Exhibit R-2, PB 2010 Navy RDT&E Budget Item Justification									DATE: May 2009	
APPROPRIATION/BUDGET ACTIVITY 1319 - Research, Development, Test & Evaluation, Navy/BA 3 - Advanced Technology Development (ATD)					R-1 ITEM NOMENCLATURE PE 0603640M USMC ADVANCED TECHNOLOGY DEMONSTRATION (ATD)					
COST ($ in Millions)	**FY 2008 Actual**	**FY 2009 Estimate**	**FY 2010 Estimate**	**FY 2011 Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
Total Program Element	90.671	103.296	107.363						Continuing	Continuing
2223: MARINE CORPS ATD	45.979	59.166	70.743						Continuing	Continuing
2297: CMC WARFIGHTING LAB CORE	37.172	36.271	36.620						Continuing	Continuing
9999: CONGRESSIONAL PLUS-UPS	7.520	7.859	0.000						Continuing	Continuing

A. Mission Description and Budget Item Justification

The efforts described in this Program Element (PE) are based on investment directions as defined in the Naval Science and Technology (S&T) Strategic Plan approved by the S&T Corporate Board (Jan 2007). This strategy is based on needs and capabilities from Navy and Marine Corps guidance and input from the Naval Research Enterprise (NRE) stakeholders (including the Naval enterprises, the combatant commands, the Chief of Naval Operations (CNO), and Headquarters Marine Corps). It provides the vision and key objectives for the essential S&T efforts that will enable the continued supremacy of U.S. Naval forces in the 21st century. The Strategy focuses and aligns Naval S&T with Naval missions and future capability needs that address the complex challenges presented by both rising peer competitors and irregular/asymmetric warfare.

As a key component of naval expeditionary forces, the Marine Corps has unique and technologically stressing requirements because of its expeditionary mission and intensive operational tempo, Marine Air-Ground Task Force (MAGTF) structure, and conduct of maneuver warfare. Critical requirements in this program element (PE) are: Command, Control, Communications, Computers (C4), Intelligence, Surveillance, and Reconnaissance (ISR); maneuver techniques and means; force protection; logistic sustainment; human performance, training and education; and firepower. There are ongoing actions to develop and demonstrate advanced technologies and concepts in operational environments. Joint service efforts are aligned with Defense Technology Objectives and Joint Warfighting Capability Objectives. In addition, there is funding for experimentation in warfighting concepts as well as operational assessment of emerging technologies, to include technical support of operating forces to assess military utility of selected technologies. This PE specifically supports: continued development of Distributed Operations (DO) through field experiments with Marine infantry battalions; rapid response to low-, mid-, and high-intensity conflicts in the Overseas Contingency Operation (OCO); methods for countering irregular threats; and expansion of seabasing and naval force packaging capabilities. The investment directly assists in fulfilling the forward presence requirements of Sea Shield and the transformational capabilities prescribed by Sea Strike. The Future Naval Capability (FNC) process is supported and funds are programmed accordingly. This PE is largely focused on demonstration of products and capabilities from the knowledge base and Discovery

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and Invention (D&I) phases of Naval Science and Technology (S&T). As Naval partners, the Navy and Marine Corps S&T Team strive to transition technologies that will implement objectives outlined in the Naval Operations Concept. This PE also funds technical solutions designed to increase Naval force capability, such as the Naval Expeditionary Combat Command. Investments in S&T provide the opportunities for future capabilities and will prevent technological surprise. The PE as a whole will advance the amphibious and expeditionary capabilities for the Combatant Commanders helping to meet their emerging challenges by enhancing Naval S&T contributions to the long commitment to the OCO.

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

B. Program Change Summary ($ in Millions)

	FY 2008	FY 2009	FY 2010	FY 2011
Previous President's Budget	77.760	100.787	107.461	
Current BES/President's Budget	90.671	103.296	107.363	
Total Adjustments	12.911	2.509	-0.098	
Congressional Program Reductions		-5.334		
Congressional Rescissions				
Total Congressional Increases		7.880		
Total Reprogrammings	-2.000			
SBIR/STTR Transfer	-0.755			
Net OCO Supplemental	15.666			
Program Adjustments			-0.161	
Rate/Misc Adjustments		-0.037	0.063	

Congressional Increase Details ($ in Millions)	FY 2008	FY 2009
Project: 9999, **BALLISTIC HELMET DEVELOPMENT**	0.000	1.197
Project: 9999, **CRAFT INTEGRATED ELECTRONIC SUITE (CIES)**	2.313	2.872
Project: 9999, **DUAL STAGE ULTRA RELIABLE WATER FILTRATION TECHNOLOGY DEVELOPMENT**	1.928	0.000
Project: 9999, **GROUND WARFARE ACOUSTICAL COMBAT SYSTEM OF NETTED SENSORS**	0.000	1.995
Project: 9999, **MARINE AIR-GROUND TASK FORCE SITUATIONAL AWARENESS**	0.965	0.997
Project: 9999, **MEMS MICRODETONATOR PACKAGING TECHNOLOGY**	2.314	0.000
Project: 9999, **NEAR INFRARED OPTICAL (NIRO) AUGMENTATION SYSTEM**	0.000	0.798

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Change Summary Explanation

Technical: FY 2009 reflects funding for a DoD directed integrated capability demonstration supporting the Protection of Ground Forces and Systems. DoD directed this initiative in response to the determination that its S&T investment is likely too small to meet the imposing security threats that challenge our Nation, and it may not be adequately postured to take advantage of key scientific and technological opportunities that offer breakthrough advantages to our warfighters. This broad, multi-year (through the FYDP) initiative will expand existing technology integration and increase/spur the application of more fundamental technologies to force and platform protection. The goal is multiple broad phased force protection applications and technologies, with off-ramps for fielding successes; therefore, funding associated with this DoD initiative is reflected throughout the PE. In FY 2010 preparation efforts continue in areas of technology that are ready for major, integrated technology demonstration. All technical work is being coordinated throughout DoD on these demonstrations. In areas such as vehicle technology demonstrations, the goal is to deliver multiple classes of advanced technology ground vehicle demonstrations leading to new classes of protective, efficient, ground vehicles.

Schedule: Project 2297, Worldwide contingency and combat operations (i.e. Operation Iraqi Freedom (OIF) campaigns, humanitarian efforts, and others) have increased the operations tempo of United States Operating Forces to the extent that their support of and participation in the Marine Corps Warfighting Laboratory (MCWL) Advanced Warfighting Experiments (AWEs) Sea Viking (SV) 2004, 2006, and 2008 was/remains substantially reduced. Events are 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.

