Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Navy										DATE: February 2011	
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603640M: *MC Advanced Technology Demo*							
COST ($ in Millions)	**FY 2010**	**FY 2011**	**FY 2012 Base**	**FY 2012 OCO**	**FY 2012 Total**	**FY 2013**	**FY 2014**	**FY 2015**	**FY 2016**	**Cost To Complete**	**Total Cost**
Total Program Element	138.913	115.089	124.324	-	124.324	129.381	132.326	135.095	137.509	Continuing	Continuing
2223: *Marine Corps ATD*	80.157	78.087	83.932	-	83.932	86.326	88.286	90.133	91.744	Continuing	Continuing
2297: *Marine Corps Warfighting Lab - Core*	35.206	37.002	40.392	-	40.392	43.055	44.040	44.962	45.765	Continuing	Continuing
4027: *Naval Innovative Science and Engineering*	0.428	-	-	-	-	-	-	-	-	0.000	0.428
9999: *Congressional Adds*	23.122	-	-	-	-	-	-	-	-	0.000	23.122

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 (Mar 2010). 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 United States 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 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 enhanced warfighting capabilities through field experiments with Marine operating forces; 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 and Invention (D&I) phases of Naval 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.

Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Navy	DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603640M: *MC Advanced Technology Demo*

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 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Previous President's Budget	120.482	115.089	125.126	-	125.126
Current President's Budget	138.913	115.089	124.324	-	124.324
Total Adjustments	18.431	-	-0.802	-	-0.802
• Congressional General Reductions		-			
• Congressional Directed Reductions		-			
• Congressional Rescissions	-	-			
• Congressional Adds		-			
• Congressional Directed Transfers		-			
• Reprogrammings	11.480	-			
• SBIR/STTR Transfer	-2.925	-			
• Program Adjustments	9.480	-	-0.041	-	-0.041
• Section 219 Reprogramming	0.428	-	-	-	-
• Rate/Misc Adjustments	-	-	-0.761	-	-0.761
• Congressional General Reductions Adjustments	-0.032	-	-	-	-

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2010	FY 2011
Project: 9999: *Congressional Adds*		
Congressional Add: *California Central Coast Partnership Research*	2.788	-
Congressional Add: *Enhanced Small Arms Protective Insert*	1.593	-
Congressional Add: *Future Immersive Training*	9.480	-
Congressional Add: *Marine Air-Ground Task Force Situational Awareness*	2.689	-
Congressional Add: *Ground Warfare Acoustical Combat System of Netted*	4.979	-
Congressional Add: *Near Infrared optical (NIRO) Augmentation System*	1.593	-
Congressional Add Subtotals for Project: 9999	23.122	-
Congressional Add Totals for all Projects	23.122	-

Change Summary Explanation

Technical: FY 2010 and out resources reflect 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

Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Navy	DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603640M: *MC Advanced Technology Demo*

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 FY2013) 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 2011 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 (e.g., Operation Enduring Freedom (OEF) and humanitarian efforts)) have increased the operations tempo of the operating forces to the extent that their support of, and participation in, the Marine Corps Warfighting Laboratory (MCWL) experimentation was/remains challenging to coordinate and often directly impacts planned projects. Additionally, rapid responses to emergent warfighter needs impacts planned projects. Thus, executing planned projects becomes "an art" in an effort to balance complicated and competing needs.

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy			DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603640M: *MC Advanced Technology Demo*	PROJECT 2223: *Marine Corps ATD*	

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
2223: *Marine Corps ATD*	80.157	78.087	83.932	-	83.932	86.326	88.286	90.133	91.744	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 Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Title: COMMAND, CONTROL, COMMUNICATIONS, COMPUTERS (C4)	5.795	5.432	5.781
Description: 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-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.			

