FY 2006/2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: Feb 2005
Exhibit R-2

BUDGET ACTIVITY: 03
PROGRAM ELEMENT: 0603640M
PROGRAM ELEMENT TITLE: MARINE CORPS ADVANCED TECHNOLOGY DEMONSTRATIONS (ATD)

COST: (Dollars in Thousands)

Project Number & Title	FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
Total PE	98,595	88,239	56,434	58,833	62,427	58,850	59,586	60,874
C2297	MARINE CORPS WARFIGHTING LAB-CORE							
	40,726	39,196	35,640	34,882	37,349	33,219	33,950	34,724
C9154	MC ANTI-TERRORIST/FORCE PROTECTION (AT/FP) ATDS							
	14,709	4,953	0	0	0	0	0	0
R2223	MARINE CORPS ATD							
	28,316	21,503	20,794	23,951	25,078	25,631	25,636	26,150
R2995	C3RP							
	3,747	4,656	0	0	0	0	0	0
R9290	EXPEDITIONARY WARFARE WATER PURIFICATION							
	5,405	11,391	0	0	0	0	0	0
R9333	CENTER OF EXCELLENCE FOR ROBOTICS, ADV TECH DEMO							
	1,345	0	0	0	0	0	0	0
R9334	RAPID REPAIR, PORTABLE PRODUCTION (R2P2)							
	961	0	0	0	0	0	0	0
R9444	ADVANCED MINE DETECTOR SYSTEM/MAN PORTABLE QUADRAPOLE RESONANCE LANDMINE DETECTION							
	3,386	2,576	0	0	0	0	0	0
R9485	CRAFT INTEGRATED ELECTRONIC SUITE (CIES)							
	0	991	0	0	0	0	0	0
R9486	EXCALIBER UNMANNED TACTICAL COMBAT VEHICLE							
	0	991	0	0	0	0	0	0
R9487	PORTABLE METHANOL FUEL CELL							
	0	991	0	0	0	0	0	0

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R9488	STUDY TO IDENTIFY AND EVALUATE ALTERNATIVE FIXED-WING LIFT PLATFORMS						
	0	991	0	0	0	0	0

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: As the land warfare component of Naval Expeditionary Forces, the Marine Corps has unique and technologically stressing requirements resulting from its amphibious mission, Marine Air-Ground Task Force (MAGTF) organizational structure, reliance on maneuver, logistic sustainability, and intensive tempo of operations in diverse environments. Critical Marine Corps requirements addressed in this program element (PE) are Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR); Maneuver; Logistics; Human Performance, Training and Education; and Firepower. These are ongoing efforts to develop and demonstrate advanced technologies and system concepts in an operational environment. Multiple transitions into the Sub-system/Component Advanced Development phase are planned, as well as fieldable prototyping to reduce risk in System Concept Development and Demonstration. Joint service efforts are in line with Defense Technology Objectives (DTOs) and Joint Warfighting Objectives (JWOs). In addition, Marine Corps operational experimentation, warfighting concept experimentation, and conceptual operational assessment of emerging technologies are funded. Specifically, this PE supports the following capabilities: promptly engaging regional forces in decisive combat on a global basis; responding to all other contingencies and missions in the full spectrum of combat operations (high, mid, and low intensity), in Military Operations in Urban Terrain (MOUT), in Operations Other than War (OOTW), and warfighting experimentation. This PE supports all of the Marine Corps mission areas. Within the Naval Transformation Roadmap, this investment will achieve one of three key transformational capabilities required by Sea Shield as well as technically enable the Ship to Objective Maneuver (STOM) and persistent Intelligence, Surveillance and Reconnaissance (ISR) key transformational capabilities within Sea Strike and the enhanced Sea-borne Positioning of Joint Assets within Sea Basing.

Due to the number of efforts in this PE, the programs described herein are representative of the work included in this PE.

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PROGRAM ELEMENT: 0603640M
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PROGRAM CHANGE SUMMARY:

	FY 2004	FY 2005	FY 2006	FY 2007
FY 2005 President's Budget Submission	90,110	58,222	60,506	59,393
Cong Rescissions/Adjustments/Undist. Reductions	0	-1,164	0	0
Congressional Action	0	31,200	0	0
Execution Adjustments	10,093	0	0	0
Non-Pay Inflation Adjustments	-80	0	330	443
Program Adjustments	0	-19	-5,482	-1,068
Rate Adjustments	0	0	1,080	65
SBIR Assessment	-1,528	0	0	0
FY 2006/2007 President's Budget Submission	98,595	88,239	56,434	58,833

PROGRAM CHANGE SUMMARY EXPLANATION:
Technical: Since the FY 2005 President’s Budget submission, Marine Corps Warfighting Laboratory (MCWL) experimentation goals for the Sea Viking 2004 (SV04) Advanced Warfighting Experiment (AWE) have been revised, as explained in the two following paragraphs.

MCWL’s Sea Viking (SV) campaign is designed to transform the 1997 STOM concept into an operational reality and couple it with the emerging Distributed Operations (DO) concept to reshape expeditionary capabilities in keeping with the Naval Transformation Roadmap. DO builds on MCWL efforts begun in 1995 (Hunter Warrior) where the Lab employed infantry squads, as DO teams, to locate and defeat a conventional mechanized infantry unit and continues the effort under the SV umbrella. A series of experiments will evaluate whether a properly equipped and trained DO platoon or squad sized unit operating independently can: locate, observe, and accurately report enemy activity; and engage enemy forces with indirect and direct supporting fires, aggregate from individual squad positions, to conduct platoon offensive operations, and survive in the dispersed battlespace.

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Schedule: C2297, MCWL: Worldwide contingency operations (i.e. Operation Iraqi Freedom (OIF) campaigns, humanitarian efforts, and others) have increased the operations tempo of United States (US) Operating Forces to the extent that their support of and participation in the MCWL AWEs Sea Viking 2004 and 2006 was substantially reduced. Events have been rescheduled and adjusted so that operational assessments may be conducted by operational units preparing to deploy to Iraq and subsequently in Iraq in order to accommodate troop availability.

BUDGET ACTIVITY: 03
PROGRAM ELEMENT: 0603640M PROGRAM ELEMENT TITLE: MARINE CORPS ADVANCED TECHNOLOGY DEMONSTRATIONS (ATD)
PROJECT NUMBER: C2297 PROJECT TITLE: MARINE CORPS WARFIGHTING LAB-CORE

COST: (Dollars in Thousands)

Project Number & Title	FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
C2297 MARINE CORPS WARFIGHTING LAB-CORE	40,726	39,196	35,640	34,882	37,349	33,219	33,950	34,724

*Congressional Enhancement Funding for Project Albert ($4,105 and $3,349) is discussed in the Plus-Ups section of this PE's R2 exhibit.

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: MCWL is the centerpiece experimental test bed for the operational enhancements of the Marine Corps. MCWL, augmented by other Marine units, as its "test bed" organization, demonstrates the usefulness and necessity of integrating advanced concepts and new technological developments into the Operational Forces of the Marine Corps. Performing in the Joint and Marine Corps arenas, MCWL focuses on developing, assessing, and field evaluations of future operational and technological concepts and serves as the focal point for the enhancement/refinement of future warfighting capabilities.

Real-time exercises held in existing environments being used to simulate campaign theater (wartime) experiences "live experimentation" permits exploration of prototype and surrogate technologies in order to better refine equipment requirements and to identify Doctrine, Organization, Training, Materiel, Leadership, Personnel, and Facilities (DOTMLPF) initiatives needed to produce future capabilities. The use of modeling and simulation (M&S), both conducted within Service wargaming and virtual experiment venues (conducted in partnership with the Navy and Joint Forces Command (JFCOM)) will provide both a necessary Joint context for the Marine Corps Expeditionary Force Development System process as well as the opportunity to explore the implications of proposed future programs on seabased power projection capabilities. MCWL experimentation encompasses inquiries into multiple warfighting areas, including: Command, Control, Communications, and Computers (C4); ISR; Fires, Targeting, and Maneuver; Seabasing, Logistics, Combat Service Support (CSS), and Combat in Cities; and Warfighting Excellence.

Using operational forces, MCWL conducts AWEs supported by Limited Objective Experiments (LOEs), Limited Technical Assessments (LTAs), Wargames, and Studies. AWEs, LOEs, and LTAs examine discrete variables in as much isolation as can be achieved. Technologies assessed in LTAs are incorporated in LOEs while LOEs are building blocks from which resulting AWEs are constructed, (e.g. the Sea Viking experimentation series).

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Under the guidance of the Commandant of the Marine Corps and in support of the Marine Corps Expeditionary Maneuver Warfare Capability List (ECL), MCWL's "build-up" phases culminate in actual AWE execution:

- Sea Viking 2004 (SV04): (FY 2002 through calendar year (CY) 2004) SV04 was a series of related events that constituted the overall Marine Corps Service Experimentation campaign through 2004. Its goals and objectives were based on guidance from the Commandant of the Marine Corps focusing on the seabased Marine Expeditionary Brigade (MEB), emphasizing execution of the Operational Maneuver from the Sea (OMFTS) and STOM concepts, in a Joint context. SV04 was significantly redefined in order to accommodate force deployments in support of OIF, with experimental objectives refocused on operational assessment by forward-deployed forces operating in highly dispersed units.
- Sea Viking 2006 (SV06): (FY 2005 through FY 2006) SV06 builds on the results, findings, and events of SV04 in order to further develop a true seabased capability within the context of emerging joint concepts. As with SV04, it uses an integrated "campaign" approach, is a key component of the Navy's Sea Trial process, and fully supports the Naval Transformation Roadmap. SV06 constitutes the principal exploratory effort into development of the future capabilities required for realization of the Naval Operational and Enhanced Network Seabasing concepts. In exploring the seabase, such issues as seabased fires are an integral part of joint fires in support of the expeditionary force conducting operational maneuvers. Live experimentation, both in simulated war zone and actual theater (i.e., Iraq) environments, permits both explorations of prototype and surrogate technologies in order to better refine equipment requirements and to identify DOTMLPF initiatives needed to produce future capabilities.

B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 2004	FY 2005	FY 2006	FY 2007
OPERATION IRAQI FREEDOM (OIF) SUPPORT	0	0	0	0

* $8,469 in FY 2004 AND $822 in FY 2005 are incorporated within the individual function areas where individual OIF II program efforts reside.