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COST ($ in Millions)	FY 2008 Actual	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
2223: MARINE CORPS ATD	45.979	59.166	70.743						Continuing	Continuing

A. Mission Description and Budget Item Justification

Critical Marine Corps requirements/imperatives addressed in this Project are: Maneuver; Force Protection; Human Performance, Training and Education; Logistics; Command, Control, Communications and Computers (C4); Intelligence, Surveillance and Reconnaissance (ISR) 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 prototyped to reduce risk in System Concept Development and Demonstration. A tactically effective Mine Countermeasures (MCM) capability is vital to Force Protection and necessary if Maneuver on land is to become a functional component of Naval Expeditionary Maneuver Warfare. 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 Military Operations in Urban Terrain (MOUT), and in Operations other than War (OOTW); and 3) 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 related Enabling Capability (EC) within the Future Naval Capabilities (FNC) portfolio. The focus of the EC within this PE is 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 and is one of the highest ranked Capability Gaps prioritized by the Chief of Naval Operations and the Marine Corps Combat Development Command (MCCDC). The UAEO technology gap is being pursued as part of an overall effort that addresses the Sea Strike Capability Gap.

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
COMMAND, CONTROL, COMMUNICATIONS, COMPUTERS (C4)	0.000	3.740	6.016	
This activity integrates and demonstrates enhanced communications and situational awareness in warfighting environments and communication and situational awareness technologies for near term USMC operations. The focus is on development and leveraging advanced C4 technologies to enable enhanced Distributed Operations, Irregular Warfare, and Marine Corps Expeditionary Warfare. Specifically, the C4 Thrust intends to demonstrate markedly improved capabilities in over-the-horizon (OTH), beyond line-of-				

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B. Accomplishments/Planned Program ($ in Millions)		**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**

sight, and restricted environment communications; mobile networking; tactical decision making; tactical situational awareness; and small unit position location and navigation. Advanced technology resources will be applied to complement commercial, other service, and defense agency investments to produce a technology base to address identified Marine Corps technology gaps.

In FY 2008, this effort was funded in the C4ISR activity within this PE.

FY 2009 reflects a funding increase for a DoD directed integrated capability demonstration supporting the Protection of Ground Forces and Systems. This capability demonstration has been directed to be wide ranging and encompass technologies for:
- Pre-detonation of IEDs;
- Personal protection materials;
- Personal power generation;
- Micro power sources; and
- Augmented reality.

The C4 activity directly supports the integrated demonstration program, which will be a broad, multi-year thrust to both investigate technology integration as well as spur application of more fundamental technologies to force and platform protection. The goal is multiple broad phased force protection applications and technologies, with off-ramps for fielding successes.

The FY 2009 to FY 2010 increase in funding is due to acceleration of the schedule of the Software Reprogrammable Payload and Satellite Communications On-The-Move Integration efforts in order to meet transition milestones. The FY 2010 resources complete the SRP program S&T and enables transition the capability to 6.4. SRP is a high priority Navy/MC Aviation program that will enable on-the-fly reconfigurable, multiple, simultaneous missions and applications in a single payload. Navy will deliver an integrated hardware prototype, software, firmware, and supporting documentation to the transition sponsor (Navy/MC Aviation).

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B. Accomplishments/Planned Program ($ in Millions)		**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
FY 2009 Plans: - Continue urban navigation with limited Global Positioning System availability demonstrations. (Realigned from C4ISR Activity) - Continue demonstrations of improved urban communications capabilities. (Realigned from C4ISR Activity) - Continue creating a service oriented sensor network for expeditionary forces' current and future tactical sensors. (Realigned from C4ISR Activity) - Continue developing tailored tactical Human to Machine Interfaces aligned to primary operational functions and non-intrusive within the battlespace. (Realigned from C4ISR Activity) - Continue creating services for the tactical network that are fully operable with DCGS and the DCGS Integration Backbone. (Realigned from C4ISR Activity) - Complete conformal antenna integration and demonstrations. (Realigned from C4ISR Activity) - Initiate an Assured Connectivity effort to develop waveforms suited to maintaining low data rate links under extreme conditions. *FY 2010 Plans:* - Continue all efforts of FY 2009, less those noted as completed above. - Complete Common Operational Picture Fusion Tools efforts, Software Reprogrammable Payload, Satellite Communications On-The-Move integration and demonstration, and C3 for the Individual Marine Spiral One.					
COMMAND, CONTROL, COMMUNICATIONS, COMPUTERS, AND INTELLIGENCE, SURVEILLANCE AND RECONNAISSANCE (C4ISR) 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 2009 reflects both Command, Control, Communications, Computers (C4) and Intelligence, Surveillance and Reconnaissance (ISR) efforts and funding now being placed into separate activities within this PE.		5.161	0.000	0.000	

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
FY 2008 Accomplishments: - Continued integration and demonstration of naval tactical warfighting applications and network connectivity. - Continued development and demonstration of low-cost compact conformal antenna capability. - Continued development and demonstration of urban communications capability. - Continued efforts to reduce the risk in investing in the ability to see through urban structures in an effort to identify enemy personnel or other assets. - Continued designing tools for mission specific tactical sensor fields capable of fulfilling specific mission objectives. - Continued developing smart tactical sensors, platforms and algorithms capable of forwarding information/knowledge vice raw data. - Continued creating a service oriented sensor network for expeditionary forces' current and future tactical sensors. - Continued creating fusion tools capable of translating tactical sensor data into appropriate situational awareness for expeditionary forces in near real-time. - Continued designing autonomous platforms and automatic sensor planning and management tools to ensure that the right data is collected by the right sensor in support of intelligence requirements. -Continued developing tailored tactical Human to Machine Interfaces aligned to primary operational functions and non-intrusive within the battlespace. - Continued creating services for the tactical network that are fully operable with DCGS and the DCGS Integration Backbone. - Continued development and demonstration of measurement and signature intelligence data management and integration capability. - Continued demonstrations of tagging, tracking and locating various adversarial targets. - Continued development of adaptable enemy course of action engine (smart algorithms) development to interfere with or influence adversarial plans. - Completed efforts to reduce the risk in investing in the ability to see through urban structures in an effort to identify enemy personnel or other assets. - Initiated demonstrations of improved urban communications capabilities. - Initiated urban navigation with limited Global Positioning System availability demonstrations.				

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B. Accomplishments/Planned Program ($ in Millions)		**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
- Initiated development of advanced tactical sensor nets that will localize mobile detection of threats.					
FIREPOWER 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 2009 reflects an increase for emerging priority requirements in lightening the load of the individual Marine while simultaneously enhancing the combat capabilities of the Marine Corps Rifle Squad and for a DoD directed integrated capability demonstration supporting the Protection of Ground Forces and Systems. This capability demonstration has been directed to be wide ranging and encompass technologies for: - Pre-detonation of IEDs; - Personal protection materials; - Personal power generation; - Micro power sources; and - Augmented reality. The Firepower activity directly supports the integrated demonstration program, which will be a broad, multi-year thrust to both investigate technology integration as well as spur application of more fundamental technologies to force and platform protection. The goal is multiple broad phased force protection applications and technologies, with off-ramps for fielding successes. The FY 2009 to FY 2010 funding decrease results from earlier than planned completion of research on Lightweight Machine Gun Barrel technology. *FY 2008 Accomplishments:* - Continued scalable effects conventional warhead concept development.		3.147	6.167	5.980	

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B. Accomplishments/Planned Program ($ in Millions)		**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**

- Continued shipboard submunition Microelectromechanical System (MEMS) fuze safety and reliability enhancement effort from PE 0602131M.
- Continued MACHSI advanced technology development.
- Continued enhanced lethality and extended range ammunition demonstrations.
- Completed development of caseless small caliber ammunition.
- Initiated improved mortar munition integration and demonstrations.
- Initiated development of targeting and engagement technologies for distributed operations collaborative fires integration and demonstrations.
- Initiated a Wind Sensing Program to provide technology that senses wind velocity & direction at firing point to apogee and supporting algorithms to compensate the computed/predicted wind effects on the ballistic flight of the 81mm mortar round in order to enhance weapon accuracy.