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603640M: *MC Advanced Technology Demo*	PROJECT 2223: *Marine Corps ATD*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
The FY 2011 decrease in funding is due to completion 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). ***FY 2010 Accomplishments:*** - Continued urban navigation with limited Global Positioning System availability demonstrations. - Continued demonstrations of improved urban communications capabilities. - Continued creating a service oriented sensor network for expeditionary forces' current and future tactical sensors. - 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. - Completed an Assured Connectivity effort to develop waveforms suited to maintaining low data rate links under extreme conditions. - Completed 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. ***FY 2011 Plans:*** - Continue all efforts of FY 2010, less those noted as completed above. - Complete Fires interoperability, Advanced HF Communications and Restricted Communications. - Initiate Application-Network Architectures, Conformal Antenna Integration and Demonstration Spiral 2 and C3 for the Individual Marine Spiral Two. ***FY 2012 Plans:*** - Continue all efforts of FY 2011, less those noted as completed above. Conformal Antenna Integration and Demonstration Spiral 2 and C3 for the Individual Marine Spiral Two have been combined into M2C3 Development. - Complete Tactical Information Services. - Initiate Application Network Architecture(reprioritized from FY11) and Automated Small Unit Decision tools.			
Title: FIREPOWER ***Description:*** 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.	5.744	7.044	7.992

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603640M: *MC Advanced Technology Demo*	PROJECT 2223: *Marine Corps ATD*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
The FY 2010 to FY 2011 funding increase is due to the acceleration of a Non-Magnetic Azimuth Sensing technology effort. This will allow early transition of warfighting capability to Marine Corps forces. THe FY2011 to FY2012 funding increase is due to the initiation of the development of Miniature Urban Missile. ***FY 2010 Accomplishments:*** - Continued scalable effects conventional warhead concept development. - Continued improved mortar munition integration and demonstrations. - Continued development of targeting and engagement technologies for distributed operations collaborative fires integration and demonstrations. - Continued design, development, prototyping and testing 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. - Continued a Flight Control Kinematic Unit effort (effort renamed Flight Control Mortar). 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. - Completed 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. - Completed an effort in Ballistic Flight Compensation Aiming in support of Distributed Operations Precision Engagement. ***FY 2011 Plans:*** - Continue all efforts of FY 2010, less those noted as completed above. - Continued Non-Magnetic Azimuth Sensing (NMAS previously identified as completed in PB 2011). ***FY 2012 Plans:*** - Continue all efforts of FY 2011, less those noted as completed above. - Complete development and testing of enhanced range mortar munitions. - Initiate development of Miniature Urban Missile, leveraging technology from MEMS, designation, guidance and control, and warhead design, to develop a shoulder launched missile capable of defeating a variety of targets. - Initiate development of precision 60mm mortar system, to demonstrate increased precision, range, and lethality in a light mortar, providing indirect fire support through projectile flight trajectory shaping.			
Title: FORCE PROTECTION	18.300	8.215	9.092

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603640M: *MC Advanced Technology Demo*	PROJECT 2223: *Marine Corps ATD*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Description: 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 were funded within the Force Protection activity. FY 2009 was 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. The FY 2010 to FY 2011 decrease in funding is the result of the Urgent Theater Warfighting Requirement for countering Improvised Explosive Devices (IED) and vehicle bourne IED, which was initiated in FY 2010. The FY 2011 to FY 2012 increase in funding is due to enhanced funding for Anti-Tank Guided Missile (ATGM) technologies. ***FY 2010 Accomplishments:*** - Continued development of technologies to defeat side/top attack and advanced fuze mines through signature reduction and advanced signature duplication. - Continued development of technologies to locate and defeat IEDs. - Continued development of technologies to defeat advanced mine fuzes (seismic, acoustic, and infrared). - Continued efforts to detect IEDs using radio frequency sources. - Continued technology development programs to address force protection capability gaps. - Continued 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. - Continued a new Anti-Tank Guided Missile (ATGM) effort to defeat ATGMs in complex urban environment. - Continued Warfighter modeling and simulation efforts for the Warfighter-as-a-System analysis approach and methodology combining survivability, mobility, and warfighter performance parameters. - Completed advanced countermeasures technology development against magnetic fuzed landmines. - Completed development of point detection of explosives associated with IEDs. (Relates to the FY 2009 plan to detect IEDs using radio frequency sources).			