This section includes Operation Iraqi Freedom (OIF) II direct support costs only, through January 2005, in the following program areas: Over the Horizon/On the Move (OTH/OTM) Combat Operations Center (COC) communications support, Dust Palliative, Vehicle Hardening, Dragon Eye, Dragon Runner, Counter Shooter, BioSciences, Project Metropolis, Project Rifleman, Center for Emerging Threats and Opportunities (CETO), enhanced reconnaissance

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team, Telepresent Rapid Aiming Platform (TRAP), and miscellaneous micro purchases. Each of these programs is discussed within the applicable functional areas listed below.

	FY 2004	FY 2005	FY 2006	FY 2007
COMMAND, CONTROL, COMMUNICATIONS, COMPUTERS (C4)	12,646	8,570	10,332	9,677

This section encompasses all MCWL C4 related experimentation efforts.

FY 2004 Accomplishments:

- Continued experimental planning and C4 development support for the SV04 AWE.
- Initiated experimental planning and C4 development support for the SV06 AWE.
- Reduced development of information processing and further integration of capabilities into the C4 Lab facility.
- Redirected command and control (C2) integration and experimentation, to include Shared Net and Target Handoff System (Experimental) (THS(X)) efforts. Transitioned THS(X) to acquisition.
- Continued to conduct experiments and evaluate the performance of advanced C2 investigations and experiments for sea based C2 interoperability.
- Continued to evaluate the effectiveness of commercially available (off-the-shelf) technology for providing wireless connectivity to the tactical level.
- Expanded Over the Horizon (OTH) communications investigations in support of First Marine Expeditionary Force (I MEF) OIF deployment. These efforts centered on the overarching Expeditionary Tactical Communication System (ETCS) efforts coupled with OTM COC investigations.
- Completed initial technological assessment of an infantry battalion COC that is capable of operating OTM and deployable internally to helicopters and tilt-rotor aircraft in support of battalion level vertical assault operations.
- Continued experimentation and development of intra-squad radio systems.

FY 2005 Plans:

- Complete C4 planning and development support for the SV04 AWE.
- Continue C4 planning and development support for the SV06 AWE.
- Continue to develop information processing and to further integrate capabilities into the C4 Lab facility.

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- Continue to conduct experiments and evaluate the performance of advanced C2 capabilities to support sea based C2 interoperability.
- Continue to evaluate commercially available wireless connectivity technologies.
- Continue OTH and OTM COC communications investigations in support of I MEF and Second MEF (II MEF) OIF deployments.
- Initiate extended/comprehensive technological assessment of an infantry battalion COC.
- Continue experimentation and development of intra-squad radio systems.
- Initiate investigation of tactics, techniques, technologies, and procedures (TTTPs) to achieve common tactical picture (CTP) for the Marine Air-Ground Task Force (MAGTF) conducting STOM.
- Initiate investigation of TTTPs for fires C2 in order to simplify operations/training and enhance interoperability of Joint, Navy, and Marine Corps systems.
- Initiate DO efforts, as they relate to C2 functions.
- Further evaluate promising C4 concepts.

FY 2006 Plans:

- Complete C4 planning and development support for the SV06 AWE.
- Initiate C4 planning and development support for the next major AWE.
- Continue to develop information processing and to further integrate capabilities into the C4 Lab facility.
- Initiate development and assessment of prototype Naval C2 systems and supporting techniques and procedures needed to give seabased forces operating ashore access to seabased fires.
- Continue to evaluate commercially available wireless connectivity technologies.
- Continue development and initiation of operational assessment of prototype OTH and OTM communications systems in concert with the Office of Naval Research (ONR) in order to determine the Beyond Line of Site communications requirements to enable MAGTF C2 of seabased forces operating ashore, focusing on the requirements of dismounted operations.
- Continue experimentation and development of intra-squad radio systems.
- Continue development and begin operational assessment of an infantry battalion COC that is capable of operating OTM and deployable internally to helicopters and tilt-rotor aircraft in support of battalion level vertical assault operations.
- Continue investigation of TTTPs to achieve CTP for MAGTF conducting STOM.
- Continue investigation of TTTPs for fires C2 in order to simplify operations/training and enhance interoperability of Joint, Navy, and Marine Corps systems.
- Continue DO efforts based on the results of initial experimentation with C2 for DO. A deploying unit will

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be trained and equipped for an extended field user evaluation as part of a seabased MAGTF.
- Complete experiments and evaluation of the performance of advanced C2 capabilities to support sea based C2 interoperability.
- Further evaluate promising C4 concepts.

FY 2007 Plans:

- Continue C4 planning and development support for an upcoming AWE.
- Continue to develop information processing and to further integrate capabilities into the C4 Lab facility.
- Continue to develop and assess prototype Naval C2 systems and supporting techniques and procedures needed to give seabased forces operating ashore access to seabased fires.
- Continue to evaluate commercially available wireless connectivity technologies.
- Continue development of prototype OTH and OTM communications systems focusing on the requirements of both surface and vertical assault forces.
- Continue experimentation and development of intra-squad radio systems.
- Continue development of an infantry battalion COC and explore the requirements for Expeditionary Fighting Vehicle (EFV) (formerly Advanced Amphibious Assault Vehicle (AAAV)) and Light Armored Vehicle (LAV) platforms.
- Continue investigation of TTTPs to achieve CTP for MAGTF conducting STOM.
- Continue investigation of TTTPs for fires C2 in order to simplify operations/training and enhance interoperability of Joint, Navy, and Marine Corps systems.
- Initiate a second iteration of DO experimentation to include a refinement of C4 requirements that includes advanced automated tactical systems as well as expansion to the company level.
- Initiate investigation of C2 capabilities needed to effect sustainment of forces conducting STOM and sustainment operations ashore from a seabased MAGTF.
- Further evaluate promising C4 concepts.

	FY 2004	FY 2005	FY 2006	FY 2007
INTELLIGENCE, SURVEILLANCE, AND RECONNAISSANCE (ISR)	2,103	5,734	4,887	5,349

This section includes MCWL ISR related experimentation efforts involving enhanced reconnaissance; sensors; and unmanned ground and aerial vehicles.

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FY 2004 Accomplishments:

- Continued ISR support for the SV04 AWE.
- Initiated ISR planning for the SV06 AWE.
- Continued Dragon Eye Unmanned Aerial Vehicle (UAV) payload development, integration, experimentation, and refinement of tactics, techniques and procedures (TTPs). This included upgrades and repairs of damaged systems, being used in support of OIF. Dragon Eye is a back-packable system with modular payloads, designed to provide the small unit leader with an "over-the-hill" reconnaissance and surveillance capability.
- Continued Dragon Runner (DR) Mobile Ground Sensor (MGS) efforts. This included payload modification/multi-unit development efforts to integrate modified M203 launchers with an approved camera. Additional efforts included integration of an explosive material sensing device and trip wire detection unit to be mounted on the DR. These efforts not only support MCWL's experimentation program, but also support OIF efforts. DR is a ground mobile sensor (Unmanned Ground Vehicle (UGV)) that will be used by marine infantry battalions.
- Conducted efforts to support enhanced reconnaissance team functions, i.e., rifle and sight/scope evaluations used in support of OIF.
- Provided vehicles as surrogates for Internal Transportable Vehicles (ITVs) aboard cargo helicopters (CH)-53s, to better define the capabilities, configuration, and effective employment of the Vertical Maneuver Element (VME) concept.

FY 2005 Plans:

- Complete ISR support for the SV04 AWE.
- Continue ISR support for the SV06 AWE.
- Complete Dragon Eye UAV payload development, integration, experimentation, and refinement of TTPs.
- Initiate investigation of refocused Tier II UAV capabilities (known as Convoy Operations/Over the Horizon (OTH) Imagery investigations); initializing focus on a complete shipboard compatibility that requires minimal maintenance and time to train. Assess the operational employment of a prototype or surrogate UAV that can be employed from the seabase to conduct surveillance 150 nautical miles inland and detect threat elements day/night and report back to the seabase in order to define the UAV requirements of a seabased Marine Air-Ground Task Force (MAGTF) conducting joint forcible entry operations.
- Initiate efforts to define technological solution and TTPs for a UAV that provides support to convoy operations.
- Continue DR MGS efforts by repairing systems damaged while supporting OIF operations.
- Re-initialize Initiate Visual Intelligence, Surveillance, Tactical Alert System (VISTAS) (formerly known as

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Local Area Sensor System (LASS)) development efforts. This includes coding for C2, power interfacing to meet military specifications, software architecture, and layout of sensor system. Additional efforts include prototyping electro-mechanical upgrades to the shell and integrating electronics with outboard sensors. VISTAS is an unattended ground sensor system.
- Continue efforts to support enhanced reconnaissance team functions by enhancing the reconnaissance and surveillance capabilities to better enable Marine infantry units to locate enemy forces as part of DO experimentation.
- Continue purchase/evaluation of vehicles as surrogates for ITVs.
- Provide for Beam Hit Digital Down Link (DDL) capability. The Beam Hit program (a joint effort with the ONR) facilitates development of an Improvised Explosive Device (IED) change detection system. Efforts support OIF.
- Conduct additional IED deterrent investigations, including vehicle engine stopping systems comparative testing, to neutralize/counter vehicle borne IED threats and cell phone jamming technology testing.
- Conduct initial investigation into Rover Image Transfer Integration, which involves capabilities into Target Handoff System (Experimental) (THS(X)) to enable video capability from various air platforms.
- Conduct initial investigation into Precision Target Locator Designator (PTLD) Integration, which involves integration with the Strike Link (THS).
- Initiate and complete initial investigation, to include flight testing and evaluation, of Advanced Screen Saving Aviation Layered Tearaways (ASSALT). Efforts include AH-1 airframe adaptations.

FY 2006 Plans:

- Complete ISR support for the SV06 AWE.
- Initiate ISR support for the next major experimentation effort (AWE).
- Expand investigation of Convoy Operations/OTH Imagery UAV capabilities.
- Continue efforts to define technological solution and TTPs for a UAV that provides support to convoy operations and maneuver forces conducting STOM.
- Continue DR MGS efforts by designing and developing an infra-red pointer/illuminator and an internal Handheld Controller for remote monitoring/functionality of the sensor payload. In addition, perform robotic arm development.
- Complete VISTAS efforts by remodeling wireless data monitoring system, to include the associated electronics, software, and code writing.
- Continue efforts to enhance the reconnaissance and surveillance capabilities to better enable Marine infantry units to locate enemy forces as part of DO experimentation.
- Continue purchase/evaluation of vehicles as surrogates for ITVs.

