FY 2004/2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2003
Exhibit R-2

BUDGET ACTIVITY: 2 PROGRAM ELEMENT:0602131M
PROGRAM ELEMENT TITLE: Marine Corps Landing Force Technology

COST: (Dollars in Thousands)

PROJECT NUMBER/ TITLE	FY 2002 ACTUAL	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	FY 2006 ESTIMATE	FY 2007 ESTIMATE	FY 2008 ESTIMATE	FY 2009 ESTIMATE
Marine Corps Landing Force Technology	27,610	29,568	31,778	35,562	38,967	38,325	39,483	40,245

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The Marine Corps is tasked to develop, in conjunction with the Navy, Army, and Air Force, those phases of amphibious operations that pertain to tactics, techniques, and equipment used by the landing force. This Program Element is organized into six amphibious expeditionary warfighting capability areas. These are: Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR); Maneuver; Logistics; Training and Education; Firepower; and Mine Countermeasures (MCM). The primary objective of this Program Element (PE) is to develop and demonstrate the technologies needed to meet the Marine Corps' unique responsibility for amphibious warfare and subsequent operations ashore. This PE provides the knowledge base to support Advanced Technology (6.3) and is the technology base for future amphibious/expeditionary warfare capabilities. This PE supports the concept based requirements system of the Marine Corps Combat Development Command and responds directly to the Marine Corps Science and Technology (S&T) process. The Future Naval Capabilities (FNC) process is supported and funds are programmed accordingly. The core program also supports Discovery and Invention (D&I). Due to the number of efforts in this PE, the programs described herein are representative of the work included in this PE. 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.

B. PROGRAM CHANGE SUMMARY:

	FY 2002	FY 2003	FY 2004	FY 2005
FY 2003 President's Budget Submission:	30,961	30,274	32,499	36,341
Adjustments from FY 2003 President's Budget:				
Execution Adjustment	-2,707			
Cong. Rescissions/Adjustments/Undist. Reduction	-150	-385		
SBIR Adjustment	-494			
NWCF Rate Adjustment			+12	-12
Pay Raise/Inflation Adjustments		-321	-733	-767
FY 2004/2005 PRESBUDG Submission:	27,610	29,568	31,778	35,562

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BUDGET ACTIVITY: 2 PROGRAM ELEMENT:0602131M
PROGRAM ELEMENT TITLE: Marine Corps Landing Force Technology

PROGRAM CHANGE SUMMARY EXPLANATION:
Schedule: Not applicable
Technical: Not applicable

FY 2004/2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2003
Exhibit R-2a

BUDGET ACTIVITY: 2 PROGRAM ELEMENT: 0602131M Project Title: Marine Corps Landing Force Technology
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COST: (Dollars in Thousands)

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B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY02	FY03	FY04	FY05
Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR)	2,115	2,000	3,500	4,079

This activity provides technologies for secure, robust, self-forming, mobile communications networks; distributed computing to support information dissemination to all echelons; and sensors, software and data processing to support formation of appropriate common picture.

FY 2004/2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2003
Exhibit R-2a
BUDGET ACTIVITY: 2 PROGRAM ELEMENT: 0602131M Project Title: Marine Corps Landing Force Technology
PROGRAM ELEMENT TITLE: Marine Corps Landing Force Technology

FY 2002 ACCOMPLISHMENTS:

- Initiated high-density data storage (rugged, no moving parts) applied research program. Began developing chip manufacturing processes for the purpose of developing and testing prototype devices applicable to tactical systems.
- Completed Command and Control testbed for testing interoperability, usability and military suitability of developmental software and hardware.
- Continued Joint Tactical Radio System (JTRS) architecture and standards development work for transfer to the JTRS Joint Program Office. Selected Wideband Networking Waveform Standard Version 1.
- Completed wearable Very High Frequency/Ultra High Frequency vest antenna work (human effects/safety certification, ruggedness, prototype development) for transition to acquisition command.
- Completed development of a black and white, still-frame imaging capability with infrared payload for the Infantry Reconnaissance Round. Completed initial testing.
- Completed C4I gateway technology development effort to perform trade-off studies and tests of possible solutions for first entry communications reach back.
- Designed prototype for airborne command and control capability (moved to Budget Activity 3).