FY 2009 Plans:
- Continue all efforts of FY 2008, less those noted as completed above.
- Complete shipboard submunition MEMS fuze safety and reliability enhancement effort.
- Complete enhanced lethality and extended range ammunition demonstrations.
- Initiate an effort in Ballistic Flight Compensation Aiming in support of Distributed Operations Precision Engagement.
- Initiate design and prototyping of lightweight technologies that provide individual Marines enhanced capabilities to detect and identify man-size targets out to at least the maximum effective range of their personal weapons during all conditions (daylight, limited visibility, & darkness) by integrating multiple capabilities into a single system.
- Initiate a Flight Control Kinematic Unit effort. Design & develop technology that provides guidance, navigation, and controls (GNC) to 81mm mortar rounds to enable trajectory shaping in urban environment to precisely & accurately strike specific targets.

FY 2010 Plans:
- Continue all efforts of FY 2009, less those noted as completed above.
- Complete research on Lightweight Machine Gun Barrel technology to develop a lighter weight machine gun barrel with longer service life. (Relates to the FY 2009 Flight Control Kinematic Unit effort).

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
FORCE PROTECTION	0.000	6.192	7.093	

This activity supports the Force Protection Thrust's Advanced Technology Demonstration efforts in the areas of individual Marine platforms, equipment and autonomous systems. This includes technologies to enable detection, neutralization, breaching, and clearing of mines, Improvised Explosive Devices (IEDs), and unexploded ordnance from the beach exit to inland objectives. Efforts supported under Force Protection also include the demonstration of technologies such as Counter Rocket, Artillery, and Mortar (CRAM) and Counter Sniper technologies in support of maneuver warfare, small unit distributed operations, and fixed installation protection and technologies for improved Personnel Protective Equipment for individual protection against blast, ballistic, and blunt impact threats as well as in a chemical, radiological, and biological environment. Physical Security technologies to support expeditionary maneuver warfare, pier/port and base infrastructure are also addressed under this thrust. Beginning in FY 2009, Mine Countermeasures (MCM) efforts will be funded within the Force Protection activity. FY 2009 is the first reporting cycle where Force Protection Thrust efforts are separated from the Maneuver activity. Counter–IED and Counter–RPG Technologies remain high priority Marine Corps focal areas.

FY 2009 reflects additional funding for a DoD directed integrated capability demonstration supporting the Protection of Ground Forces and Systems. This capability demonstration has been directed to be wide ranging and encompass technologies for:
- Pre-detonation of IEDs;
- Personal protection materials;
- Personal power generation;
- Micro power sources; and
- Augmented reality.

The Force Protection activity is central to the integrated demonstration program, which will be a broad, multi-year thrust to both investigate technology integration as well as spur application of more fundamental technologies to force and platform protection. The goal is multiple broad phased force protection applications and technologies, with off-ramps for fielding successes.

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B. Accomplishments/Planned Program ($ in Millions)		**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
FY 2009 Plans: - Continue development of technologies to defeat side/top attack and advanced fuze mines through signature reduction and advanced signature duplication. - Continue development of technologies to locate and defeat IEDs. - Continue development of technologies to defeat advanced mine fuzes (seismic, acoustic, and infrared). - Continue efforts to detect IEDs using radio frequency sources. - Continue technology development programs to address force protection capability gaps. - Complete studies to identify technology development plans and develop roadmaps to close identified force protection capability gaps. - Complete design of a novel low passive inter-modulation wideband antenna for use against multiple classes of radio frequency triggered IEDs. - Complete investigation of polarization diversity designs to counter specific placements and orientations of radio frequency triggered IEDs. - Initiate new Explosives Hazard Defeat to address the Suicide-Bomber threat. This effort will combine multiple sensor modalities, analysis algorithms, and data fusion to demonstrate high Pd, low FAR detection of suicide bombers from standoff distances from multiple aspect angles. - Initiate a new Anti-Tank Guided Missile (ATGM) effort to defeat ATGMs in complex urban environment. - Initiate Warfighter modeling and simulation efforts for the Warfighter-as-a-System analysis approach and methodology combining survivability, mobility, and warfighter performance parameters. *FY 2010 Plans:* - Continue all efforts of FY 2009 less those noted as completed above. - Complete advanced countermeasures technology development against magnetic fuzed landmines. - Complete development of point detection of explosives associated with IEDs. (Relates to the FY 2009 plan to detect IEDs using radio frequency sources). - Initiate high-power solid state source development for IED neutralization. - Initiate vulnerability assessment of threat targeting sensors to directed energy.					
HUMAN PERFORMANCE, TRAINING & EDUCATION		3.036	7.504	9.230	

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
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 2009 reflects an increase for enhanced requirements in support of Distributed Operations and for a DoD directed integrated capability demonstration supporting the Protection of Ground Forces and Systems. This capability demonstration has been directed to be wide ranging and encompass technologies for: - Pre-detonation of IEDs; - Personal protection materials; - Personal power generation; - Micro power sources; and - Augmented reality. The Human Performance, Training and Education activity is key to the integrated demonstration program, which will be a broad, multi-year thrust to both investigate technology integration as well as spur application of more fundamental technologies to force and platform protection. The goal is multiple broad phased force protection applications and technologies, with off-ramps for fielding successes. The FY 2009 to FY 2010 funding increase is due to enhanced development of early prototype systems for Human Performance and Training efforts (Cognitive and physical enhancement, modeling and simulation, and virtual reality and mixed reality squad level training in support of the Marine Corps concept for Distributed Operations). *FY 2008 Accomplishments:* - Continued the development of tools to capture metrics and lessons learned from a variety of simulation and training sources.				