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- Develop and complete concept and staff planning procedures that enable integration of MAGTF DO with Special Operating Force (SOF) operations.

FY 2007 Plans:

- Continue ISR support for the upcoming AWE.
- Continue investigation of Convoy Operations/OTH Imagery UAV capabilities.
- Based on results of SV06, continue to assess the operational employment of a prototype or surrogate UAV as part of the next major experimentation effort (AWE).
- Complete DR UGV efforts developing mini-pincher/grabber, wire cutting capability, and coaxial camera for the robotic arm.
- Continue efforts to enhance the reconnaissance and surveillance capabilities to better enable Marine infantry units to locate enemy forces as part of DO experimentation. This effort will examine the potential for DO teams to employ advanced ground sensors, UGVs, and UAVs.
- Continue purchase/evaluation of vehicles as surrogates for ITVs.
- Continue efforts to define training and equipment capabilities for ISR conducted during STOM and DO.

	FY 2004	FY 2005	FY 2006	FY 2007
FIRES, TARGETING, AND MANEUVER	4,441	4,456	4,587	3,667

This section includes MCWL experimentation efforts in the areas of fires, targeting, and maneuver.

FY 2004 Accomplishments:

- Continued first Dragon Fire II concept demonstrator development. This effort is an augmentation to the Mobile Fire Support System (MFSS) Congressional enhancement (Project C9154).
- Completed THS(X) development and transition to the Marine Corps Systems Command (MCSC). The THS(X) program investigated and conducted experiments in aviation and fire support technologies that could lead to increased accuracy and effectiveness of close air and fire support missions while also reducing the possibility of fratricide.
- Concluded engineering support as well as upgrades and assessment of the current TRAP systems design. This included writing standard operating procedures for rocket propelled grenade (RPG) live-fire testing, performing laser safety classifications, and evaluation of the Guardian Watch Perimeter Security System and its Potential Application to the TRAP. These efforts, in addition to supporting MCWL experimentation efforts,

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support OIF functions. These efforts augmented the TRAP Congressional enhancement (Project C9154).
- Conducted Digital Fires Coordination Device (DFCD) development, by providing concept demonstrator design and version I system delivery for participation in the SV04 AWE. The DFCD program designed a concept demonstrator of an advanced fire support coordination software system hosted in a ruggedized computer (handheld or laptop) to give the forward elements of a STOM force the ability to control and deconflict fires. The system is based on the THS(X) software and was designed to give the advance force commander a simplified and compact system to develop and transmit coordinating measures, target lists, fire plans, fire missions, and warnings. This program transitioned with THS(X) to MCSC.
- Completed M3M machine gun mounted on helicopter platforms experimentation.
- In support of OIF II and MCWL sponsored experimentation, initiated Counter Shooter testing – First Marine Expeditionary Force (I MEF) Limited Technical Assessment (LTA) on the Gunfire Detection and Location (GDL) System.
- Also in support of OIF, purchased a Lightweight Counter Mortar Radar (LCMR) to conduct investigation/ experimentation. LCMR is a technology that detects and locates hostile firing systems, out to a range of 7,000 meters.
- Initiated efforts to develop, purchase, and test 12 gauge rounds (fragmenting and armor piercing) for fin-stabilization and penetration.

FY 2005 Plans:

- Complete first Dragon Fire II concept demonstrator. This includes the gun assembly, safety release testing/documentation, ammunition purchase, and firing tests.
- Complete development of modular Dragon Fire II design for fire support systems using the Dragon Fire/Light Armored Vehicle (LAV) test-bed.
- Continue LCMR investigation/experimentation, to include research and testing of improved cooling units.
- Initiate investigations into highly mobile, internally transportable counter-fire radar to support a vertical maneuver element (VME).
- Initiate investigation of capabilities to enhance tactical mobility of a VME.
- Complete 12 gauge ammunition efforts.
- Expand/conclude counter shooter efforts by purchasing/testing additional systems.
- Conduct Heavy Machine Gun Initiative (HMGI) related design, fabrication, and testing of prototype advanced mounts; and purchase and test grenade machine guns as well as quick change barrels. HMGI is a joint initiative with the Office of Naval Research (ONR) and the Naval Surface Warfare Center (NSWC) to develop a heavy machine gun Advanced Technology Demonstrator (ATD).

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- Initiate efforts to develop and assess STOM tactics, techniques, and procedures (TTPs).
- Initiate efforts to develop and assess planning and execution TTPs to exploit/examine EFSS in support of forces conducting STOM.
- Initiate investigation of the potential for Marine Infantry at the squad and team level with enhanced equipment and training to terminally control indirect and aviation fires.

FY 2006 Plans:

- Continue LCMR investigation/experimentation.
- Continue investigations into highly mobile, internally transportable counter-fire radar to support a VME.
- Continue investigating capabilities to enhance tactical mobility of a VME.
- Continue to examine/develop EFSS prototypes focusing on operational assessment of a modular capability employed by both foot and LAV mobile forces.
- Continue efforts to develop and assess STOM TTPs.
- Continue efforts to develop and assess planning and execution TTPs to exploit EFSS in support of forces conducting STOM.
- Complete investigation of the potential for Marine Infantry at the squad and team level with enhanced equipment and training to terminally control indirect and aviation fires.

FY 2007 Plans:

- Continue LCMR investigation/experimentation.
- Continue investigations into highly mobile, internally transportable counter-fire radar to support a VME.
- Continue investigating capabilities to enhance tactical mobility of a VME.
- Continue to examine/develop EFSS prototypes.
- Continue efforts to develop and assess STOM TTPs.

	FY 2004	FY 2005	FY 2006	FY 2007
SEABASING, LOGISTICS, COMBAT SERVICE SUPPORT (CSS), AND COMBAT IN THE CITIES	5,836	5,827	3,454	3,539

This section includes MCWL experimentation efforts involving seabasing, logistics, CSS, urban combat, medical, as well as training and education.

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FY 2004 Accomplishments:

- Continued to search for, evaluate, and assess potential solutions to enhance seabased sustainment capabilities. This effort explored the use of C2, fires, maneuver, and sustainment required of a Marine Combat Service Support Detachment (MCSSD) in support of a Marine Air-Ground Task Force (MAGTF) Operational Maneuver from the Sea (OMFTS) operation.
- Continued effort with experimental vehicles to enable sustainment of forces in an OMFTS environment. This included titanium door and Explosive Resistant Coating (ERC) testing on High Mobility Multi-purposed Wheeled Vehicles (HMMWVs) and Medium Tactical Vehicles (MTVs). In addition, ballistic properties testing and modeling of various materials was performed. These tasks supported MCWL experimentation efforts, as well as, OIF vehicle hardening efforts.
- Initiated efforts to harden vehicles against rocket propelled grenades (RPGs) and warhead fragments.
- Continued development of MCM initiative to develop and assess the TTTPs surrounding a Marine Expeditionary Unit (MEU) MCM Capability Set. This effort supports MCWL experimentation and OIF.
- Completed testing of various Counter Mine Detection systems.
- Continued MOUT experimentation efforts to include Project Metropolis and Project Rifleman. Efforts included Stability and Support Operations (SASO) and training (including Squad Automatic Weapon (SAW) Simunition Kit and ammunition purchases). In addition, vehicle armor and Rocket Propelled Grenade (RPG) testing/assessments were conducted. These efforts not only supported MCWL sponsored experimentation, but OIF as well. Project Metropolis was the definitive multi-year experiment designated to create realistic warfighting allowing Marines to shoot, move, and communicate as they accomplished missions during MOUT. Project Rifleman, a subset of Project Metropolis, is a project conducting experimentation with the TTTPs of the individual Marine to better enable him/her to fight and survive in expeditionary combat environments.
- Continued to investigate individual equipment to enhance Marines' survivability and combat effectiveness. This effort included the purchase of protective face masks/shields and lower torso gear which not only supported MCWL experimentation, but OIF as well.
- Maintained Marine Corps and Special Operations Command (SOCOM) TTTPs collaboration.
- Expanded High Speed Connector (HSC) (formerly Joint High Speed Vessel (JHSV)) development, integration, and experimentation by assisting the Joint Operations Center (JOC) with program efforts to explore the concepts and capabilities with commercially available advanced hull and propulsion technology.
- Continued bio-science (medical) initiatives. Specific efforts included: Tactical Medical Coordination System (TacMedCS), which is a prototype system to enhance Casualty Evacuation (CASEVAC) tracking via individual casualty locator; Combat Trauma Registry (CTR) efforts, which is the raw data collection, entering of pertinent data into the CTR, performing analysis, and reporting on casualties treated during Operation

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Enduring Freedom (OEF) as well as the OIF campaigns; and Advanced First Aid Limited Technical Assessment (LTA), which consists of addressing the major need for systematic, scientific study of combat casualties. All three of these efforts support MCWL sponsored experimentation, as well as OIF.
- Also known as Dust Palliative development, provided for the development of a suitable low-maintenance lightweight replacement or augmentation to current AM-2 matting to facilitate the construction or enhancement of Forward Operating Bases (FOBs). This effort supported MCWL sponsored experimentation, as well as OIF.
- Initiated investigations into the Electronic Control Active Suspension System (ECASS), which is a system that has the capability to adjust itself continuously to changing road conditions. This was a joint venture with the ONR.

FY 2005 Plans:

- Continue to search for, evaluate, and assess potential solutions to enhance seabased sustainment capabilities.
- Complete experimental vehicle effort to include assessment of Military Utility, associated fuel costs, environmental impact surveys of experiment sites, internal aerial transportability certification, and loaders/attachments feasibility.
- Continue limited vehicle hardening efforts.
- Refurbish/purchase Flyer ITVs to collect data during experimentation with insertion of motorized Marine infantry. In addition, helicopter certification will be obtained for the Flyer vehicles.
- Complete MCM development/experimentation efforts.
- Continue MOUT experimentation efforts.
- Continue to investigate individual equipment to enhance Marines' survivability and combat effectiveness.
- Continue to maintain Marine Corps and SOCOM TTTPs collaboration.
- Continue HSC efforts.
- Continue bio-science (medical) initiatives, to include CTR; purchasing/evaluating Dragon Doc/Medical Assault Packs (MAP), which are upgraded Field Corpsman treatment items; and providing for Mini Forward Resuscitative Surgery System (FRSS) capability study using a proven method to provide medical support for STOM/DO.
- Expand ECASS investigations by providing for baselined data modeling as well as development and build of an initial prototype.
- Initiate efforts to identify the organization, equipment, and tactics required for CSS elements operating ashore on unsecured LOC to facilitate sustaining a seabased MAGTF conducting STOM.