FY 2003 PLANS:

- Initiate development of low-probability of interception, low-probability of detection ultra-wide band communications technologies.
- Initiate development of network management capabilities for the low-bandwidth, heterogeneous communications environment.
- Initiate development of network security technologies for low-bandwidth distributed environments.
- Complete Joint Tactical Radio System Standards and Architecture development. Complete JTRS network modeling and methods of employment.
- Continue development of high-density, solid-state data storage devices.
- Initiate development of vehicular conformal antenna technology.

FY 2004 Plans:

- Complete development and testing of low-probability of interception, low-probability of detection ultra-wide band communications.
- Continue development of network management capabilities for the low-bandwidth, heterogeneous communications environment.
- Continue development of network security technologies for low-bandwidth distributed environments.
- Continue development of high-density, solid-state data storage devices.
- Continue development of vehicular conformal antenna technology.
- Initiate peer-to-peer communications networking technologies development.

- Initiate distributed tactical database management technologies development.
- Initiate development of information management technologies applicable to tactical decision systems.

FY 2005 Plans:

- Continue development of network management capabilities for the low-bandwidth, heterogeneous communications environment.
- Continue development of network security technologies for low-bandwidth distributed environments.
- Complete development of high-density, solid-state data storage devices.
- Complete peer-to-peer communications networking technologies development.
- Complete distributed tactical database management technologies development.
- Complete information management technology development.
- Initiate intelligent agent technology development for decision support and dynamic information management.
- Initiate development of agent-based course-of-action inference tools.
- Complete development of conformal vehicle antennas and evaluate.

	FY 02	FY 03	FY 04	FY 05
Maneuver	5,035	2,311	4,300	4,750

This activity develops technologies to support and enhance survivability and mobility of forces ashore including vehicles and systems.

FY 2002 ACCOMPLISHMENTS:

- Initiated Marine Corps Air Ground Task Force (MAGTF) Expeditionary Family of Fighting Vehicles (MEFFV) Phase I Lightweight Materials Development effort of structural armor concepts and materials with multifunctional capabilities.
- Continued MEFFV modeling and simulation (M&S) of an urban warfare scenario with capabilities from new armor materials and concept platforms.
- Initiated enhancements to third generation Concept Validation Model (CVM) of the Unmanned Ground Vehicle.
- Initiated development and design for Unmanned Ground Vehicle (UGV) technologies.
- Initiated Joint Spectrum Center (JSC) study for UGVs.
- Initiated UGV survivability analysis/database development.
- Initiated Reconnaissance Surveillance and Targeting Vehicle (RST-V) control system improvements including power budgeting and battery management electric transmission mode implementation.
- Completed RST-V Build #3 configuration through trade studies, design, and hardware and control development.
- Completed RST-V survivability testing and analysis.

FY 2004/2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2003
Exhibit R-2a
BUDGET ACTIVITY: 2 PROGRAM ELEMENT: 0602131M Project Title: Marine Corps Landing Force Technology
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FY 2003 PLANS:

- Initiate MEFFV lethality study to drive science and technology investment.
- Begin MEFFV platform design and integration studies using modeling and design tools.
- Continue evolving the M&S tool development.
- Continue Lightweight Materials Development program, prepare for testing and down-selection process.
- Complete urban combat modeling runs over range of advanced vehicle concepts.