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603640M: *MC Advanced Technology Demo*	PROJECT 2223: *Marine Corps ATD*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
- Initiated the Urgent Theater Warfighting Requirement for countering Improvised Explosive Devices (IED) and vehicle bourne IED. - Initiated high-power solid state source development for IED neutralization. - Initiated vulnerability assessment of threat targeting sensors to directed energy. ***FY 2011 Plans:*** - Continue all efforts of FY 2010, less those noted as completed above. - Complete modeling and simulation (M&S) efforts for the Warfighter-as-a-System analysis approach and methodology combining survivability, mobility, and warfighter performance parameters. - Complete countermeasures technology development against seismic fuzed landmines. - Complete development of stand-off detection of explosives utilizing Raman and Laser Induced Breakdown Spectroscopy sensor modalities. (Relates to FY 2009 initiation of new Explosives Hazard Defeat Plan). - Initiate efforts to neutralize incoming rocket, artillery, and mortar threats via non-kinetic means. - Initiate development and evaluation of landmine detection utilizing ground penetrating radar from an airborne platform. ***FY 2012 Plans:*** - Continue all efforts of FY 2011, less those noted as completed above. - Continue efforts to neutralize incoming rocket, artillery, and mortar threats via non-kinetic means. - Continue development and evaluation of landmine detection utilizing synthetic aperture radar from an airborne platform.			
Title: HUMAN PERFORMANCE, TRAINING & EDUCATION ***Description:*** 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. The FY 2010 to FY 2011 funding increase is due to planned initiation of efforts to apply learning theories for language and culture training and to initiation of related efforts in team immersive language and cultural learning in simulation environments. ***FY 2010 Accomplishments:*** - Continued development of "Warfighter as a System" modeling tools. (Effort renamed to Enhancing warfighter psycho-physical performance). - Continued development of adaptive experiential learning tools for Distributed Operations Training. (Effort renamed to Real-time adaptive training environments). - Continued development of automated behavioral and neurophysiological performance measurement technologies for Distributed Operations Warfighter assessment, classification and assignment to training. (Predictive training transfer toolset).	8.875	10.693	11.539

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603640M: *MC Advanced Technology Demo*	PROJECT 2223: *Marine Corps ATD*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
- Completed the development of tools to capture metrics and lessons learned from a variety of simulation and training sources. - Completed Marine Advanced Combat Headborne Initiative (MACHSI): physical protection of the head, neck and face. (Transitioned from the Firepower activity). - Completed development of the Distributed Operations Training/Virtual Test Bed. - Completed research into environmental effects on cognitive and team performance. - Completed in-depth analysis, state-of-the-art report, and testing on all USMC physical training regimens, their effectiveness and their injury incidence rates. - Completed Human Performance and Training capabilities (Cognitive and physical enhancement, modeling and simulation, virtual reality squad level training) in support of Distributed Operations. - Completed demonstrations and field studies of mitigation/augmentation capabilities that enhance squad level communication in support of Distributed Operations. - Completed development of a Distributed Operations virtual reality simulation training system prototype that will be scalable across fire team, squad, and platoon. - Completed 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. - Completed 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 developing tracking, Helmet Mounted Displays, and software technologies to enable Augmented Reality in unimproved locations. - Initiated evaluations and validations of applications geared towards peak neural and cognitive performance-in distributed operations. - Initiated Distributed Operations training system investigations into perceptual skills enhancement that lead to enhanced cognition and decision making. - Initiated 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). ***FY 2011 Plans:*** - Continue all efforts of FY 2010, less those noted as completed above. - Continue development of adaptive experiential learning tools for Distributed Operations Training. (Effort renamed Real-time adaptive training environments). - Continue development of "Warfighter as a System" modeling tools. (Effort renamed Enhancing warfighter psycho-physical performance).			