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FY 2006 Plans:

- Continue to search for, evaluate, and assess potential solutions to enhance seabased sustainment capabilities.
- Continue experimental vehicle testing/experimentation.
- Continue limited vehicle hardening efforts.
- Conduct, as part of SV06, efforts to examine technologies that support sustainment of seabased forces ashore by enhancing distribution and reducing logistics footprint ashore. Initial focus of effort will be on fuel and water.
- Continue MOUT experimentation efforts.
- Continue to investigate individual equipment to enhance Marines' survivability and combat effectiveness.
- Continue to maintain Marine Corps and SOCOM TTTPs collaboration by continuing conceptual development of the organization, equipment, and TTPs for CSS elements operating ashore on unsecured LOC. The results of 2005 and 2006 workshops and wargames will drive the development of prototypes and processes for subsequent live experimentation.
- Reduce HSC experimentation/investigation efforts.
- Continue bio-science (medical) initiatives. Continue to develop and assess prototype casualty tracking and enroute care systems focusing on how the Marine Corps maintains medical information; and tracks and treats casualties during live force experimentation. Also continue Dragon Doc/MAP, Mini FRSS, and complete CTR efforts.
- Complete Dust Palliative efforts by providing application system equipment and performing liquid polymer testing.
- Continue ECASS investigations/development/experimentation efforts
- Continue efforts to identify the organization, equipment and tactics required for CSS elements operating ashore on unsecured LOC to facilitate sustaining a seabased MAGTF conducting STOM.

FY 2007 Plans:

- Continue to search for, evaluate, and assess potential solutions to enhance seabased sustainment capabilities.
- Continue experimental vehicle testing/experimentation.
- Continue limited vehicle hardening efforts.
- Continue to examine technologies that support sustainment of seabased forces ashore by enhancing distribution and reducing logistics footprint ashore.

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- Continue to assess capability packages consisting of equipment, organization changes and supporting TTPs for CSS elements operating ashore on unsecured LOCs.
- Continue MOUT experimentation efforts.
- Continue to investigate individual equipment to enhance Marines' survivability and combat effectiveness.
- Transition HSC program to Marine Corps Systems Command (MCSC).
- Continue bio-science (medical) initiatives.
- Continue to develop and assess prototype casualty tracking and enroute care systems; Dragon Doc/MAP enhancements; and Mini FRSS analysis.
- Continue ECASS investigations/development/experimentation efforts
- Continue efforts through operation experimentation to identify the organization, equipment and tactics required for CSS elements operating ashore on unsecured LOC to facilitate sustaining a seabased MAGTF conducting STOM.

	FY 2004	FY 2005	FY 2006	FY 2007
MARINE CORPS WARFIGHTING LABORATORY (MCWL)OPERATIONS (SUPPORT)	6,273	6,860	7,758	7,875

MCWL Operations (Support) efforts include overall MCWL experimentation doctrine, planning, analysis, data collection, as well as transition efforts.

FY 2004 Accomplishments:

- Completed SV04 AWE planning and technology investigations.
- Initiated SV06 AWE planning and technology investigations.
- Maintained Strategic Planning efforts through the location, development, and evaluation of advanced warfighting operational and organizational concepts and related enabling technologies.
- Continued to synthesize results and lessons learned into proposed DOTMLPF recommendations for the Marine Corps.
- Continued pursuing transition avenues for maturing TTTPs.
- Continued to provide technical, strategic, and managerial support to Marine Corps Experimentation.
- Completed S&T Common Operational Picture (COP) (formerly known as Science and Technology Operations Information Center (STOIC)) development, focusing on linking S&T communities.
- Maintained overall analysis and reporting of experimentation efforts, analytical experimental design support, and a capability to provide ad-hoc analysis support as required.

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- Provided funding to support Force Battle Lab effort – Third Marine Expeditionary Force (III MEF) experimental shooting house training device completion. Efforts permitted enhanced MOUT, Close Quarters Battle training.
- Continued to support tactical instrumentation capability that provides battlespace instrumentation for experimentation.
- Continued to provide overall analysis and reporting of experimentation efforts, provide analytical assistance during experiment design, and maintain an ad-hoc analysis capability.
- Continued to provide technical, strategic, and managerial support to Marine Corps Experimentation.
- Continued efforts to improve upon the automated data collection system (Integrated Global Positioning System Radio System (IGRS) II).

FY 2005 Plans:

- Continue SV06 AWE planning and technology investigations.
- Continue Strategic Planning efforts.
- Continue to synthesize results and lessons learned into proposed DOTMLPF recommendations.
- Continue pursuing transition avenues for maturing TTTPs.
- Continue to provide technical, strategic, and managerial support to Marine Corps Experimentation.
- Initiate Electronic File (eFile) (formerly known as S&T COP) development, focusing on file maintenance and linking to S&T communities.
- Continue to provide technical, strategic, and managerial support to Marine Corps Experimentation.
- Continue to provide overall analysis and reporting of experimentation efforts, provide analytical assistance during experiment design, and maintain an ad-hoc analysis capability.
- Continue to provide for emerging Force Battle Lab efforts.
- Continue tactical instrumentation/data collection efforts.
- Complete IGRS II data collection/reconstruction efforts.

FY 2006 Plans:

- Complete SV06 AWE planning and technology investigations.
- Initiate planning for the next AWE.
- Continue Strategic Planning efforts.
- Continue to synthesize results and lessons learned into proposed DOTMLPF recommendations.
- Continue pursuing transition avenues for maturing TTTPs.

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- Continue to provide technical, strategic, and managerial support to Marine Corps Experimentation.
- Continue eFile efforts.
- Continue to provide overall analysis and reporting of experimentation efforts, provide analytical assistance during experiment design, and maintain an ad-hoc analysis capability.
- Continue to provide for emerging Force Battle Lab efforts.
- Continue tactical instrumentation/data collection efforts.

FY 2007 Plans:

- Continue planning and technology investigations for next AWE.
- Continue Strategic Planning efforts.
- Continue to synthesize results and lessons learned into proposed DOTMLPF recommendations.
- Continue pursuing transition avenues for maturing TTTPs.
- Continue to provide technical, strategic, and managerial support to Marine Corps Experimentation.
- Continue eFile efforts.
- Continue to provide overall analysis and reporting of experimentation efforts, provide analytical assistance during experiment design, and maintain an ad-hoc analysis capability.
- Continue to provide for emerging Force Battle Lab efforts.
- Continue tactical instrumentation/data collection efforts.

	FY 2004	FY 2005	FY 2006	FY 2007
WARFIGHTING EXCELLENCE	5,303	4,381	4,622	4,775

This section includes MCWL experimentation efforts in the areas of wargaming, the Center for Emerging Threats and Opportunities (CETO), and Project Albert.

FY 2004 Accomplishments:

- Continued Executive Agent (EA) responsibilities for joint Title Ten (X)/Joint Concept Development and Experimentation (JCDE) programs such as Unified Quest, Unified Course, and Unified Engagement. EA responsibilities are comprehensive, e.g., planning, training, and assessing for critical importance to the USMC. Title X wargames generally address future capabilities in the context of core Title X readiness responsibilities and include participation in other service Title X wargames, as well as, planning and executing the Marine Corps Title X Expeditionary Warrior (EW) program. JCDE efforts include the co-sponsored

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Marine Corps/JFCOM Joint Urban Warrior (JUW) program designed to support JFCOM Joint Urban Operations (JUO) efforts.
- Continued EW as the Marine Corps' Service, or Title X Wargaming Program, consisting of a combination of war games, seminars, workshops, and related events designed to address issues of particular concern to the senior leadership of the Marine Corps, (e.g., the cooperation and interoperability of USMC and Special Operations Command (SOCOM) forces in the context of the Global War on Terrorism (GWOT)).
- Continued the management and oversight of non Title X wargaming to include the highly visible Office of the Secretary of Defense's (OSD's) Net Assessment Transformation War Game series and the SOCOM wargaming series.
- Continued the partnership, JUW, between the USMC and JFCOM on joint and combined urban operations concept development and experimentation (CD&E). JUW is focused on the integration of the full spectrum of advanced operational concepts, organizational innovations, technologies, and other transformational opportunities in complex urban operations.
- Continued to provide CETO support. CETO is a partnership between the Marine Corps Combat Development Command (MCCDC) and the Potomac Institute for Policy Studies (PIPS). CETO's mission is to identify emerging threats, explore concepts, and determine capabilities and solutions to meet future challenges in coordination with the USMC operating forces. (Note: Although administratively attached to MCWL, CETO is operationally controlled by the MCCDC). A small portion of the CETO effort supported Operation Iraqi Freedom (OIF) by providing limited Operating Force training.
-Re-energized Joint Experimentation Cell efforts by conducting Joint Warfighting Capability Assessments (JWCAs) and participating on Functional Capability Boards (FCB), as well as providing Joint Integration and Implementation Planner support to the Marine Corps.

FY 2005 Plans:

- Continue EA responsibilities for joint Title X/JCDE programs.
- Continue EW efforts.
- Continue the management and oversight of non Title X wargaming.
- Continue the partnership, JUW, between the USMC and JFCOM on joint and combined urban operations CD&E.
- Re-initiate SEAWAY logistical efforts by providing support for a broad range of wargames, e.g., EW, JUW, and SV.
- Re-define CETO effort to support the development of future warfighting concepts and related experimentation by researching and assessing current, emerging, and future world threats, opportunities, and strategic settings, to include adversarial threats and strategies; regional geographical, environmental, and economic

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conditions; and scenarios involving the potential deployment and employment of Naval forces. CETO will conduct research and make recommendations for developing “change strategies” to enable the Marine Corps to institutionalize and field future warfighting capabilities across the Doctrine, Organization, Training, Materiel, Leadership, Personnel, and Facilities (DOTMLPF) spectrum.
- Continue Joint Experimentation Cell efforts.
- Initiate the Joint Force Protection (JFP) Advanced Concept Technology Demonstration (ACTD) to provide warfighters with a simple, timely, comprehensive understanding of deployment and distribution information. ACTDs are intended to rapidly field needed joint capabilities by employing emergent mature technologies matched with innovative operational concepts. Marine Corps participation in ACTDs enables experimental efforts to leverage OSD research, development, test, and evaluation (RDT&E) and other Service funding for the development of systems and concepts likely to transition to acquisition programs of record and joint concept of operations. JFP plans to increase the Warfighter’s ability to see and influence the identification, sourcing, projection and integration of force capabilities employed to achieve operational effects in the theater Joint Operating Area.