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B. Accomplishments/Planned Program ($ in Millions)		**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
- Continued Marine Advanced Combat Headborne Initiative (MACHSI): physical protection of the head, neck and face. (Transitioned from the Firepower activity.) - Continued development of the Distributed Operations Training/Virtual Test Bed. - Continued research into environmental effects on cognitive and team performance. - Completed research into augmented reality training systems to enhance warfighter performance in urban combat. - Completed integration of cognitive performance improvement (augmented cognition) technology using operationally relevant systems and scenarios, and demonstrate improved human cognition via multiple sensory modalities. - Completed development of immersive closed loop training system for MOUT. *FY 2009 Plans:* - Continue all efforts of FY 2008, less those noted as completed above. - Initiate development of adaptive experiential learning tools for Distributed Operations Training. - Initiate in-depth analysis, state-of-the-art report, and testing on all USMC physical training regimens, their effectiveness and their injury incidence rates. - Initiate development of “Warfighter as a System” modeling tools. - Initiate development of automated behavioral and neurophysiological performance measurement technologies for Distributed Operations Warfighter assessment, classification and assignment to training. - Initiate Human Performance and Training capabilities (Cognitive and physical enhancement, modeling and simulation, virtual reality squad level training) in support of Distributed Operations. - Initiate demonstrations and field studies of mitigation/augmentation capabilities that enhance squad level communication in support of Distributed Operations. - Initiate development of a Distributed Operations virtual reality simulation training system prototype that will be scalable across fire team, squad, and platoon. - Initiate Lightening the Load efforts aimed at developing the software necessary to conduct trade off analysis on a physically and ergonomically accurate model of the United States Marine and its infantry equipment. - Initiate new Experiential Learning Technologies to improve the Infantry Immersive Trainer to support the Squad Immersive Training Environment (SITE) Marine Corps Urgent Needs Statement. This includes					

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B. Accomplishments/Planned Program ($ in Millions)		**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
developing tracking, Helmet Mounted Displays, and software technologies to enable Augmented Reality in unimproved locations. *FY 2010 Plans:* - Continue all efforts of FY 2009, less those noted as completed above. - Initiate evaluations and validations of applications geared towards peak neural and cognitive performance-in distributed operations. - Initiate Distributed Operations training system investigations into perceptual skills enhancement that lead to enhanced cognition and decision making. - Initiate development of early prototype systems for Human Performance and Training efforts (Cognitive and physical enhancement, modeling and simulation, and virtual reality and mixed reality squad level training in support of Distributed Operations).					
INTELLIGENCE, SURVEILLANCE, AND RECONNAISSANCE (ISR) This activity supports the demonstration of technologies to enhance situational awareness and tactical decision making through automated analysis, fusion of data, rapid integration of information, and acquired knowledge resulting in actionable intelligence at the lower command levels. The activity includes the demonstration of ISR efforts involving enhanced reconnaissance and persistent surveillance, and sensors for unmanned ground and aerial vehicles. Advanced Technology demonstrations also include the collection of information [monitoring, sensing, and locating] in the 3D urban battlespace as well as exploiting information [identifying and classifying data] as part of the intelligence preparation of the battlespace in order to facilitate operational maneuver and distributed operations. In FY 2008, this effort was funded in the C4ISR activity within this PE. FY 2009 reflects an increase for a DoD directed integrated capability demonstration supporting the Protection of Ground Forces and Systems. This capability demonstration has been directed to be wide ranging and encompass technologies for: - Pre-detonation of IEDs; - Personal protection materials;		0.000	2.351	3.140	

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B. Accomplishments/Planned Program ($ in Millions)		**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
- Personal power generation; - Micro power sources; and - Augmented reality. The ISR activity directly supports the integrated demonstration program, which will be a broad, multi-year thrust to both investigate technology integration as well as spur application of more fundamental technologies to force and platform protection. The goal is multiple broad phased force protection applications and technologies, with off-ramps for fielding successes. The FY 2009 to FY 2010 funding increase is due to planned acceleration of work to refine enemy course of action prediction software to adapt to stimuli. *FY 2009 Plans:* - Continue development of advanced tactical sensor nets that localize mobile detection of threats in a complex environment. (Realigned from C4ISR Activity) - Continue development and demonstration of measurement and signature intelligence data management and integration capability. (Realigned from C4ISR Activity) - Continue integration and demonstration of naval tactical warfighting applications and network connectivity. - Continue tagging, tracking, and locating efforts to demonstrate the effectiveness of tactically relevant tag readers which support track classification algorithms. (Realigned from C4ISR Activity) - Continue efforts to refine enemy course of action prediction software to adapt to stimuli. (Realigned from C4ISR Activity) - Continue and initiate new Actionable Intelligence for Expeditionary and Irregular Warfare efforts which include Human Network Decision Modeling and the fusion across modeling approaches to increase prediction accuracy. (Realigned from C4ISR Activity) - Initiate development of tactical sensor nets with organic unattended multi-level security processing and information dissemination.					

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B. Accomplishments/Planned Program ($ in Millions)		**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
- Initiate new Relevant and Situational Information on Demand such as Identity Dominance Enabled by an Integrated Biometric/Tag Track and Locate (TTL) Capability, providing human tracking algorithms based on models of biometric (face, voice and soft) and TTL (optical taggant) capabilities and modeling a biometric/optical taggant system relevant to human tracking across an urban 5 km x 2 km area. - Initiate new Sensor Fields efforts such as Nanotechnology Enabled Witness Fields, development of sensors that provide near real time decision support to distributed operations by detecting specific interactions, and nanotechnology efforts which offer the potential to revolutionize tactical sensors. To enable this capability, nanomaterials that change state in the presence of another nanomaterial will be developed. *FY 2010 Plans:* - Continue all efforts of FY 2009, less those noted as completed above. - Complete efforts to refine enemy course of action prediction software to adapt to stimuli. - Initiate tagging, tracking, and locating efforts to demonstrate a system that will automatically translate large amounts of wide area surveillance data into tracks, useful to expose entity to entity associations; build urban context, as well as detect events and anomalies; and associate objects, tasks, locations and events for creating actionable intelligence. - Initiate algorithm development for base classification on context, similarity to clutter, and nearness to suspicion. - Initiate efforts to analyze and expose enemy networks using close observations of entity to entity associations and social network analysis. - Initiate efforts to develop methods and techniques for investigating open source information on the Internet to form a human terrain map indicating space and time features to aid network identification and prediction of enemy activity. - Initiate efforts to incorporate social models for human decision making with statistical models.					
LITTORAL COMBAT/POWER PROJECTION (LC/PP) This activity is aligned with the Sea Strike, Sea Shield, Sea Basing and FORCEnet pillars and provides the capability for the demonstration and transition of technologies developed through the related Marine		14.480	16.675	17.111	

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B. Accomplishments/Planned Program ($ in Millions)		**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**

Corps S&T programs directly to an acquisition program of record. Littoral Combat/Power Projection is the Enabling Capability (EC).

The funding profile reflects the alignment of the FNC program investments into ECs. Funding for each EC is aligned to a 6.2 or 6.3 Budget Activity (BA) as appropriate. The focus of the ECs within this PE will be on technology related to Urban, Asymmetric, Littoral and Expeditionary Operations. The related science and technology development is of the highest importance to Marine Corps operations in Iraq, Afghanistan and the OCO. Understandably, these Warfighter Capability Gaps are among those highest ranked of the prioritized Capability Gaps (prioritized by the OPNAV and the MCCDC). The technologies associated with these gaps are being pursued as part of an overall effort that addresses Sea Strike, Sea Shield, Sea Basing and FORCEnet Capability Gaps. Warfighter Capability Gaps are made up of ECs and supporting products. This activity includes support to the Urban, Asymmetric Operations-related to EC's for IED's, Modular Scalable Effects Weapons, Advanced Naval Fires Technology, Dynamic Target Engagement, Position Location Information, Transparent Urban Structures, Hostile Fire Detection and Response, Lightweight Protective Systems, and Lightening the Load of Dismounted Combatants.