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603640M: *MC Advanced Technology Demo*	PROJECT 2223: *Marine Corps ATD*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
- Complete development of automated behavioral and neurophysiological performance measurement technologies for Distributed Operations Warfighter assessment, classification and assignment to training. - Complete evaluations and validations of applications geared towards peak neural and cognitive performance-in distributed operations. (Technologies supporting peak cognitive performance). - Complete Distributed Operations training system investigations into perceptual skills enhancement that lead to enhanced cognition and decision making. - Complete 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). - Complete development of adaptive experiential learning tools for Distributed Operations Training. - Complete in-depth analysis, state-of-the-art report, and testing on all USMC physical training regimens, their effectiveness, and their injury incidence rates. - Initiate efforts to apply learning theories for language and culture training. - Initiate team immersive language and cultural learning in simulation environments. - Initiate classroom/field testing of learning theories extended to complex tasks for a range of expertise levels; training mitigation strategies triggered by neurophysiological markers of learning, cognition and expertise; and principles of expertise development on a continuum of novice to expert. (Rename effort Algorithms Physiologically-derived to Promote Learning Efficiency (APPLE)). - Initiate field evaluations of training mitigation strategies triggered by behavioral and neurophysiological markers of learning, cognition, and expertise. - Initiate effectiveness and validation studies of Advanced Mobile Field Assessment and Readiness Technologies to improve the capability to assess situational awareness in the field and predict physical performance by developing mobile and rugged tools, algorithms, and models. ***FY 2012 Plans:*** - Continue all efforts of FY 2011, less those noted as completed above. Due to operational urgency in FY 2011 initiated development of an autonomous robotic adversarial target system to extend simulation marksmanship training to live-fire ranges with the use of robotic targets (all-terrain, mobile, tactical, return fire) and integrate with simulation feedback and scoring for transition to Marine Corps Systems Command (PM-Training Systems). - Continue effectiveness and validation studies of Advanced Mobile Field Assessment and Readiness Technologies to improve the capability to assess situational awareness in the field and predict physical performance by developing mobile and rugged tools, algorithms, and models. - Complete development of adaptive experiential learning tools for Distributed Operations Training. (Effort renamed to Real-time Adaptive Training Environments).			

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603640M: *MC Advanced Technology Demo*	PROJECT 2223: *Marine Corps ATD*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
- Complete development of "Warfighter as a System" modeling tools. (Effort renamed to Enhancing warfighter psycho-physical performance). - Complete development of algorithms physiologically derived to promote learning efficiency (Relates to early prototype systems for Human Performance and Training efforts initiated in FY10). - Complete development of expressive interactions for desktop virtual environments (Relates to early prototype systems for Human Performance and Training efforts initiated in FY10). - Complete efforts to apply learning theories for language and culture training. - Complete team immersive language and cultural learning in simulation environments. - Complete classroom/field testing of learning theories extended to complex tasks for a range of expertise levels; training mitigation strategies triggered by neurophysiological markers of learning, cognition and expertise; and principles of expertise development on a continuum of novice to expert. (Rename effort Algorithms Physiologically derived to Promote Learning Efficiency (APPLE)). - Complete field evaluations of training mitigation strategies triggered by behavioral and neurophysiological markers of learning, cognition, and expertise. - Initiate development of sleep deprivation mitigations (phase II) to enhance warfighter performance during extended operations (initial phase completed in FY10). - Initiate development of technologies supporting peak cognitive performance of warfighters. - Initiate development of physical conditioning assessment and training optimization methods to improve warfighter performance (previous efforts related to physical conditioning impacts on combat readiness resourced by PE 0602131M). - Initiate development of applied training technologies for Squad Immersive Training Environments(SITE). - Initiate evaluation of neurological symptoms of performance at altitude to reduce the incidences of acute mountain sickness (AMS). - Initiate development and demonstrate immersive training communication analysis systems to support instructor assessment of infantry units.			
Title: INTELLIGENCE, SURVEILLANCE, AND RECONNAISSANCE (ISR) ***Description:*** 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.	3.020	3.644	3.897