FY 2006 Plans:

- Continue EA responsibilities for joint Title X/JCDE programs.
- Continue EW efforts.
- Continue the management and oversight of non Title X wargaming.
- Continue the partnership, JUW, between the USMC and JFCOM on joint and combined urban operations CD&E.
- Continue CETO operations.
- Continue Joint Experimentation Cell efforts.
- Continue JFP efforts to provide warfighters with a simple, timely, comprehensive understanding of deployment and distribution information.
- Conduct investigations into other promising ACTD efforts.

FY 2007 Plans:

- Continue EA responsibilities for joint Title X/JCDE programs.
- Continue EW efforts.
- Continue the management and oversight of non Title X wargaming.
- Continue the partnership, JUW, between the USMC and JFCOM on joint and combined urban operations CD&E.
- Re-initiate SEAWAY logistical efforts by providing support for a broad range of wargames.

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- Continue CETO operations.
- Continue Joint Experimentation Cell efforts.
- Continue JFP efforts to provide warfighters with a simple, timely, comprehensive understanding of deployment and distribution information.
- Continue investigations into other promising ACTD efforts.

C. OTHER PROGRAM FUNDING SUMMARY:
NAVY RELATED RDT&E: The Navy’s 6.1 program contributes indirectly to this effort.
PE 0602131M Marine Corps Landing Force Technology

NON-NAVY RELATED RDT&E: Not applicable.

D. ACQUISITION STRATEGY:
Not applicable.

FY 2006/2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: Feb 2005
Exhibit R-2a

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Project Number & Title	FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
R2223 MARINE CORPS ATD	28,316	21,503	20,794	23,951	25,078	25,631	25,636	26,150

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: Critical Marine Corps requirements/imperatives addressed in this Project are: Maneuver; Firepower; C4ISR; Logistics; Human Performance, and Training and Education. These are ongoing efforts to develop and demonstrate advanced technologies and system concepts in an operational environment. Multiple transitions into the Sub-system/Component Advanced Development Phase are planned, as well as fieldable prototyping to reduce risk in System Concept Development and Demonstration. A tactically effective MCM capability is necessary if Maneuver on land is to become a functional component of Naval Expeditionary Maneuver Warfare (EMW). Maneuver, supported by MCM provides synchronization and speed of detection, breaching, clearance, proofing, and marking operations. This project supports: 1) engaging regional forces in decisive combat on a global basis; 2) responding to all other contingencies and missions in the full spectrum of combat operations (high, middle, and low intensity), in MOUT, and in OOTW; 3) and warfighting experimentation. By providing the technologies to enable these capabilities, this project supports the goals and objectives of the Strike, Littoral Warfare and Surveillance Joint Mission Areas. These are ongoing efforts to develop and demonstrate advanced technologies and system concepts in an operational environment.

In addition, this project supports the goals and objectives of the Littoral Combat/Power Projection Future Naval Capability (FNC). Through 2005 the focus of the FNC efforts has been on satisfying technology gaps related to Power Projection and Littoral Combat. As the products of these efforts are transitioned to acquisition programs of record, the focus of the FNC within this PE in FY 2006 and beyond will be on technology related to Urban, Asymmetric, and Expeditionary Operations (UAEO). The UAEO Capability Gap is a science and technology developmental area that is of the highest importance to Marine Corps operations in Iraq and Afghanistan. The UAEO Capability Gap is one of 25 prioritized Capability Gaps (prioritized by OPNAV N-6/7 and the Marine Corps Combat Development Command) that are made up of Enabling Capabilities (ECs) and supporting products. The UAEO technology gap is being pursued as part of an overall effort that addresses the Sea Strike Capability Gap.

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B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 2004	FY 2005	FY 2006	FY 2007
MANEUVER	1,954	5,903	7,134	6,835

This activity demonstrates technologies to enhance battlespace mobility and survivability through analysis and development of demonstration hardware. Technology Maneuver Thrust Area focuses on the development, demonstration, and transition of technologies that will increase the warfighting capabilities and effectiveness of current and future Marine Corps maneuver systems. This Thrust aims at capturing emerging and “leap ahead” technologies in the areas of mobility, materials, propulsion, survivability, durability, signature reduction, and modularity. A concentrated effort has been made in the development of modeling and simulation “tools” that integrate many different physics based modeling systems with rigorous operational analysis simulations to accurately define a system’s performance characteristics. These tools will aid in defining the trade space for emerging technologies and assist in providing the Program Manager insight and guidance into pursuing future technologies. This activity also focuses on advanced development and demonstration of MCM technologies enabling MCM capabilities in synchronization and speed of mine detection, organic neutralization, assault breaching, tactical clearance, proofing, marking, and Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4I) operations. MCM encompasses countermine, counter-IED, and counter-unexploded Ordnance (UXO) enabling technologies.

This activity includes efforts for the Advanced Mine Detector (AMD). AMD will combine multiple sensing technologies to detect explosives in antipersonnel and antitank mines, a key capability due to the worldwide proliferation of low and non-metallic mines. AMD will apply nuclear quadrupole resonance (NQR) science to confirm the presence of explosives.

In FY 2005 and beyond, the MCM efforts are reflected under the Maneuver activity.

FY 2004 Accomplishments:

- Completed development of very low power stochastic NQR pulse sequencing techniques for detection of multiple lines of Trinitrotoluene (TNT).
- Completed development of advanced NQR techniques for improved TNT detection, to include pulse sequences that are less sensitive to temperature variations, and examine the possibility of increasing TNT SNR by hybrid NQR/Nuclear Magnetic Resonance techniques.

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- Completed reduction of acoustic ringing by developing coils with a reduced electric field and composite RF pulses.
- Completed TNT characterization by determining whether observed differences in TNT formulations represent mixtures of pure orthorhombic and monoclinic crystalline forms, or twinning effects of the monoclinic phase.
- Completed development of Marine Air Ground Task Force (MAGTF) Expeditionary Family of Fighting Vehicle (MEFFV) concept designs.
- Completed designs and built technology demonstrators of Tactical Unmanned Ground Vehicles (TUGV) to demonstrate advanced unmanned capabilities in the areas of mobility, survivability, Command and Control (C2), ISR (intelligence, surveillance, and reconnaissance), and lethality (lethal and non-lethal systems.
- Transitioned TUGV to the Marine Corps Systems Command for acquisition.
- Continued exploration of methods to compensate for the inhomogeneous radio-frequency (RF) field of surface coils, for optimizing Signal to Noise Ratio (SNR) for varying inspection depths.
- Continued to improve Radio Frequency Interference (RFI) mitigation techniques and hardware, by considering coil designs, alternate RFI reference antenna designs, correlation between channels, and mitigation algorithms.
- Continued extension of characterization to a broader range of TNT sources, and to tetryl.
- Initiated NQR technology integration efforts with a Ground Penetrating Radar (GPR) and Electro Magnetic Induction EMI system.

FY 2005 Plans:

- Continue refinement of RFI mitigation, SNR enhancement, and acoustic ringing techniques.
- Continue extension of characterization to a broader range of TNT sources, and to tetryl.
- Continue NQR technology integration efforts with a GPR and EMI system.
- Initiate development of technology for the Tactical Unmanned Ground Vehicle (TUGV) by applying advanced data and video signal processing to enhance operator/machine interaction for improved performance, safety & mobility at greater distances and in cluttered environments.
- Initiate Advanced Electronically Controlled Active Suspension System (ECASS) development efforts for High Mobility Multi-Purpose Wheeled Vehicle (HMMWV) and future USMC vehicles (MEFFV).

FY 2006 Plans:

- Complete NQR technology integration efforts with a GPR and EMI system.
- Continue Advanced ECASS development in support of HMMWV, MEFFV and other Light Armored Vehicles.

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- Continue development of data transmission technology for the TUGV.
- Transition the AMD effort (which includes extension of characterization to a broader range of TNT sources, and to tetryl) to the Marine Corps System Command.
- Continue refinement of RFI mitigation, SNR enhancement, and acoustic ringing techniques.
- Initiate development of effective corrosion control techniques & materials to apply to broad range of USMC vehicles & applications.
- Initiate Land MCM S&T detection initiatives approved to address close-in and standoff detection deficiencies within the MAGTF.
- Initiate Land MCM neutralization initiatives approved to address assault breaching deficiencies within the MAGTF.

FY 2007 Plans:

- Continue Advanced ECASS development
- Continue advanced technology development for the TUGV.
- Continue development of effective corrosion control techniques & materials to apply to broad range of USMC vehicles & applications.
- Continue Land MCM S&T detection initiatives to address close-in and standoff detection deficiencies within the MAGTF.
- Continue Land MCM S&T neutralization initiatives to address assault breaching deficiencies within the MAGTF.
- Initiate S&T efforts addressing MEFFV technology investment plan.
- Initiate advanced armor concepts development for Marine Corps platforms from 6.2 program.

	FY 2004	FY 2005	FY 2006	FY 2007
LITTORAL COMBAT/POWER PROJECTION (LC/PP)	11,458	5,308	2,887	3,604

The goal of the LC/PP FNC is to support the development of Naval Expeditionary Maneuver Warfare via the application of technologies which enhance the ability of the Navy-Marine Corps team to achieve assured access and sustained operations in the littorals as the naval portion of a Joint campaign. By being assigned S&T responsibility for littoral combat, the LC/PP FNC has been given an expansive warfighting problem set. The littoral region is where the future fight will take place and requires a broad naval perspective in identifying and solving capability gaps. In identifying capability gaps, the LC/PP FNC considers all the critical warfighting functions: Command, Control, Intelligence, ISR, Fires, Maneuver, Sustainment, and Force

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Protection. This activity includes support to the FNC Enabling Capability for Improvised Explosive Devices spirals 1 and 2, Modular Scalable Weapon, Position Location Information, Advanced Naval Fires Technology spiral 1, Dynamic Target Engagement and enhanced sensor capabilities, and Hostile Fire Detection and Response spiral 1.