FY 2004 PLANS:

- Initiate Phase II of the MEFFV lightweight materials efforts to determine feasibility of scaling and producing candidate structural armor.
- Continue lethality analysis for the MEFFV and assess the commonality between the 10 ton and 30 ton MEFFV variants and technology trade-offs.
- Initiate the advanced combat vehicle propulsion design and development effort to investigate the trade-offs, technical feasibility and risk of advanced propulsion systems versus conventional propulsion systems.
- Initiate the concept design of a propulsion demonstrator platform (PDP) for use in assessing candidate propulsion systems and other technologies.
- Continue platform system design by applying Computer Aided Design (CAD) tools.

FY 2005 PLANS:

- Continue MEFFV design/development process and develop concept technologies in the area of mobility (propulsion) for assessment and evaluation.
- Initiate concepts and designs of the integrated MEFFV System utilizing the design tools developed in FY02 through FY04 and results of subsystem developments.
- Continue Phase II MEFFV Lightweight Materials efforts.
- Continue MEFFV development and fabrication of the PDP and associated analyses of integrating advanced propulsion technologies into the base system.
- Continue MEFFV lethality system analysis and select the design for integration into the PDP.
- Continue with Modeling and Simulation of detailed MEFFV concepts in accredited USMC and Joint Service scenarios.

	FY 02	FY 03	FY 04	FY 05
Logistics	1,370	1,600	2,100	2,600

FY 2004/2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2003
Exhibit R-2a

BUDGET ACTIVITY: 2 PROGRAM ELEMENT: 0602131M Project Title: Marine Corps Landing Force Technology
PROGRAM ELEMENT TITLE: Marine Corps Landing Force Technology

This activity develops technologies to enhance movement of material to end users ashore with emphasis on packaging, maintenance, sensors and distribution. Additionally it develops technologies that enhance expeditionary power and water generation.

FY 2002 ACCOMPLISHMENTS:

- Completed Expeditionary packaging technologies for biodegradable and non-expendable materials for improved distribution/throughput of Sustainment items for Sea Based Logistics
- Initiated Rapid Deployable Composite Bridging Program
- Initiated Lightweight Power Generation (3kw) initiatives within Expeditionary Energy Program.
- Initiated advanced surface coatings and materials technologies to be utilized in Depot level Reliability, Availability, and Maintainability (RAM) and Service Life Improvement Programs.

FY 2003 PLANS:

- Complete Rapid Deployable Composite Bridging Program.
- Complete advanced surface coatings and materials technologies to be utilized in Depot level Reliability, Availability, and Maintainability (RAM) and Service Life Improvement Programs.
- Continue development of Lightweight (3kw) Power Generation via Micro Turbine Technologies. (Moved to Budget Activity 3)
- Initiated development of Alternative Power initiatives: Hybrid Zinc Air batteries and Fuel Cells.

FY 2004 PLANS:

- Initiate the development of water generation/purification and distribution program to demonstrate feasibility of performance improvement.
- Continue development of Alternative Power initiatives: Hybrid Zinc Air batteries and Fuel Cells.

FY 2005 PLANS:

- Continue the development of water generation/purification and distribution program to demonstrate feasibility of performance improvement.
- Continue development of Alternative Power initiatives: Hybrid Zinc Air batteries and Fuel Cells.

	FY 02	FY 03	FY 04	FY 05
TRAINING & EDUCATION	2,611	3,162	2,100	2,595

This activity develops advanced training technology and technologies that enhance neural and cognitive aspects of human performance including portable synthetic environment generation.

FY 2002 ACCOMPLISHMENTS:

- Completed evaluation of technologies available for the development of a Combat Service Support Element (CSSE) (Logistics) Tactical Decision-making Simulation (TDS). Developed a conceptual model for a TDS that will be used to supplement the program of instruction for the Logistics Officer's Course.
- Completed evaluation of potential technologies for the development of a Portable Synthetic Environment Generation capability. Developed a conceptual model for a system that will be capable of automatically producing a three dimensional synthetic database from a video stream of real world terrain and cultural features in a 'common' database format suitable for Close Quarter Battle (CQB) and Military Operations in Urban Terrain (MOUT) training.
- Completed assessment of the organizational and technological needs of the 4th Marine Expeditionary Brigade, Anti-Terrorism (4th MEB AT) and provided a final report for the Center For Emerging Threats and Opportunities.
- Initiated technology search and experimentation in the areas of combating terrorism and thermobaric weapons for the Center For Emerging Threats and Opportunities (CETO).

