost/operational effectiveness analysis, and major milestone decisions.

FY 1997 Accomplishments:

- 1073 Conducted the electronic warfare vulnerability assessment for Crusader, Bradley A3, Command and Control Vehicle, ABRAMS M1A2, Breacher, Heavy Assault Bridge.
 - 1747 Conducted the ballistic survivability/lethality analysis for U.S. Army ground combat systems; supported Future Scout Cavalry System decision reviews.
 - 1202 Conducted the chemical, biological, nuclear, and atmospheric effects survivability analysis for U.S. Army ground combat systems.
 - 209 SLAD2000 pilot program. Developed methodology for support of integrated analyses – Defense Aided Suite Program.
 - 227 Supported susceptibility analyses of survivability suite components for ground combat systems.
 - 549 Supported Consolidated Army Evaluation Function.
- Total 5007

FY 1998 Planned Program:

- 1234 Conduct integrated electronic warfare vulnerability analysis and assessment of U.S. Army ground combat systems – Future Scout Cavalry System, Crusader, Bradley A3, Command and Control Vehicle, ABRAMS M1A2, Breacher. Provide interim susceptibility reports. Recommend EW survivability enhancements.
 - 2072 Conduct the ballistic survivability/lethality analysis for U.S. Army ground combat systems.
 - 1340 Conduct the chemical, biological, nuclear, and atmospheric effects survivability analysis for U.S. Army ground combat systems.
 - 258 Provide integrated survivability/lethality analyses to support scheduled ground combat systems program decision milestones in FY 98.
 - 126 Small Business Innovative Research/Small Business Technology Transfer Programs
- Total 5030

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PROJECT
D677

FY 1999 Planned Program:

- 1410 Conduct the electronic warfare vulnerability assessment for U.S. Army ground combat systems such as Crusader, Bradley A3, Command and Control Vehicle, ABRAMS 2000, Breacher.
 - 2318 Conduct the ballistic survivability/lethality analysis for U.S. Army ground combat systems.
 - 1405 Conduct the chemical, biological, nuclear, and atmospheric effects survivability analysis for U.S. Army ground combat systems.
 - 270 Provide integrated survivability/lethality analyses to support scheduled ground combat systems program decision milestones in FY 99.
- Total 5403

B. Project Change Summary

	<u>FY 1997</u>	<u>FY 1998</u>	<u>FY 1999</u>
FY 1998/1999 President's Budget	5225	5190	5403
Appropriated Value	5337	5190	
Adjustments to Appropriated Value	-330	-160	
FY 1999 President's Budget	5007	5030	5403

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PROJECT
D678

COST (In Thousands)	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	Cost to	Total Cost
	Actual	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Complete	
D678 Munitions Systems	5365	5440	5615	3115	3569	3706	3855	Continuing	Continuing

A. Mission Description and Justification: Project D678 - Munitions Systems: This project funds the investigation of the lethality/vulnerability of Army fire support smart weapons (smart and conventional) to the full spectrum of battlefield threats. The analysis is integrated across all battlefield threats, i.e., conventional ballistic, electronic warfare, directed energy, nuclear weapons effects, and nuclear and chemical/biological contamination effects. This work is accomplished through theoretical and engineering analyses, signature measurements, modeling, simulations, laboratory experiments, and field investigations.

FY 1997 Accomplishments:

- 2253 Conducted integrated electronic warfare vulnerability assessment for advanced developmental U.S. Army conventional and smart munitions systems such as BAT, Hellfire Longbow Missile, Wide Area Mine, and Javelin and any associated pre-planned product improvement programs. Conducted electronic warfare vulnerability assessments of BAT P3I, STAFF, Enhanced Fiber Optic Guided Missile (EFOG-M), Follow on to Tube launched Optically tracked Wired guided munition (FOT TOW), and Multiple Launch Smart Tactical Rocket (MSTAR).
 - 930 Conducted the ballistic survivability/lethality analysis for U.S. Army munitions systems.
 - 813 Conducted the chemical, biological, nuclear, and atmospheric effects survivability analysis for U.S. Army munitions systems.
 - 820 Provided integrated survivability/lethality analyses to support scheduled munitions systems program decision milestones in FY 97.
 - 549 Supported Consolidated Army Evaluation Function.
- Total 5365

FY 1998 Planned Program:

- 2569 Conduct the electronic warfare vulnerability assessment for developmental U.S. Army munitions systems and any associated P3I. Conduct electronic warfare countermeasure analysis/support for U.S. Army munitions to include FOT TOW, MSTAR, Precision Guided Mortar Munition (PGMM), and EFOG-M.
 - 1114 Conduct the ballistic survivability/lethality analysis for U.S. Army munitions systems.
 - 1220 Conduct the chemical, biological, nuclear, and atmospheric effects survivability analysis for U.S. Army munitions systems.
 - 400 Provide integrated survivability/lethality analyses to support scheduled munitions systems program decision milestones in FY 98.
 - 137 Small Business Innovative Research/Small Business Technology Transfer Programs
- Total 5440

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PROJECT
D678

FY 1999 Planned Program:

- 2642 Conduct the electronic warfare vulnerability assessment for U.S. Army munitions systems such as Army Tactical Missile System (ATACMS) with smart payloads such as BAT and BAT P3I, Hellfire-Longbow Missile, STAFF, Wide Area Mine (WAM)/WAM PIP, Javelin, EFOG-M, FOT TOW, Sense and Destroy Armor (SADARM) P3I, and MSTAR.
 - 1324 Conduct the ballistic survivability/lethality analysis for U.S. Army munitions systems.
 - 1249 Conduct the chemical, biological, nuclear, and atmospheric effects survivability analysis for U.S. Army munitions systems.
 - 400 Provide integrated survivability/lethality analyses to support scheduled munitions systems program decision milestones in FY 99.
- Total 5615

B. Project Change Summary

	<u>FY 1997</u>	<u>FY 1998</u>	<u>FY 1999</u>
FY 1998/1999 President's Budget	5609	5613	5615
Appropriated Value	5729	5613	
Adjustments to Appropriated Value	-364	-173	
FY 1999 President's Budget	5365	5440	5615

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

PROJECT
D679

COST (In Thousands)	FY 1997 Actual	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	Cost to Complete	Total Cost
D679 Soldier Systems	763	800	735	421	449	463	478	Continuing	Continuing

A. Mission Description and Justification: Project D679 - Soldier Systems: Supports individual-soldier related programs and material to maximize survivability and functionality under severe combat environments of chemical-biological warfare, nuclear, electronic and information warfare, countermeasures, directed energy and ballistics. Provides for technical investigations and analyses into the survivability of soldiers in various combat environments with many types of equipment. Provides administration of the MANPRINT Soldier Survivability (SSv) Domain. Broad areas addressed by SSv are: Fratricide reduction; soldier detectability reduction; attack prevention if detected; damage prevention; medical injury reduction; the reduction of mental and physical fatigue. The survivability of soldier systems is investigated and reported to milestone decision reviews.

FY 1997 Accomplishments:

- 392 Conducted integrated electronic, ballistic, and chemical/biological/nuclear/atmospheric effects survivability analysis for the U.S. Army Land Warrior System (Computer and Communication System, Weapon System, Protective Clothing and Individual Equipment, Chem/Bio Mask, and Integrated Headgear), Force XXI Land Warrior ACTD components and the Air Warrior System.
 - 85 Coordinated preparation and direct execution of MANPRINT Soldier Survivability Assessments and Reports.
 - 47 Sustained international soldier activities (NATO); provide chem/bio/physiology expertise for operations other than war and less-than-lethal efforts.
 - 102 Provided integrated survivability/lethality analyses to support scheduled soldier systems program decision milestones in FY 97.
 - 137 Supported Consolidated Army Evaluation Function through development of Survivability Criteria, Measure of Effectiveness, measures of Performance, and Data Elements.
- Total 763

FY 1998 Planned Program:

- 494 Conduct integrated electronic, ballistic, and chemical/biological/nuclear/atmospheric effects survivability analysis for the U.S. Army Land Warrior and Air Warrior Systems (Computer and Communication System, Weapon System, Protective Clothing and Individual Equipment, Chem/Bio Mask, and Integrated Headgear), Force XXI Land Warrior ACTD components, the Mounted Warrior System and Military Operations in Urban Terrain ACTD.
- 184 Coordinate preparation and direct execution of MANPRINT Soldier Survivability Assessments and Reports.
- 27 Sustainment of international soldier activities (NATO); provide chem/bio/physiology expertise for operations other than war and less-than-lethal efforts.
- 75 Provide integrated survivability/lethality analyses to support scheduled soldier systems program decision milestones in FY 98.
- 20 Small Business Innovative Research/Small Business Technology Transfer Programs

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 EXHIBIT)

PROJECT
D679

Total 800

FY 1999 Planned Program:

- 422 Conduct integrated electronic, ballistic, and chemical/biological/nuclear/atmospheric effects survivability analysis for the U.S. Army Land Warrior and Air Warrior Systems (Computer and Communication System, Weapon System, Protective Clothing and Individual Equipment, Chem/Bio Mask, and Integrated Headgear), Force XXI Land Warrior ACTD components, the Mounted Warrior System and Military Operations in Urban Terrain ACTD.
 - 166 Coordinate preparation and direct execution of MANPRINT Soldier Survivability Assessments and Reports.
 - 47 Sustainment of international soldier activities (NATO); provide chem/bio/physiology expertise for operations other than war and less-than-lethal efforts
 - 100 Provide integrated survivability/lethality analyses to support scheduled soldier systems program decision milestones in FY 99.
- Total 735

B. Project Change Summary

	<u>FY 1997</u>	<u>FY 1998</u>	<u>FY 1999</u>
FY 1998/1999 President's Budget	797	825	735
Appropriated Value	814	825	
Adjustments to Appropriated Value	-51	-25	
FY 1999 President's Budget	763	800	735

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PROJECT
D734

COST (In Thousands)	FY 1997 Actual	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	Cost to Complete	Total Cost
D734 Survivability Evaluation	0	1599	0	0	0	0	0	Continuing	Continuing

A. Mission Description and Justification: Project D734 - Survivability Evaluation: Effective in FY 1998, all U.S. Army Research Laboratory (ARL) Survivability/Lethality Analysis Directorate (SLAD) evaluation functions in support of survivability/lethality testing will be financed through Project D734 under the direction of the U.S. Army Operational Test and Evaluation Command (OPTEC). Starting in FY 1999 funding for Project D734 has been transferred to PE 0605716A Army Evaluation Center established under OPTEC to perform the Army's consolidated developmental and operational evaluation function. FY 1998 funding provides for evaluation of soldier and materiel system survivability into an integrated Army evaluation supporting decision-makers at milestone reviews. It includes the planning and coordination of developmental tests, experiments, and subsequent evaluation of results to determine system survivability in battlefield threat environments. Evaluators will develop the strategy and incorporate SLAD efforts to ensure that electronic warfare (EW), information warfare (IW), conventional ballistics, nuclear, chemical, biological, electromagnetic environmental effects (E3), atmospheric/obscuration and meteorological effects on soldier/system survivability are properly addressed. Evaluation results will be incorporated into a single Army evaluation and presented at all acquisition milestones.

FY 1997 Accomplishments: Project funded by SLAD under other projects in this PE.

FY 1998 Planned Program:

- 1559 Conduct integrated survivability evaluations for Army weapon systems and Automated Information Systems for major milestone decisions, materiel changes, and materiel releases in support of the Army Acquisition Executive and force development. Develop the evaluation strategy, design technical and operational tests and evaluate the test results to address the survivability and lethality factors pertinent to the decision process such as: soldier survivability, performance in countermeasures, system survivability. As the Army lead for Live Fire Test and Evaluation, plan and execute the Army Live Fire Test and Evaluation program for required developmental systems. Specific efforts include: conduct evaluations of Crusader, Armored Scout Vehicle (ASV), Army Tactical Missile System Block II (ATACMS Blk II), Hellfire, Longbow, Army TACMS Block II/BAT P3I (BAT P3I), FOT TOW, and Wide Area Munition (WAM) Milestone III results; prepare System Evaluation Plans for Multiple Launch Rocket System (MLRS A1), Bradley Fire Support Team (BFIST), Breacher, Bradley Fighting Vehicle System, Command and Control System (C2V), Command, Control, Communication, and Computer Systems (C4I), Suite of Integrated RF Countermeasures (SIRFCM), and Search and Destroy Armor (SADARM). Efforts include costs for 18 civilian authorizations.
 - 40 Small Business Innovative Research/Small Business Technology Transfer Programs
- Total 1599

FY 1999 Planned Program: Project consolidated under newly established PE 0605716A Army Evaluation Center under OPTEC.

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PROJECT
D734

B. <u>Project Change Summary</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>FY 1999</u>
FY 1998/1999 President's Budget	0	1650	1180
Appropriated Value	0	1650	
Adjustments to Appropriated Value	0	-51	
FY 1999 President's Budget	0	1599	0

Change Summary Explanation: Funding : FY 99 Funds (-1180) transferred to PE 0605716A Army Evaluation Center.