FY 2008 Accomplishments:

- Continued development of tools and technologies to support Marine Corps Intelligence, Surveillance and Reconnaissance (ISR) efforts Measurement and Signature Intelligence Tactical Remote Sensor System (MASINT/TRSS) in remote sensor integration within the Distributed Common Ground/Surface System (DCGS).
- Continued 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. (Concurrent funding in PE 0602131M and 0602236N)
- Continued development of improved lightweight computational fire control interface technology. (Concurrent funding from PE 0602131M, 0602236N, 0603236N and 0603782N)
- Continued development of improved fire control systems technologies to Expeditionary Fire Support System artillery and mortar systems.

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
- Continued effort to incorporate advanced target acquisition target hand-off technologies to reduce sensor to shooter loop and improve target location. (Concurrent effort funded in PE 0602131M). - Continued development of ammunition packaging techniques to lower weight and have the packaging provide additional use on the battlefield. (Concurrent funding provided by PE 0602131M). - Continued integration of hostile fire detection and counter-fire system (GUNSLINGER). (Concurrent funding in PE 0602131M). - Continued development of innovative relay Beyond Line of Sight (BLOS) technology through integration and demonstration of secure wireless networks/secure wireless local area network (LAN) communication technologies. (Concurrent funding in PEs 0602131M, 0602236N, 0603236N and 0603782N). - Completed development and transition of Asymmetric Threat Weapon technologies. (Transitioned from PE 0602131M and 0602123N) - Completed development and transition unambiguous warning devices technologies. (Transitioned from PE 0602131M) - Completed development and transition active RPG defense technologies. (Transitioned from PE 0602131M) - Completed development and transition improved imaging (Electro Optic/InfraRed/Laser) technologies. (Transitioned from PE 0602131M) - Completed development and transition reconfigurable surveillance Unmanned Aerial Vehicles (UAVs) for Warfighter protection technologies. (Transitioned from PE 0602131M) - Initiated development of transparent urban structures technologies. (Concurrent funding from PE 0602131M) - Initiated development of modular scalable effects prototype weapon. (Concurrent funding from PE 0602131M) - Initiated development of counter improvised explosive devices technologies. (Concurrent funding from PE 0602131M) - Initiated development of tactical urban breaching technologies. (Concurrent funding from PE 0602131M) *FY 2009 Plans:* - Continue all efforts of FY 2008, less those noted as completed above.				

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B. Accomplishments/Planned Program ($ in Millions)		**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
- Initiate development of individual Warfighter protection technologies. (Concurrent funding in PE 0602131M; funding will also be provided by PE 0603236N in FY 2009). - Initiate development of advanced survivability and mobility technologies for Marine Corps tactical and combat vehicles. (Concurrent funding in PE 0602131M; funding will also be provided by PE 0603236N in FY 2009). *FY 2010 Plans:* - Continue all efforts of FY 2009. - Complete development and transition of improved fire control technologies based on small-scale hardened non-magnetic azimuth sensor to improve timeliness and accuracy of mortars/howitzers.					
LOGISTICS 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, reconstitution/redeployment, and command and control. These pillars are thoroughly integrated and perpetually related in execution. FY 2009 reflects an increase for sustainability/logistics programs (includes fuel, water, ammunition, rations, and casualty care /MEDEVAC) in support of Distributed Operations; new USMC priorities in lightening the load of the individual Marine and enhancing the Marine Corps rifle squad's overall capabilities; and for a DoD directed integrated capability demonstration supporting the Protection of Ground Forces and Systems. This capability demonstration has been directed to be wide ranging and encompass technologies for: - Pre-detonation of IEDs; - Personal protection materials; - Personal power generation; - Micro power sources; and		3.200	7.881	11.526	

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
- Augmented reality. The Logistics activity directly supports the integrated demonstration program, which will be a broad, multi-year thrust to both investigate technology integration as well as spur application of more fundamental technologies to force and platform protection. The goal is multiple broad phased force protection applications and technologies, with off-ramps for fielding successes. The FY 2009 to FY 2010 funding increase results from plans to accelerate and complete development of both the portable fuel analyzer and the lightweight thermoelectric generator efforts. *FY 2008 Accomplishments:* - Continued exploring the development of portable fuel cell technologies capable of providing power in the 100 Watt to 500 Watt power range. - Continued efforts to develop a micro turbine generator capable of 100W average power. - Continued research into developing a replaceable electrode battery power source that consists of a metallic structure that is consumed during power generation and then easily replaced with a new metallic component that restores a full charge. (Realigned from PE 0602131M.) - Completed development of vehicle embarked & powered manipulator arm for next generation expeditionary vehicles. - Initiated analysis of material alternatives for automated vehicle health monitoring and reporting. - Initiated development of a tracking capability for major classes of supplies, forces & equipment. *FY 2009 Plans:* - Continue all efforts of FY 2008, less those noted as completed above. - Initiate technology demonstration for responsive precision aerial logistic transport from Seabase to Distributed Operations Squad or Platoon. - Initiate technology demonstration of an innovative bridge structure constructed from highly versatile modular composite components, thus expanding site-specific assembly options while simplifying logistic transport.				

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B. Accomplishments/Planned Program ($ in Millions)		**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
- Initiate development of a backpack that prevents oscillatory and transient peak loading forces from causing skeletal injury while enhancing human mobility with heavy loads. - Initiate development of a man-portable capability to analyze captured fuel for adulterants and contaminants. - Initiate development of a lightweight man-portable multi-fuel thermoelectric battery charger. *FY 2010 Plans:* - Continue all efforts of FY 2009. - Complete development of portable fuel analyzer. - Complete development of lightweight thermoelectric generator. - Initiate the development and demonstration of advanced materials for corrosion prevention and wear reduction for USMC vehicles and equipment.					
MANEUVER The Maneuver Thrust Technology 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, modularity, and unmanned systems. Beginning in FY 2009, Mine Countermeasures (MCM) efforts are funded under the Force Protection activity. Presently, MCM supports and enhances the maneuver and force protection Marine landing forces with the development of technologies to enable detection, neutralization, breaching, and clearing of mines, Improvised Explosive Devices (IEDs), and unexploded ordnance from the beach exit to inland objectives. MAGTF MCM is a functional component of Naval Expeditionary Maneuver Warfare and includes Ship to Objective Maneuver (STOM), Expeditionary Operations from a Sea Base, sustained Operations Ashore, Urban and Asymmetric Operations, and OOTW. The $11,590K increase in FY2008 funds in PE0603640M is Supplemental funding for a project designated as NIRF (Neutralizing Improvised Explosive Devices with RF). This is a high priority Science and Technology (S&T) effort with the objective of minimizing the casualties being inflicted by improvised explosive devices (IEDs). The successful neutralization of threat IEDs will provide the warfighter with a		16.955	8.656	10.647	

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
capability to remotely "safe" devices that are rapidly proliferating in areas where US troops are currently deployed. FY 2009 reflects an increase for a DoD directed integrated capability demonstration supporting the Protection of Ground Forces and Systems. This capability demonstration has been directed to be wide ranging and encompass technologies for: - Pre-detonation of IEDs; - Personal protection materials; - Personal power generation; - Micro power sources; and - Augmented reality. The Maneuver activity directly supports this integrated demonstration which will be a broad, multi-year thrust to both investigate technology integration as well as spur application of more fundamental technologies to force and platform protection. The goal is multiple broad phased force protection applications and technologies, with off-ramps for fielding successes. The FY 2009 to FY 2010 increase in funding is due to expanded Survivability/Active Protection Systems Improvement efforts to increase effectiveness of defeat (Pdefeat) of shoulder launched Rocket-Propelled Grenade (RPG) type threats and Anti-Tank Guided Missile (ATGM) threats on light platforms utilizing non-kinetic kill technologies. *FY 2008 Accomplishments:* - Continued Advanced Electromagnetic Armor technology development efforts. - Continued development of technologies to defeat side/top attack and advanced fuze mines through signature reduction and advanced signature duplication. - Continued S&T programs to address MAGTF Land MCM Master Plan capability gaps. - Continued development of technologies to defeat advanced mine fuzes (seismic, acoustic, and infrared).				