FY 2003 PLANS:

- Initiate evaluation of technologies available for the development of a Combating Terrorism (Cbt) Tactical Decision-making Simulation (TDS).
- Initiate development of technologies required to produce a prototype of a Combat Engineering Tactical Decision-making Simulation (TDS) to supplement the program of instruction for the Engineer Officer's Course.
- Initiate development of technologies required to produce a prototype of a Combat Service Support Element (CSSE) Tactical Decision-making Simulation (TDS) to supplement the program of instruction for the Logistics Officer's Course. Transition to higher level S&T (6.3) for product testing, evaluation, and demonstration.
- Initiate development of promising technologies for the development of a Rapid Portable Synthetic Environment Generation capability.
- Continue technology search and experimentation in the areas of combating terrorism, support for the 4th MEB AT, and thermobaric weapons for the Center For Emerging Threats and Opportunities (CETO)
- Initiate evaluation of technologies available for instrumentation and enhanced situational awareness in a Military Operations in Urban Terrain (MOUT) training environment.

FY 2004 PLANS:

- Continue development of technology to produce a prototype of a Combating Terrorism (Cbt) Tactical Decision-making Simulation (TDS).
- Initiate evaluation of technologies available for the development of Air Combat Element (ACE) and Command Element (CE) Tactical Decision-making Simulations (TDS).

- Evaluate candidate technologies available for the development of a Portable Synthetic Environment Generation capability.
- Develop and evaluate technologies available for instrumentation and enhanced situational awareness in a Military Operations in Urban Terrain (MOUT) training environment.
- Initiate development and evaluation of technologies available for the development of a Training Mission Support Center (TMSC).
- Initiate augmented cognition program to improve human cognition via multiple sensory modalities. This will provide improved human performance for complex cognitive tasks to include: reduced error rates; faster response times and enhanced task switching, especially under high stress.

FY 2005 PLANS:

- Continue to develop technologies available for the development of an Air Combat Element (ACE) and Command Element (CE) Tactical Decision-making Simulation (TDS).
- Initiate the development of a Rapid Portable Synthetic Environment Generation capability.
- Continue to develop and evaluate technologies available for instrumentation and enhanced situational awareness in a Military Operations in Urban Terrain (MOUT) training environment.
- Continue to develop and evaluate technologies available for the development of a Training Mission Support Center (TMSC).
- Continue Augmented Cognition/Enhanced Human Performance (Aug Cog) applied research efforts in the areas of human perception, memory, attention, focus and other neural warfighting attributes.

	FY 02	FY 03	FY 04	FY 05
Firepower	3,136	1,500	2,100	1,500

This activity develops technologies that enhance effectiveness and expand spectrum of lethality of Marines including non-lethals, and fire control technologies.

FY 2002 ACCOMPLISHMENTS:

- Initiated Tactical Weapons Control Station (TCS) software integration risk reduction in support of Dragon Warrior Unmanned Aerial Vehicle (UAV).
- Initiated assessment of micro-electro-mechanical systems (MEMS) technology developments for enabling possible integration into a targeting information system (TIS) to enhance firepower effects at ranges from near contact to 1-2 kilometers.
- Continued development of enhanced electro-optic signal processing and high performance, low cost uncooled Forward Looking Infra-Red (FLIR) for M1A1 Firepower Enhancement Program (FEP) technology insertion.

- Continued development of non-lethal weapons technology, e. g. neuro-muscular disruption (NMD) systems to deliver shock or trauma to multiple targets at greater than contact weapons ranges.