FY 2004 Accomplishments:

- Completed a study of how SIGINT operators can be tested against realistic signal environment prior to deploying.
- Continued development of Sensitive Compartmented Information (SCI) communication specifications for a Marine Corps Signal Intelligence (SIGINT) System that enables advanced data parsing, fusion and knowledge dissemination and transition to acquisition.
- Continued development of improved lightweight computational fire control interface Expeditionary Fires Support System (EFSS) technology.
- Continued development of advanced weapon materials for use in artillery and mortar systems to reduce weight while maintaining strength, and increasing operational life and capability. Transitioned Isogrid topology for application on the M777 Howitzer trails.
- Continued to develop, integrate and test additional functionality for expeditionary maneuver warfare (STOM) planning software.
- Initiated development of the Measurement and Signal Intelligence (MASINT) core sensor fusion Tactical Remote Sensor System (TRSS) architecture.
- Initiated development of algorithms for identifying multi-source intelligence (INT) visualization by Radio Frequency (RF), magnetic, acoustic, or other emissions signature.
- Initiated development of a system that provides for stationary RF emitter tracking in high multi-path urban environment using one mobile and one fixed collector.
- Initiated development of innovative relay (Beyond Line of Sight (BLOS)) technology to provide secure communication during STOM.
- Initiated efforts to provide an obstacle avoidance capability for the Expeditionary Fighting Vehicle (EFV).
- Initiated design integration and demonstration of hostile fire detection and counterfire system (GUNSLINGER) spiral 1.

FY 2005 Plans:

- Complete development and begin transition of expeditionary maneuver warfare (STOM) planning and decision-

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making tools for Marine ground forces.
- Complete the development of multi-source INT visualization algorithms to increase the efficiency and effectiveness of raw sensor data to actionable intelligence and commence testing/demonstration. (FY 06 effort funded by PE 0603782N).
- Continue development of tools and technologies to support Marine Corps ISR efforts (MASINT/TRSS) in remote sensor integration within the Distributed Common Ground/Surface System (DCGS).
- Continue efforts to provide urban direction finding for RF emitters from moving platforms.
- Continue development of improved fire control systems technologies to EFSS artillery and mortar systems.
- Continue design and development of advanced weapons materials for use in artillery and mortar systems to reduce weight while maintaining strength, and increasing operational life and capability.
- Continue efforts to provide an obstacle avoidance system on the EFV by conducting open ocean testing of a brassboard design. Transition to technology to acquisition program of record.
- Continue design, integration and demonstration of hostile fire detection and counter-fire system (GUNSLINGER).
- Continue development of innovative relay (BLOS) technology through integration and demonstration of secure mobile network/wireless local area network (LAN) communication technologies. Transition EFV high data rate secure wireless communication connection to acquisition program of record.
- Initiate development of improved lightweight computational fire control interface technology.

FY 2006 Plans:

- Complete development and transition technology to provide an obstacle avoidance system on the EFV acquisition program of record.
- Continue efforts to provide urban direction finding of RF emitters from moving platforms.
- Continue development of tools and technologies to support Marine Corps ISR efforts (MASINT/TRSS) in remote sensor integration within the Distributed Common Ground/Surface System (DCGS)
- Continue design and development of advanced weapons materials for use in artillery and mortar systems to reduce weight while maintaining strength, and increasing operational life and capability.
- Continue development of improved lightweight computational fire control interface technology.
- Continue development of improved fire control systems technologies to EFSS artillery and mortar systems.
- Continue effort to incorporate advanced target acquisition target hand off technologies to reduce sensor to shooter loop and improve target location.
- Continue investigation of ammunition packaging techniques to lower weight and have the packaging provide additional use on the battlefield. (Previous and concurrent funding provided by PE 0602131M)

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- Continue integration of hostile fire detection and counter-fire system (GUNSLINGER).
- Continue development of innovative relay (BLOS) technology through integration and demonstration of secure wireless networks/secure wireless LAN communication technologies.

FY 2007 Plans:

- Complete efforts to provide urban direction finding of RF emitters from moving platforms.
- Complete effort to incorporate advanced target acquisition target hand-off technologies to reduce sensor to shooter loop and improve target location.
- Complete investigation of ammunition packaging techniques to lower weight and have the packaging provide additional use on the battlefield.
- Complete development and transition improved lightweight computational fire control interface (EFSS) technology.
- Complete development and transition advanced weapons materials for use in artillery and mortar systems to reduce weight while maintaining strength, and increasing operational life and capability.
- Continue development of tools and technologies to support Marine Corps ISR efforts (MASINT/TRSS) in remote sensor integration within the DCGS.
- Continue development and demonstrate hostile fire detection and counter-fire system (GUNSLINGER).
- Continue development of landmine countermeasure insensitive munitions technology. (Previous efforts funded by PE 0602131M)
- Continue development of innovative relay (BLOS) technology through integration and demonstration of secure wireless networks/secure wireless LAN communication technologies.

	FY 2004	FY 2005	FY 2006	FY 2007
HUMAN PERFORMANCE, TRAINING & EDUCATION	3,998	2,778	2,726	3,623

This activity develops and demonstrates advanced training technology and technologies that enhance neural and cognitive aspects of human performance including tactical decision-making, modeling, simulation, range instrumentation, synthetic environment generation and training effectiveness evaluation.

FY 2004 Accomplishments:

- Completed demonstration technologies available for prototype of an Anti-Terrorism (AT) Tactical Decision Simulation (TDS) for use by the 4th Marine Expeditionary Brigade Marine Security Force.

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- Completed demonstration of technologies available for prototype of Logistics Combat Services Support Element (CSSE) TDS for use in the Logistics Officer's Course at the Logistics School.
- Completed Ground Combat Element (GCE) Platoon Tactical Decision Game (TDG), Close Combat Marine.
- Continued development and evaluation of low-cost, dynamic cognitive skills training tools (tactical decision simulations) that cut across every echelon for individual, groups, and groups of groups.
- Continued demonstration and evaluation of a prototype of Video Flashlights capability for enhanced situational awareness in a Military Operations in Urban Terrain MOUT training environment for the Marine Security Forces.
- Continued demonstration and evaluation of technologies available for prototype of RF tracking and video tracking fusion capability for enhanced situational awareness in a MOUT training environment.
- Continued demonstration and evaluation of technologies available for prototype of a Rapid Portable Synthetic Environment Generation capability.

FY 2005 Plans:

- Complete the development of RF tracking and video tracking fusion for enhanced situational awareness in a MOUT training environment.
- Complete demonstration and transition of a prototype of Video Flashlights capability for enhanced situational awareness in a MOUT training environment for the Marine Security Forces.
- Continue development and evaluation of low-cost, dynamic cognitive skills training tools (tactical decision simulations) that cut across every echelon for individual, groups, and groups of groups.
- Continue advanced development and evaluation of technologies capable of Rapid Synthetic Environment Generation within urban MOUT landscapes.
- Continue to demonstrate and measure improvement in situational awareness and a MOUT training environment.
- Initiate integrating cognitive performance improvement (augmented cognition) technology using operationally relevant systems and scenarios, and demonstrate improved human cognition via multiple sensory modalities.
- Initiate the integration and evaluation of cognitive state detection technologies with instructor-based training scenario applications and demonstrate improved individual task performance.

FY 2006 Plans:

- Continue development and evaluation of low-cost, dynamic cognitive skills training tools (tactical decision simulations) that cut across every echelon for individual, groups, and groups of groups.
- Continue advanced development and evaluation of technologies capable of Rapid Synthetic Environment

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Generation within urban MOUT landscapes.
- Continue to demonstrate and measure improvement in situational awareness and a MOUT training environment.
- Continue integrating cognitive performance improvement (augmented cognition) technology using operationally relevant systems and scenarios, and demonstrate improved human cognition via multiple sensory modalities.
- Continue the integration and evaluation of cognitive state detection technologies with instructor-based training scenario applications and demonstrate improved individual and team task performance.
- Initiate the development of tools to capture metrics and lessons learned from a variety of simulation and training sources.

FY 2007 Plans:

- Complete development and transition of low-cost, dynamic cognitive skills training tools (tactical decision simulations) that cut across every echelon for individual, groups, and groups of groups.
- Continue advanced development and demonstration of technologies capable of Rapid Synthetic Environment Generation within urban MOUT landscapes.
- Continue to demonstrate and measure improvement in situational awareness and a MOUT training environment.
- Continue integrating cognitive performance improvement (augmented cognition) technology using operationally relevant systems and scenarios, and demonstrate improved human cognition via multiple sensory modalities.
- Continue the integration and evaluation of cognitive state detection technologies with instructor-based training scenario applications and demonstrate improved individual and team task performance.
- Continue the development of tools to capture metrics and lessons learned from a variety of simulation and training sources.
- Initiate development of scenarios and prototype applications demonstrating improved team performance in stressful urban environments.

	FY 2004	FY 2005	FY 2006	FY 2007
LOGISTICS	2,438	2,660	3,055	3,565

This activity supports Marine Corps Expeditionary Logistics which is the practical discipline and real world application of the deployment, sustainment, reconstitution, and re-deployment of forces engaged in expeditionary operations. Expeditionary Logistics replaces mass with assured knowledge and speed, is equally capable ashore or afloat in austere environments, and is fully scalable to meet uncertain requirements. Expeditionary Logistics logically divides into five pillars: deployment support, force closure, sustainment,

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reconstitution/redeployment, and command and control. These pillars are thoroughly integrated and perpetually related in execution.

FY 2004 Accomplishments:

- Completed initial research into demonstrating the feasibility of a lightweight micro turbine power generation technology.
- Completed initial research into the feasibility of a micro-channel, methanol reforming fuel cell battery charger technology.
- Continued development of hybrid alternative power systems focusing on metal oxide battery technology (zinc air batteries) with ultra-capacitors.
- Continued development of a computer simulation-based tool for evaluating power requirements and powering options for electronic equipment used by Marine Expeditionary Forces.

FY 2005 Plans:

- Complete development of hybrid alternative power systems (metal oxide battery technology) to demonstrate performance improvement.
- Continue development of a computer simulation-based tool for evaluating power requirements and powering options for electronic equipment used by Marine Expeditionary Forces.
- Initiate exploring the development of portable fuel cell technologies capable of providing power in the 100 Watt to 500 Watt power range.
- Initiate next phase of research into developing a lightweight expeditionary bridging capability through assessment of bridge design, manufacturing, construction, and material solutions to include composites, extrusion, and forming techniques.

FY 2006 Plans:

- Complete development of a computer simulation-based tool for evaluating power requirements and powering options for electronic equipment used by Marine Expeditionary Forces.
- Continue developing a lightweight expeditionary bridging capability.
- Continue exploring the development of portable fuel cell technologies to demonstrate performance improvement.