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603640M: *MC Advanced Technology Demo*	PROJECT 2223: *Marine Corps ATD*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
The FY2010 to FY2011 funding increase is due to initiation of robust efforts to automatically fuse data across all identifiers (TTL, biometrics, symbols) based on similarity measures. The FY2011 to FY2012 funding increase is due to acceleration of efforts to develop agile tactical sensor nets to improve the availability, timeliness, and usefulness of battlespace intelligence. ***FY 2010 Accomplishments:*** - Continued development of advanced tactical sensor nets that localize mobile detection of threats in a complex environment. - Continued development and demonstration of measurement and signature intelligence data management and integration capability. - Continued integration and demonstration of naval tactical warfighting applications and network connectivity. - Continued tagging, tracking, and locating efforts to demonstrate the effectiveness of tactically relevant tag readers which support track classification algorithms. - Continued efforts to refine enemy course of action prediction software to adapt to stimuli. - Continued 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. - Continued development of tactical sensor nets with organic unattended multi-level security processing and information dissemination. - Continued 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. - Continued 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. - Completed efforts to refine enemy course of action prediction software to adapt to stimuli. - Initiated 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. - Initiated algorithm development for base classification on context, similarity to clutter, and nearness to suspicion.			

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603640M: *MC Advanced Technology Demo*	PROJECT 2223: *Marine Corps ATD*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
- Initiated efforts to analyze and expose enemy networks using close observations of entity to entity associations and social network analysis. This includes development of audio tools which enable automated understanding of analog and digital recordings, as well as text files. - Initiated 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. - Initiated efforts to incorporate social models for human decision making with statistical models. This includes 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 and also the development of an active dynamic resource manager to make collected data better available to decision makers. ***FY 2011 Plans:*** - Continue all efforts of FY 2010, less those noted as completed above. - Initiate new Operational Adaptation Enablers effort to provide one analysis framework for the incorporation of interdisciplinary techniques related to addressing contextual questions. - Initiate efforts to extend the utility of track classification algorithms to sparse data. - Initiate efforts to automatically fuse data across all identifiers (TTL, biometrics, symbols) based on similarity measures. - Initiate efforts to show entity tracking using disparate ground and air sensors and tools that automatically compute latent area atmospheric measures. ***FY 2012 Plans:*** - Continue all efforts of FY 2011, less those noted as completed above. - Complete efforts to use the warfighter as a supplementary sensor in the battlespace to improve ISR to C2 connectivity. - Complete efforts to develop agile tactical sensor nets to improve the availability, timeliness, and usefulness of battlespace intelligence. - Initiate development of model based own force decision tools based on adversarial decision making models. - Initiate development of an active layered sensing capability.			
Title: LITTORAL COMBAT/POWER PROJECTION (LC/PP) ***Description:*** This activity is aligned with the Sea Strike, Sea Shield, Sea Basing, FORCEnet and the Expeditionary Maneuver Warfare pillars as well as Force Health Protection and Platform Enablers. It provides the capability for the demonstration and transition of technologies developed through the related Marine Corps S&T programs directly to an acquisition program of record. Littoral Combat/Power Projection is the Enabling Capability (EC).	17.111	17.622	18.075