FY 2003 PLANS:

- Complete assessment of MEMS technologies for target information system (TIS) to enhance firepower effects.
- Complete TCS software risk reduction.
- Complete development of enhanced electro-optic signal processing and high performance, low cost uncooled FLIR in support of M1A1 FEP.
- Complete development of non-lethal NMD weapons technology for transition to Marine Corps Systems Command.

FY 2004 PLANS:

- Initiate development of technologies to improve far target location, extended range performance and detection of camouflaged/hidden targets in support of M1A1 FEP.
- Initiate concept development for a MEMS based TIS system.
- Initiate study of explosives technologies to improve firepower effectiveness while increasing affordability and decreasing logistical burden to Fleet Marine Force combat elements.

FY 2005 PLANS:

- Continue development of sensor technologies to improve firepower effectiveness while increasing affordability and decreasing logistical burden to Fleet Marine Force combat elements.
- Continue study of explosives technologies to improve firepower effectiveness while increasing affordability and decreasing logistical burden to Fleet Marine Force combat element.
- Complete concept development for a MEMS based TIS system.

	FY 02	FY 03	FY 04	FY 05
Mine Countermeasures (MCM)	N/A	1,350	2,609	3,000

This activity develops technologies to enable mine detection, neutralization, breaching and clearing from beach exit zone to the objectives.

FY 2002 ACCOMPLISHMENTS:

- Not applicable

FY 2003 PLANS:

- Initiate a tactically effective MCM capability program, which will become a functional component of Naval Expeditionary Maneuver Warfare (EMW).

- Initiate the evaluation of technologies relating to speed of detection (Stand-Off and Close-In), organic neutralization, assault breaching, tactical clearance, proofing, marking, and Command, Control, Communications, Computers and Intelligence (C4I) operations.

FY 2004 PLANS:

- Continue a tactically effective MCM capability program, which will become a functional component of Naval Expeditionary Maneuver Warfare (EMW).
- Continue Discovery and Invention (D&I) efforts to examine speed of detection (Stand-Off and Close-In), organic neutralization, assault breaching, tactical clearance, proofing, marking, and C4I operations. Examples of potential efforts include change detection, forward looking detection systems, unmanned ground vehicles with detection and marking capability, tailored explosives, advanced signature duplicators, and vehicle standoff neutralization systems.

FY 2005 PLANS:

- Continue a tactically effective MCM capability program, which will become a functional component of Naval Expeditionary Maneuver Warfare (EMW).
- Continue D&I efforts in the detection (Stand-Off and Close-In), organic neutralization, assault breaching, tactical clearance, proofing, marking, and C4I operations to identify transition to 6.3 Advanced Technology Development projects.

	FY 02	FY 03	FY 04	FY 05
Littoral Combat/Power Projection	13,343	17,645	15,069	17,038

This activity provides the capability for the demonstration and transition of technologies developed through the Marine Corps Science and Technology program.

FY 2002 ACCOMPLISHMENTS:

- Initiated study of surface craft maneuver in support of Ship to Objective Maneuver (STOM) in terms of communications needs, information needs, planning needs, and navigation needs.
- Initiated development of diver operated tactical hydrographic survey equipment for underwater reconnaissance capability.
- Initiated lethality effectiveness study and analyses of advanced kill mechanisms via analytic modeling and destructive testing.
- Initiated and released Broad Agency Announcement for technology development in the areas of Beyond Line of Sight communications, Intelligence, Surveillance and Reconnaissance (ISR) sensor packages, and maneuver planning.

- Obtained software programmable radios for use in demonstrations of secure wireless large area networks.