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B. Accomplishments/Planned Program ($ in Millions)		**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
- Continued the formation of blast consortia to foster the increased understanding of blast and fragmentation interaction with vehicles and biological effects. - Continued development of a Combat S&T vehicle prototype to enhance crew survivability and vehicle fuel efficiency. - Continued efforts to detect IEDs using radio frequency sources. - Continued studies to identify technology development plans to close identified force protection capability gaps. - Continued development of a test bed to demonstrate advanced survivability concepts. - Completed development of scalable explosive neutralization technologies for MCM. - Completed Advanced ECASS development in support of HMMWV, MAGTF Expeditionary Family of Fighting Vehicles and other Light Armored Vehicles. - Completed and transitioned continued development of technologies to locate and defeat IEDs into PEs associated with the FNC program. - Completed Electromagnetic Non-Explosive Reactive Armor (E-NERA). - Initiated technology development programs to address force protection capability gaps. - Initiated development of fuel efficiency and battlefield power systems for improved performance. *FY 2009 Plans:* - Continue all efforts of FY 2008, less those noted as completed above. - Initiate development of a Combat S&T Vehicle demonstrator to enhance crew survivability and vehicle fuel efficiency. - Initiate survivability improvements and technologies to mitigate acceleration and traumatic brain injuries to occupants to enhance tactical mobility and survivability in support of Distributed Operations. - Initiate advanced suspension systems development with ride height adjustment, ride quality adjustment, rollover prevention, and load equalizing systems for USMC tactical wheeled platforms to enhance tactical mobility in support of Distributed Operations. - Initiate a Survivability/ Active Protection Systems Improvement effort to increase effectiveness of defeat (Pdefeat) of shoulder launched RPG type threats and ATGM threats on light platforms utilizing non-kinetic kill technologies.					

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
- Initiate new mobility efforts for On-Board Vehicle Power to increase mobile exportable power for Diesel Electric Propulsion Concepts and a Fuels effort to investigate future fuel alternatives for internal combustion engines to include Fischer-Tropsch and coal gasification processes for use in military tactical wheeled vehicles. - Initiate Maneuver Enabling Technologies such as Vehicle Stabilization to improve vehicle suspension and control technologies to stabilize the platforms themselves to improve ride quality, shoot on the move capability and human systems integration. - Initiate a Vehicle Demonstrator program to design and fabricate an Integrated Power Demonstrator platform capable of producing the power needs for mobility and survivability concept demonstrations. *FY 2010 Plans:* - Continue all efforts of FY 2009.				

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C. Other Program Funding Summary ($ in Millions)

	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
PE 0204163N/Fleet Telecommunications (Tactical)									Continuing	Continuing
PE 0206313M/Marine Corps Communications Systems									Continuing	Continuing
PE 0206623M/Marine Corps Ground Combat/ Supporting Arms Systems									Continuing	Continuing
PE 0305204N/Tactical Unmanned Aerial Vehicles									Continuing	Continuing
PE 0601152N/In-House Laboratory Independent Research									Continuing	Continuing
PE 0601153N/Defense Research Sciences									Continuing	Continuing
PE 0602131M/Marine Corps Landing Force Technology									Continuing	Continuing
PE 0602236N/Warfighter Sustainment Applied Research									Continuing	Continuing
PE 0602702E/Tactical Technology									Continuing	Continuing
PE 0602782N/Mine and Expeditionary Warfare Applied Research									Continuing	Continuing
									Continuing	Continuing

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PE 0603004A/Weapons and Munitions Advanced Technology			
PE 0603005A/Combat Vehicle and Automotive Advanced Technology		Continuing	Continuing
PE 0603235N/Common Picture Advanced Technology		Continuing	Continuing
PE 0603236N/Warfighter Sustainment Advanced Technology		Continuing	Continuing
PE 0603606A/Landmine Warfare and Barrier Advanced Technology		Continuing	Continuing
PE 0603607A/Joint Service Small Arms Program		Continuing	Continuing
PE 0603612M/USMC Mine Countermeasures Systems - Adv Dev		Continuing	Continuing
PE 0603619A/Landmine Warfare and Barrier - Adv Dev		Continuing	Continuing
PE 0603635M/Marine Corps Ground Combat/ Support System		Continuing	Continuing
PE 0603772A/Advanced Tactical Computer Science and Sensor Technology		Continuing	Continuing
		Continuing	Continuing

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PE 0603782N/Mine and Expeditionary Warfare Advanced Technology		
PE 0604710A/Night Vision Systems - SDD	Continuing	Continuing
PE 0604808A/Landmine Warfare/Barrier - SDD	Continuing	Continuing

D. Acquisition Strategy

Not Applicable.

E. Performance Metrics

The primary objective of this PE is the development of technologies to meet unique Marine Corps needs in conducting Expeditionary Maneuver Warfare. The program consists of a collection of projects categorized by critical warfighting function. Individual project metrics reflect the technical goals of each specific project. Typical metrics include the advancement of related Technology Readiness Levels, the degree to which project investments are leveraged with other performers, reduction in life cycle cost upon application of the technology, and the identification of opportunities to transition technology to higher categories of development.

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COST ($ in Millions)	FY 2008 Actual	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
2297: CMC WARFIGHTING LAB CORE	37.172	36.271	36.620						Continuing	Continuing

A. Mission Description and Budget Item Justification

Marine Corps Warfighting Laboratory (MCWL) examines lessons learned from current operations, explores emerging threats and opportunities, and explores Joint and emerging service concepts through concept-based experimentation in order to enhance current and future warfighting 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.

"Live experimentation" permits exploration of prototype and surrogate technologies, as well as Tactics, Techniques, and Procedures (TTPs), 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. Experimentation encompasses inquiries into multiple warfighting areas, including: Command, Control, Communications, and Computers (C4); Intelligence, Surveillance, and Reconnaissance (ISR); Fires, Targeting, and Maneuver; Combat Service Support (CSS) and Force Protection; and Warfighting Excellence.