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- Initiate developing and assessing concepts that permit precision delivery of logistics assets while also reducing the logistics footprint ashore.

FY 2007 Plans:

- Continue exploring the development of portable fuel cell technologies to demonstrate performance improvement.
- Continue developing a lightweight expeditionary bridging capability to demonstrate the feasibility of performance improvement.
- Continue assessing concepts that permit precision delivery of logistics assets while also reducing the logistics footprint ashore to demonstrate the feasibility of performance improvement.

	FY 2004	FY 2005	FY 2006	FY 2007
COMMAND, CONTROL, COMMUNICATIONS, COMPUTERS, AND INTELLIGENCE, SURVEILLANCE AND RECONNAISSANCE (C4ISR)	2,672	2,556	2,618	3,059

This activity integrates and demonstrates enhanced communications and situational awareness in warfighting environments and communication and situational awareness technologies for near term USMC operations.

FY 2004 Accomplishments:

- Completed demonstration of Low-Probability of Intercept/Low-Probability of Detection (LPI/LPD) ultra-wide band radios for reconnaissance and urban communications.
- Continued Command and Control Technology testbed culminating in the migration of functionality in the systems integration environment for user prototyping, and requirements generation on prospective commercial and developmental software products.
- Initiated and completed ground weapons locating radar study to determine the feasibility of modifying advanced ground-based radar functionality through software changes.
- Initiated and completed development of blue-force tracking information management and data interoperability capabilities.

FY 2005 Plans:

- Complete and transition Command and Control Technology testbed culminating in the migration of functionality

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in the systems integration environment for user prototyping, and requirements generation on prospective commercial and developmental software products.
- Initiate development and demonstration of low-cost compact satellite communications on-the-move capability.
- Initiate integration and demonstration of naval tactical warfighting applications and network connectivity.
- Initiate development and demonstration of urban communications capability.

FY 2006 Plans:

- Complete development and demonstration of low-cost compact satellite communications on-the-move capability.
- Complete integration and demonstration of naval tactical warfighting applications and network connectivity.
- Complete development and demonstration of urban communications capability.
- Initiate demonstration of advanced network mobility and network security capabilities
- Initiate and complete demonstration of urban navigation capability.

FY 2007 Plans:

- Complete demonstration of advanced network mobility and network security capabilities.
- Initiate integration and demonstration of broadband, conformal, ultra-high frequency/very high frequency (UHF/VHF) antennas to be completed in FY 2008.
- Initiate development and demonstration of measurement and signature intelligence data management and integration capability to be completed FY 2008.

	FY 2004	FY 2005	FY 2006	FY 2007
FIREPOWER	0	2,298	2,374	3,265

This activity develops technology for application on current and future expeditionary weapons and elements of the kill chain. It includes, but is not limited to, the following technologies: fuze, fire control, launch/propulsion, lethality, and accuracy.

FY 2004 Accomplishments:

- No Firepower Advanced Research was conducted in FY 2004.

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FY 2005 Plans:

- Complete M1A1 Firepower Enhancement Program support from PE 0602131M.
- Initiate and complete long range, non-lethal weapon, and electronic projectile advanced development.
- Initiate variable yield conventional warhead concept development for experiments and tests to prove technological feasibility, assess operability, scalability and demonstrate general military utility and/or cost reduction potential.

FY 2006 Plans:

- Continue variable yield conventional munitions development from FY05.
- Initiate shipboard submunition microelectromechanical system (MEMS) fuze safety and reliability enhancement effort from PE 0602131M. Prototype and demonstrate MEMS safe and arm device subsystems. Explore systems safety, shipboard storage, sensitivity, affordability and munitions effectiveness for expeditionary maneuver warfare and demonstrate general military utility and/or cost reduction potential.
- Initiate Marine Advanced Combat Headborne System Initiative (MACHSI) advanced technology development. The goal is to increase warfighter head and neck protection while enhancing warfighter comfort and minimizing warfighter encumbrance.

FY 2007 Plans:

- Continue all efforts of FY06.

	FY 2004	FY 2005	FY 2006	FY 2007
MINE COUNTERMEASURES (MCM)	5,796	0	0	0

This activity focuses on advanced development and demonstration of MCM technologies enabling MCM capabilities in synchronization and speed of mine detection, organic neutralization, assault breaching, tactical clearance, proofing, marking, and C4ISR operations.

This activity includes efforts for the AMD. AMD will combine multiple sensing technologies to detect explosives in antipersonnel and antitank mines, a key capability due to the worldwide proliferation of low and non-metallic mines. Initial operational capability is scheduled for FY 2008 and full operational capability for FY 2009.

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AMD will apply NQR science to confirm the presence of explosives. NQR science detects the electromagnetic signal emitted by relaxation of nitrogen atom nuclei in explosives, after tipping caused by a near-resonant frequency pulse. NQR science also detects metal objects and voids by sensing discontinuities in the dielectric properties of the medium, after application of an alternating current pulse. Specialized NQR science applications enable discrimination of buried, multi-compound explosives from clutter such as metal fragments, rocks, and voids.

In FY 2005 and beyond, the MCM efforts are reflected under the Maneuver activity.

FY 2004 Accomplishments:

-Initiated NQR technology integration efforts with a Ground Penetrating Radar (GPR) and Electro Magnetic Induction (EMI) system.
-Developed very low power stochastic NQR pulse sequencing techniques for detection of multiple lines of Trinitrotoluene (TNT).
-Explored methods to compensate for the inhomogeneous Radio Frequency (RF) field of surface coils, for optimizing Signal to Noise Ratio (SNR) for varying inspection depths.
-Continued to improve Radio Frequency Interference (RFI) mitigation techniques and hardware, by considering coil designs, alternate RFI reference antenna designs, correlation between channels, and mitigation algorithms.
-Developed advanced NQR techniques for improved TNT detection, to include pulse sequences that are less sensitive to temperature variations, and examine the possibility of increasing TNT SNR by hybrid NQR/Nuclear Magnetic Resonance techniques.
-Reduced acoustic ringing by developing coils with a reduced electric field and composite RF pulses.
-Completed TNT characterization by determining whether observed differences in TNT formulations represent mixtures of pure orthorhombic and monoclinic crystalline forms, or twinning effects of the monoclinic phase.
-Extended characterization to a broader range of TNT sources, and to tetryl.

C. OTHER PROGRAM FUNDING SUMMARY:
ALL: NAVY RELATED RDT&E:
PE 0602131M (Marine Corps Landing Force Technology)
PE 0603612M (USMC Mine Countermeasures Systems Adv Dev)
PE 0603635M Marine Corps Ground Combat/Support Systems

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PE 0206313M (Marine Corps Communications Systems)
PE 0206623M (Marine Corps Ground Combat/Supporting Arms Systems)
PE 0601152N (In-House Laboratory Independent Research)
PE 0601153N (Defense Research Sciences)
PE 0602782N (Mine and Expeditionary Warfare Applied Research)
PE 0603782N (Mine and Expeditionary Warfare Advanced Technology)
PE 0603235N (Common Picture Advanced Technology)
PE 0603236N (Warfighter Sustainment Advanced Technology)
PE 0204163N (Fleet Telecommunications - (Tactical))
PE 0305204N (Tactical Unmanned Air Vehicles JMIP)

NON-NAVY RELATED RDT&E:
PE 0603004A (Weapons and Munitions Advanced Technology)
PE 0603005A (Combat Vehicle and Automotive Advanced Technology)
PE 0603606A (Landmine Warfare and Barrier Advanced Technology)
PE 0603607A (Joint Service Small Arms Program)
PE 0603619A (Landmine Warfare and Barrier-Adv Dev)
PE 0603772A (Advanced Tactical Computer Science and Sensor Technology)
PE 0604710A (Night Vision Systems - SSD)
PE 0604808A (Landmine Warfare/Barrier SSD)
PE 0602301E (Computing Systems and Communications Technology)
PE 0602702E (Tactical Technology)

D. ACQUISITION STRATEGY:
Not applicable.

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CONGRESSIONAL PLUS-UPS:

C2297	FY 2004	FY 2005
PROJECT ALBERT	4,105	3,368

Under the umbrella of MCWL experimentation efforts, Project Albert provides design and development of new tools to capture emergent behavior in synthetic environments that, over time, will lead to more effective warfighters. The project's vision includes strong interdisciplinary collaborative teams to address previously unanswered questions relevant to success in warfare. The goal of Project Albert is to investigate and apply promising technologies to support military decision-makers in meaningful ways through modeling, analysis, and new ways of combining them to include important phenomena inadequately represented by current techniques.

FY 2004 Accomplishments:
- Continued modeling and developing Data Farming techniques to allow decision-makers to deal with asymmetric threats and the uncertainty inherent in conflicts in today's world. Specific areas of application included surf zone/beach obstacle reduction and mine counter measures, human decision-making and Command and Control, and defense against enhanced blast weapons.

FY 2005 Plans:
- Continue modeling and developing Data Farming techniques. Specific areas of application include Maneuver in Urban Operations and UAV for concurrent operations.
- Initiate Convoy Protection, Improvised Explosive Devices, Manpower versus Technical Tradeoff in Combat Support Operations, Search Pattern Effectiveness for UAVs in a Maritime Environment, and Modeling Aspects of Net Centric Operations.

C9154	FY 2004	FY 2005
ADVANCED LIGHT STRIKE VEHICLE (ALSV)	3,394	0

ALSV is an MV-22 (Osprey (medium lift, vertical takeoff and landing (VTOL) tilt-rotor aircraft) ITV prototype development effort being pursued by the MCWL via Congressional enhancements.

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FY 2004 Accomplishments:
- Continued to capitalize upon lessons learned from the ITV and the Reconnaissance Surveillance Targeting Acquisition - Vehicle (RSTA-V) teaming Marine Corps, Navy, and industry subject matter experts (SMEs) to investigate promising technologies leading to an effective, combat suitable, ALSV.
- Continued to harness promising technologies in an effort to balance and mitigate competing performance requirements against vehicle characteristics such as speed, weight, and size versus mobility and payload.
- Used computer-aided design and key technologies such as advanced suspension, hybrid electric drives, and composites, continued efforts to produce a working (ultimately leading to an objective) prototype.
- Program schedule provided for delivery of two prototype vehicles in September 2005.

C9154	FY 2004	FY 2005
MOBILE FIRE SUPPORT SYSTEM 120MM MORTAR “DRAGON FIRE”	2,784	991

* FY 2004 and FY 2005 funding/efforts were augmented by Marine Corps Warfighting Laboratory (MCWL) core funding; discussed in Project C2297 under Fires, Targeting, and Maneuver subsection.