FY 2003 PLANS:

- Develop prototype Expeditionary Fires technologies to include platform and weapon stabilization techniques to enable firing on the move.
- Complete STOM study and architecture development. Implement technology roadmap recommendations.
- Complete development and demonstration of diver operated tactical hydrographic survey system. Transition to USMC Underwater Reconnaissance Capability program for acquisition.
- Complete lethality effectiveness study and provide results to USMC Expeditionary Fire Support System (EFSS) program.
- Award contract from Broad Agency Announcement (BAA) process for Advanced Amphibious Assault Vehicle (AAAV) obstacle avoidance system development and integration.
- Award contract from BAA process for Beyond Line of Sight (BLOS) tactical communications connectivity for use by maneuver forces.
- Initiate development of sensor technology packages for tactical platforms to include Electro-Optical/Infrared (EO/IR) and Chemical/Biological agent detection systems.
- Develop target acquisition technologies for achieving interoperability with US/Joint/Coalition close air support platforms.
- Develop, evolve and demonstrate technology solutions that provide tools for Marine ground forces that support the conduct of military decision-making process in the planning, evaluation, and execution of Expeditionary Maneuver Warfare.
- Initiate the development, integration and demonstration of an advanced Position Location Information (PLI) and range instrumentation system

FY 2004 PLANS:

- Continue development of planning and decision-making tools for Marine ground forces. Test the software and evaluate during training exercises.
- Complete the development of the PLI system and transition to the Multiple Integrated Laser Engagement System program.
- Continue development of BLOS tactical communications connectivity for use by maneuver forces.
- Continue development and integration of AAAV obstacle avoidance system.
- Continue development and integration of sensor technology packages for tactical platforms
- Initiate development of an architecture to network existing expeditionary fires systems.

FY 2005 PLANS:

- Continue development of planning and decision-making tools for Marine ground forces. Test the software and evaluate during training exercises.
- Demonstrate AAAV obstacle avoidance system and transition to acquisition.
- Demonstrate beyond line of sight tactical communications connectivity during a scheduled training exercise.
- Demonstrate and analyze data acquired by integrated sensor packages flown on tactical platforms.
- Complete target acquisition technologies for achieving interoperability with US/Joint/Coalition close air support platforms.
- Demonstrate a limited netted fires capability between systems.

C. OTHER PROGRAM FUNDING SUMMARY:

NAVY RELATED RDT&E: This program adheres to Tri-Service Reliance Agreements in Chemical/Biological Defense; Command, Control and Communications; Conventional Air/Surface Weaponry; Electronic Devices; Ground Vehicles; Ships and Watercraft; Manpower and Personnel; and Training Systems.

PE 0601152N (In-House Laboratory Independent Research)
PE 0601153N (Defense Research Sciences)
PE 0204163N (Fleet Telecommunications (Tactical))
PE 0602235N (Common Picture Applied Research)
PE 0602782N (Mine and Expeditionary Warfare Applied Research)
PE 0603782N (Mine and Expeditionary Warfare Advanced Technology)
PE 0603235N (Common Picture Advanced Technology)
PE 0206623M (Marine Corps Ground/Supporting Arms Systems)
PE 0603640M (Marine Corps Advanced Technology Demonstrations)
PE 0603612M (Marine Corps Mine Countermeasures)
PE 0603635M (Marine Corps Ground Combat/Support System)
PE 0206313M (Marine Corps Communications Systems)
PE 0603236N (Warfighter Sustainment Advanced Technology)

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 Programs)
PE 0603619A (Landmine Warfare and Barrier Advanced Development)
PE 0603772A (Advanced Tactical Computer Science and Sensor Technology)
PE 0604710A (Night Vision Systems-Engineering Development)

FY 2004/2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2003
Exhibit R-2a

BUDGET ACTIVITY: 2 PROGRAM ELEMENT: 0602131M Project Title: Marine Corps Landing Force Technology
PROGRAM ELEMENT TITLE: Marine Corps Landing Force Technology

PE 0604808A (Landmine Warfare/Barrier Engineering Development)
PE 0602301E (Computing Systems and Communications Technology)
PE 0602702E (Tactical Technology)

D. ACQUISITION STRATEGY: Not applicable