Using operational forces, MCWL conducts Advanced Warfighting Experiments (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 AWE-level campaigns are constructed. These campaigns (e.g., the Sea Viking (SV) experimentation series) are executed under the guidance of the Commandant of the Marine Corps (CMC) and in support of the Marine Air-Ground Task Force (MAGTF) Requirements List (MRL). The following provides an overview of MCWL experimentation:

- Sea Viking 2008 (SV08): (FY 2007 through FY 2008) SV08 continued exploration of Distributed Operations (DO). Experiments in this area take place in the context of the irregular, nonlinear, battlespace which demands enhanced individual and small unit capabilities. In addition to infantry, SV08 examined logistics, command and control (C2), fires, and ISR. With the conclusion of SV08, DO experimentation evolved into focus on Enhanced Company Operations (ECO).

- The ECO experiment series represents a major evolution in Marine infantry company operations. In the extended battlespace encountered in current and future operations, companies are required to execute functions normally conducted at battalion level and higher. ECO seeks to investigate structure, TTPs, training and

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equipment that will enable companies to effectively conduct full spectrum combat operations across an extended battlespace. ECO also seeks to use computer based simulation systems to expand the training opportunities and mission rehearsal capabilities.

- MCWL experimentation in FY 2010 and beyond will continue to address the broad challenges of seabased expeditionary warfare focused on the tactical levels. Specific areas of interest are reflected in the projects listed below which deal with outcomes impacting today's Marine Corps, the next Marine Corps, and Marine Corps after next.

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
COMBAT SERVICE SUPPORT (CSS) AND FORCE PROTECTION	9.857	4.096	2.937	
This activity includes MCWL CSS and force protection experimentation efforts including assessment of equipment, new TTPs, training programs, and proposed organizational changes associated with enhanced capabilities. Although this category covers several small (less than $500K per FY) efforts being pursued by MCWL, most programs listed below are considered major (valued at $500K or more) or have near real-time operational impact. FY 2008 funding level reflects a Supplemental increase of $3.6M to support Extended User Evaluation (EUE) of the Improvised Explosive Device (IED) Detector Dog program. The decrease from FY 2009 to FY 2010 is due to the completion of the IED Detector Dog EUE. *FY 2008 Accomplishments:* - Continued Mine Counter-Measures (MCM)/Counter-IED efforts for mine and IED clearance, detection, and neutralization. - Continued to develop and experiment with bio-science (medical) technologies. - Continued experimentation of simulation based training technologies to enhance small unit leader decision-making ability (transitions to Warfighting Excellence activity in FY 2010). - Continued development and experimentation with concept demonstrators that enable distribution of material from the seabase to small, widely dispersed units ashore. - Continued development and experimentation of logistics-related equipment and employment tactics tailored to the requirements of logistics units supporting DO/ECO.				

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B. Accomplishments/Planned Program ($ in Millions)		**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
- Completed IED Detector Dog experiment that merged specialized breeding, urban conditioning, and multi-disciplinary training techniques in support of small unit infantry operations. Effort supports Operation Iraqi Freedom (OIF). - Completed experiment to develop training, organization, and equipment allowance modifications for logistics units based on the requirement to support DO/ECO. - Initiated IED Detector Dog Extended User Evaluation (EUE). Augments FY 2008 Supplemental funding. *FY 2009 Plans:* - Continue all efforts of FY 2008, less those noted as completed above. - Complete MCM/Counter-IED efforts for mine and IED clearance, detection, and neutralization. - Complete IED Detector Dog EUE. - Complete development and experimentation with logistics-related equipment tailored to requirements of DO/ECO. - Complete development and experimentation with concept demonstrators that enable distribution of material from the seabase to small, widely dispersed, units ashore. *FY 2010 Plans:* - Continue all efforts of FY 2009, less those noted as completed above. - Initiate assessment of technologies for sustainment of tactical level units from the sea-base. - Initiate assessment of unmanned ground logistics delivery technologies that support infantry small unit operations. - Initiate new investigations into point-of-wound stabilization and emerging technologies that support casualty evacuation (CASEVAC)/casualty extractions using robots.					
COMMAND, CONTROL, COMMUNICATIONS, COMPUTERS (C4) This activity encompasses all MCWL C4 related experimentation efforts including assessment of equipment, new TTPs, training programs, and proposed organizational changes associated with enhanced C4 capabilities. Although this category covers several small (less than $500K per FY) efforts being pursued by MCWL, most programs listed below are considered major (valued at $500K or more) or have near real-time operational impact.		8.082	8.437	8.700	

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B. Accomplishments/Planned Program ($ in Millions)		**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
FY 2008 Accomplishments: - Continued C4 extended user assessments of selected prototype technologies in support of forces engaged in Operation Enduring Freedom and Operation Iraqi Freedom (OIF). - Continued experimentation of concept demonstrators to support company and below alternative C2 architectures. - Continued C4 related small unit enhancements against irregular forces, including urban terrain. - Completed experimentation of enhanced over-the-horizon (OTH) communications Low Earth Orbit Satellite (LEOSAT)/Line of Sight (LOS) hybrid in support of SV08. - Completed experimentation of coalition C4 interoperability concept demonstrator. - Completed C4 support for SV08. - Completed experimentation of enhanced communications concept demonstrators as part of SV08. *FY 2009 Plans:* - Continue all efforts of FY 2008, less those noted as completed above. - Initiate and complete C4 support for ECO experiments. - Initiate and complete experimentation of enhanced communications concept demonstrators as part of ECO. - Initiate development and assessment of a voice-to-voice automated language translator concept demonstrator. *FY 2010 Plans:* - Continue all efforts of FY 2009. - Complete C4 related small unit enhancements against irregular forces, including urban terrain. - Initiate assessment of network management systems for Capability Set (CAPSET) V (all C2 below Battalion) networks. - Initiate assessment of an integrated company level C4 ISR network.					
FIRES, TARGETING, AND MANEUVER		2.857	3.243	3.107	

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B. Accomplishments/Planned Program ($ in Millions)		**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
This activity includes MCWL experimentation efforts in the areas of fires, targeting, and maneuver including assessment of equipment, new TTPs, training programs, and proposed organizational changes associated with enhanced capabilities. Although this category covers several small (less than $500K per FY) efforts being pursued by MCWL, most programs listed below are considered major (valued at $500K or more) or have near real-time operational impact. FY 2009 funding was realigned to pursue automated aviation and surface fires de-confliction, as well as small unit precision munitions, loitering weapons, and armed UAS concept demonstrator assessments. *FY 2008 Accomplishments:* - Continued evaluation of alternative counter shooter technologies. - Continued development and assessment of Heavy Machine Gun Initiative (HMGI), an effort to design advanced mounts for USMC crew served weapons. *FY 2009 Plans:* - Continue all efforts in FY 2008. - Complete development and assessment of HMGI. - Initiate assessment of an automated aviation and surface fires de-confliction system concept demonstrator. - Initiate assessment of small unit precision munitions/loitering weapons/armed UAS concept demonstrators. *FY 2010 Plans:* - Continue all efforts in FY 2009, less those noted as completed above. - Initiate assessment of concept demonstrator precision targeting device.					
INTELLIGENCE, SURVEILLANCE, AND RECONNAISSANCE (ISR) This activity includes MCWL ISR related experimentation efforts including assessment of equipment, new TTPs, training programs, and proposed organizational changes associated with enhanced ISR capabilities.		4.212	7.148	7.108	