The Mobile Fire Support System (MFSS), now referred to as Dragon Fire II, is an automated and modular rifled 120-millimeter fire support system concept demonstrator that uses automation to improve precision, responsiveness, and digital connectivity to support units. It is capable of firing from its towed carriage and from its modified LAV interchangeably and in its towed configuration is transportable within the MV-22 Osprey aircraft.

FY 2004 Accomplishments: Proceeded with efforts to complete design and fabrication. These included gun assembly and safety release testing/documentation.

FY 2005 Plans: Will complete software and engineering design. The new concept demonstrator system is being fabricated and test firings are being conducted to complete the system.

C9154	FY 2004	FY 2005
RAPID DEPLOYMENT FORTIFICATION WALL (RDFW)	967	990

* FY 2004 funding/efforts were augmented by MCWL core funding; discussed in Project C2297 under Seabasing, Logistics, CSS, and Combat in the Cities subsection.

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RDFW prototyped development/experimentation effort being pursued by MCWL mainly via Congressional enhancements. The purpose of this Improved Expedient Fortification Construction program is to experiment with commercial-off-the-shelf expedient fortification construction systems. By leveraging modern materials and techniques, the Marine Corps can increase force protection while decreasing the manpower hours needed to construct expedient fortifications.

FY 2004 Accomplishments:
- Purchased additional grids and continued investigations and experimentation with new TTPs to improve deployable fortification wall design and construction. These efforts supported the I MEF in OIF.

FY 2005 Plans:
- Conduct extensive ballistic testing using the Air Force's Force Protection Battle Lab.
- Purchase additional grids, in support of the Second Marine Expeditionary Force (II MEF)/OIF deployments, for force protection and road stabilization in theater experimentation in Iraq.

C9154	FY 2004	FY 2005
TELEPRESENT RAPID AIMING PLATFORM (TRAP)	1,700	990

* FY 2004 funding/efforts were augmented by MCWL core funding; discussed in Project C2297 under Fires, Targeting, and Maneuver subsection.

The Remote Precision Gun (also known as TRAP) is a remotely operated weapon system which integrates 5.56 to .50 caliber systems with man-in-the-loop remotely controlled robotic firing and observation systems.

FY 2004 Accomplishments: In support of OIF as well as MCWL sponsored experimentation:
- Initiated slew to cue multi-spectral sensor suites and wireless C2 systems integration.
- Began design overhaul of current system human interface.
- Began upgrade of weapon integration, magazine, and batteries.

FY 2005 Plans:
- Continue the design overhaul and upgrades began in FY 2004.
- Integrate laser range finding module and improved optics with digitally generated aiming crosshair into the system.

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- Conduct operational assessment of the upgraded system with the Second Marine Expeditionary Force (II MEF) in theater. Efforts support OIF.
- Publish report to MCCDC for potential transition to acquisition program of record.

C9154	FY 2004	FY 2005
TRANSPORTABLE TRANSPONDER LANDING SYSTEM (TTLS)	3,398	1,982

TTLS was originally developed under a Defense Advanced Research Projects Agency (DARPA) effort through Naval Air Systems Command (NAVAIR) and Advanced Navigation and Positioning Corporation (ANPC). The system was designed to provide a precision approach capability by using inexpensive ground systems to provide position information for aircraft equipped with a transponder and standard Federal Aviation Administration (FAA) Category I Instrument Landing System (ILS) equipment. In order for TTLS to suit the USMC tactical mission requirements, several technologies must be developed. These include: Link 4A data-link guidance output to support USMC aircraft; multiple aircraft tracking and guidance; miniaturization of the system for mounting on a supporting ground vehicle; reciprocal approaches/runway support; Local Sector Surveillance and Control; and reduced TTLS susceptibility to jamming.

FY 2004 Accomplishments: In concert with MCWL experimentation efforts:
- Continued development efforts in support of the TTLS concept demonstration.
- Provided support for the miniaturization of the prototype version of the landing system.
- Tested the compatibility of the Air Surveillance and Precision Approach Radar and Control System (ASPARCS), the program of record that will integrate elements of the Marine Air Traffic Control and Landing System (MATCALS) to the Operating Forces.

FY 2005 Plans:
- Continue development efforts in support of the TTLS concept demonstration.
- Test a new interrogation method that doubles the current surveillance range while minimizing aircraft transponder occupancy to address the FAA’s concerns.

C9154	FY 2004	FY 2005
USMC UAV/UGV WEARABLE COMPUTER PROJECT	2,466	0

The purpose of this program will be to develop a rugged, user friendly, light-weight, Modular Wearable

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Computer (MOWC) that provides monitoring, command/control, and system status for three separate small unit remote scouting system technologies: UAV, Unmanned Ground Vehicle (UGV) and Unattended Ground Sensor (UGS). The MOWC will bring together real-time reconnaissance, surveillance, and target acquisition data thereby increasing the using unit's overall situational awareness. This coverage, executed by an organic suite of remote sensors, controlled/monitored off of one central MOWC, will provide observational coverage of confined/distant areas where human access is impractical or unsustainable, mitigating risk to the Marines normally carrying out these missions.

FY 2004 Accomplishments:
- Provided for prototype development, software development, testing, and purchase of limited numbers of prototype MOWC computers.
- Integrated three separate small unit remote scouting system technologies.
- Conducted a Limited Technical Evaluation to determine and evaluate future Concepts of Employment, and future technical enhancements of a system at the Marine small unit level.
- The Marine Corps Warfighting Laboratory (MCWL) then experimented and assessed the prototype MOWCs to determine the efficacy of such a computer system at the Marine small unit level.

R2995	FY 2004	FY 2005
C3RP	3,747	4,656

FY 2004 effort established an Interdisciplinary Center of Excellence in research relevant to national security and the Marine Corps on the Central Coast of California by bringing together the University, government agencies (both federal and state), and the private sector, which can evolve into a valuable national resource. FY 2005 Efforts continue to explore this potential and to identify and support relevant research and expertise.

R9290	FY 2004	FY 2005
EXPEDITIONARY WARFARE WATER PURIFICATION	5,405	11,391

FY 2004 effort focused on two areas. The first aspect of this program is to build a high capacity 100,000 – 300,000 gallon per day water purification demonstrator which will be transportable by existing cargo lift aircraft, and which can provide logistics support for a variety of strategic and operational missions including humanitarian operations and disaster relief. The second aspect of this program focuses on

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stimulating discovery and invention in science and technology to push well beyond the present state of the art in water reclamation, purification, energy, and distribution technologies. This aspect of the program seeks to identify, develop and transition alternative water purification technologies which will significantly improve mid-term (5-10 years) and longer (10-20 year) technological capabilities.

FY 2005 effort will conduct comprehensive search for robust, dynamic, other than classical S&T approaches to water desalination, reclamation, and energetics, distribution, on the national and international scale. Fund select S&T efforts deemed to have higher than average expectation of reducing the cost of water purification in terms of power, footprint, and so on. Utilizing both the Generation I demonstrator, and the Generation II preliminary specification and engineering design, conduct studies and analysis of promising S&T derived from the EUWP S&T program to date. Simultaneously, develop a Generation II, 300 – 500,000 gallon per day (GPD) engineering prototype which can be used to develop knowledge products for military, federal, and applicable commercial entities of successful S&T also emanating from the Expeditionary Warfare Water Purification (EUWP) S&T investment program, as well as newly emerging technology from independent sources. Such a studies and analysis process will be available for use to address such issues as scalability of select “technology insertion” candidates into large capacity water systems both ship board and land based.

R9333	FY 2004	FY 2005
CENTER FOR EXCELLENCE FOR ROBOTICS, ADVANCED TECHNOLOGY DEMO	1,345	0

This effort is related to development and deployment of robotic systems, to include the use of autonomous and semi-autonomous vehicles in military and civil application domains.

R9334	FY 2004	FY 2005
RAPID REPAIR, PORTABLE PRODUCTION (R2P2)	961	0

This effort is to explore new capabilities in basic infrastructure technologies such as construction materials. New lighter materials that are thermally resistant, bio-resistant, and more rapidly deployable are mission critical to Expeditionary Forces. The R2P2 initiative focused on an emerging class of advanced lightweight composite materials (chemically bonded residuals) and their ability to address enhancements in areas such as rapidly formed, lightweight columns for expeditionary force bridges, thermally resistant

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overlays for takeoff/landing of vertical aircraft, and new runway overlay repair techniques for rapid conversion of bomb damaged enemy airfields.

R9444	FY 2004	FY 2005
ADVANCED MINE DETECTOR SYSTEM	0	2,576

Effort supports Advanced Mine Detector System.

R9444	FY 2004	FY 2005
MAN-PORTABLE QUADRUPOLE RESONANCE LANDMINE DETECTION	3,405	0

This effort focused on advanced development and demonstration of landmine countermeasures technologies; specifically, a landmine detection system on quadrupole resonance technology, engineered into a man-portable configuration.

R9485	FY 2004	FY 2005
CRAFT INTEGRATED ELECTRONIC SUITE (CIES)	0	991

Integrate an electronic control system and add the sensors and C2 systems required to enhance the situational awareness of the crew of a small boat (Stilitto). The objective of the work is to ready the Stilitto for participation in experimentation that is aimed at understanding ad hoc survivable networks. The deliverable is a boat with upgraded electronic control and C4ISR. Technology transfer to the Sea Lion program of record is expected.

R9486	FY 2004	FY 2005
EXCALIBER UNMANNED TACTICAL COMBAT VEHICLE	0	991

Effort supports Excaliber Unmanned Tactical Combat Vehicle.

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R9487	FY 2004	FY 2005
PORTABLE METHANOL FUEL CELL	0	991

This effort is designed to develop direct methanol fuel cell electrochemistry by employing advanced micro-fuel cell technology in passive, ambient conditions (e.g. no balance of plant for humidity and no temperature controls). This no fault methanol fuel cell module (cells will be both in parallel and in series) will leverage industrial battery research efforts directed towards the consumer market. The ultimate research goal is to provide a lighter, longer lasting power supply thereby reducing the weight of batteries carried by individual Marines.

R9488	FY 2004	FY 2005
STUDY TO IDENTIFY AND EVALUATE ALTERNATIVE FIXED-WING LIFT PLATFORMS	0	991

Effort supports Study to Identify and Evaluate Alternative Fixed-Wing Lift Platforms.