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
Although this category covers several small (less than $500K per FY) efforts being pursued by MCWL, most programs listed below are considered major (valued at $500K or more) or have near real-time operational impact. FY 2008 funding was realigned from Tier II Unmanned Aerial System (UAS) payloads concept demonstrator efforts to the Combat Service Support (CSS) and Force Protection area in support of the initiation of Improvised Explosive Device (IED) Detector Dog Extended User Evaluation (EUE). *FY 2008 Accomplishments:* - Continued additional IED investigations into promising detect and neutralize technologies. - Continued experimentation with TTPs and payloads for a Tier II Unmanned Aerial System (UAS) concept demonstrator to provide persistent ISR at regimental and battalion level. - Continued efforts to develop the TTPs required for small infantry units to employ Unmanned Ground Vehicles (UGVs), UASs, and unattended ground sensors. - Continued experimentation with the Small Unit Surveillance System (SUSS) and the Mobile Wearable Computer (MOWC). - Completed development and experimentation of ISR technologies in preparation for SV08 planned experiments. - Completed experimentation of enhanced ISR technologies and concept demonstrators as part of SV08. - Completed participation in Defense Advanced Research Projects Agency's (DARPA's) development and upgrade of the Wasp micro UAS and conducted extended operational assessment of Wasp Block II and Block III, in support of DO experimentation and OIF. - Completed ISR related small unit enhancements against irregular forces, including urban terrain. *FY 2009 Plans:* - Continue all efforts of FY 2008, less those noted as completed above. - Complete experimentation with SUSS and MOWC. - Initiate development and experimentation with a networked suite of small unit disposable sensors to enhance small unit force protection.				

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B. Accomplishments/Planned Program ($ in Millions)		**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
FY 2010 Plans: - Continue all efforts of FY 2009, less those noted as completed above. - Initiate assessment of an integrated company level C4 ISR network. - Initiate investigations into rotary wing/hovering tactical level UAS concept demonstrators.					
MARINE CORPS WARFIGHTING LABORATORY (MCWL) OPERATIONS (SUPPORT) MCWL Operations (Support) efforts include overall MCWL experimentation doctrine, planning, analysis, data collection, as well as technology transition tracking efforts. Although this category covers several small (less than $500K per FY) efforts being pursued by MCWL, most programs listed below are considered major (valued at $500K or more) or have near real-time operational impact. FY 2008 funding was realigned due to a reduced level of anticipated overall analysis and management/ strategic planning support and an execution adjustment at the program level. *FY 2008 Accomplishments:* - Continued to synthesize results and lessons learned into proposed DOTMLPF recommendations for the Marine Corps. - Continued to provide technical, strategic, and managerial support to Marine Corps experimentation. - Continued to provide overall analysis and reporting of experimentation efforts, analytical assistance during experiment design, and maintenance of an ad-hoc analysis capability. - Completed engineering, technical and data collection support for SV08. *FY 2009 Plans:* - Continue all efforts of FY 2008, less those noted as completed above. *FY 2010 Plans:* - Continue all efforts of FY 2009.		7.488	7.902	8.629	
WARFIGHTING EXCELLENCE		4.676	5.445	6.139	

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
This activity includes MCWL efforts in the development and assessment of joint and service warfighting concepts, joint and service missions, analysis of emerging threats and opportunities, and joint capability experimentation. It also includes MCWL service experimentation in areas that impact multiple warfighting functions. Although this category covers several small (less than $500K per FY) efforts being pursued by MCWL, most programs listed below are considered major (valued at $500K or more) or have near-real-time operational impact. FY 2008 to FY 2009 funding increase is due to an increased level of support to complete technology assessment and operational evaluation of DARPA-developed robotic prototypes. FY 2010 and beyond funding was realigned from CSS and Force Protection area in support of experimentation of simulation based training technologies. *FY 2008 Accomplishments:* - Continued executive agent responsibilities for Joint Title X programs, such as Unified Quest, Unified Course, and Unified Engagement. Title X war games address future capabilities in the context of Title X readiness responsibilities. - Continued management and oversight of non-Title X Wargaming, including the highly visible Office of the Secretary of Defense Net Assessment Transformation War Game series and the Special Operations Command wargaming series. - Continued to conduct quarterly Emerald Express seminars that resulted in collection and dissemination of insights and observations from the Operating Forces. Produced reports for the purpose of professional military education and advancing the lessons-learned process. - Continued to support the Center for Emerging Threats and Opportunities (CETO) mission: 1) prevent operational and tactical surprises to senior Warfighting Commanders by assessing future security environments in light of emerging threats and potential conceptual and technological opportunities; 2) help focus science, technology, and experimental efforts by appraising promising concepts and technologies; 3) serve as a catalyst to stimulate thought and debate on issues of importance to the Marine Corps.				

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
- Continued funding contributions to Joint Concept Technology Demonstrations (JCTDs) and Advanced Concept Technology Demonstrations (ACTDs). Both JCTDs and ACTDs are intended to rapidly field needed capabilities by using emergent mature technologies matched with innovative operational concepts. - Continued technology assessment and operational evaluation of DARPA-developed robotic prototypes in support of DO/ECO experimentation. - Completed concept development and Modeling and Simulation support for SV08. *FY 2009 Plans:* - Continue all efforts of FY 2008, less those noted as completed above. - Complete technology assessment and operational evaluation of DARPA-developed robotic prototypes in support of DO/ECO experimentation. *FY 2010 Plans:* - Continue all efforts of FY 2009, less those noted as completed above. - Continue experimentation of simulation based training technologies to enhance small unit leader decision-making ability (transitions from CSS activity).				

C. Other Program Funding Summary ($ in Millions)

	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
PE 0602131M/Marine Corps Landing Force Technology									Continuing	Continuing

D. Acquisition Strategy

Not Applicable.

E. Performance Metrics

The primary objective of this PE is the development of technologies to meet unique Marine Corps needs in conducting Expeditionary Maneuver Warfare. The program consists of a collection of projects categorized by critical warfighting function. Individual project metrics reflect the technical goals of each specific project. Typical

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metrics include the advancement of related Technology Readiness Levels, the degree to which project investments are leveraged with other performers, reduction in life cycle cost upon application of the technology, and the identification of opportunities to transition technology to higher categories of development.

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APPROPRIATION/BUDGET ACTIVITY 1319 - Research, Development, Test & Evaluation, Navy/BA 3 - Advanced Technology Development (ATD)				R-1 ITEM NOMENCLATURE PE 0603640M USMC ADVANCED TECHNOLOGY DEMONSTRATION (ATD)					PROJECT NUMBER 9999	
COST ($ in Millions)	**FY 2008 Actual**	**FY 2009 Estimate**	**FY 2010 Estimate**	**FY 2011 Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
9999: CONGRESSIONAL PLUS-UPS	7.520	7.859	0.000						Continuing	Continuing

A. Mission Description and Budget Item Justification

N/A

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A