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603640M: *MC Advanced Technology Demo*	PROJECT 2223: *Marine Corps ATD*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
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 2010 Accomplishments:*** - Continued development of improved lightweight computational fire control interface technology. (Concurrent funding from PE 0602131M, PE 0602236N, PE 0603236N and PE 0603782N) - Continued development of improved fire control systems technologies to Expeditionary Fire Support System artillery and mortar systems (concurrent funding from PE 0602131M and 0602114N. These PEs complete the effort in FY 2010). - Continued development of transparent urban structures technologies. (Concurrent funding from PE 0602131M) - Continued development of modular scalable effects prototype weapon. (Concurrent funding from PE 0602131M) - Continued development of tactical urban breaching technologies. - Continued development of counter improvised explosive devices technologies. (Concurrent funding from PE 0602131M) - Continued development of individual Warfighter protection technologies. (Concurrent funding in PE 0602131M; funding will also be provided by PE 0603236N in FY 2009). - Completed 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. - Initiated 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 2010). ***FY 2011 Plans:*** - Continue all efforts of FY 2010, less those noted as complete above. - Complete development and transition transparent urban structures technologies which will enable tactical units to detect, classify and discriminate between friendly and enemy personnel in urban structures, and to gather ground data to dynamically develop 3D models to map urban areas using a UAV (Unmanned Air Vehicle)/UGV (Unmanned Ground Vehicle)-based system. (Concurrent funding provided by PE 0602131M.)			

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603640M: *MC Advanced Technology Demo*	PROJECT 2223: *Marine Corps ATD*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
- Complete development of individual warfighter lightweight protective system technologies that will reduce body armor weight, improve survivability and increase the mobility of the warfighter. - Initiate development of technologies to lighten the load of warfighters by 1) reducing the weight of and improving the capability of the day/night weapon sight, 2) eliminating battery incompatibility, and 3) providing Graphical User Interface (GUI-based) software for tradeoff analyses based on Military Operational Posture. (Previous FY10 effort resourced by PE 0602236N and PE 0603236N. Concurrent FY11 funding provided by PE 0602131M and PE 0603236N.) ***FY 2012 Plans:*** - Continue all efforts of FY 2011, less those noted as complete above. Due to urgent operational needs the development of tactical urban breaching technologies will complete in FY2011 to transition to the Marine Corps System Command SMAW II Rocket Launcher program. Due to required program necessities resourcing for the development of Modular Scalable Effects Weapons (selectable output weapon) technologies has been realigned to PE 0602114N and 0603114N. - Complete development of counter Improvised Explosive Device (IED) technologies. (Concurrent funding in PE 0602131M.) - Complete development of advanced survivability and mobility technologies for Marine Corps tactical and combat vehicles. (Concurrent funding in PE 0602131M and 0603236N). - Initiate development of wide area surgical and persistent surveillance technologies. (Concurrent funding in PE 0602271N and PE 0602131M).			
Title: LOGISTICS ***Description:*** 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. The FY 2010 to FY 2011 funding increase results from enhanced emphasis on the development of advanced lightweight fuel to energy conversion concepts. The FY 2011 to FY2012 funding increase results from operational demands to complete development of Marine Corps backpacks designed to minimize injurious peak oscillatory skeletal loading and generate electric power while walking during combat missions. ***FY 2010 Accomplishments:***	11.084	13.125	13.931

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603640M: *MC Advanced Technology Demo*	PROJECT 2223: *Marine Corps ATD*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
- 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.) - Continued analysis of material alternatives for automated vehicle health monitoring and reporting. - Continued development of a backpack that prevents oscillatory and transient peak loading forces from causing skeletal injury while enhancing human mobility with heavy loads. - Completed development of a tracking capability for major classes of supplies, forces & equipment. - Completed technology demonstration for responsive precision aerial logistic transport from Seabase to Distributed Operations Squad or Platoon. - Completed technology demonstration of an innovative bridge structure constructed from highly versatile modular composite components, thus expanding site-specific assembly options while simplifying logistic transport. - Completed development of a man-portable capability to analyze captured fuel for adulterants and contaminants. - Completed development of a lightweight man-portable multi-fuel thermoelectric battery charger. - Completed development of portable fuel analyzer. - Completed development of lightweight thermoelectric generator. - Initiated the development and demonstration of advanced materials for corrosion prevention and wear reduction for USMC vehicles and equipment. ***FY 2011 Plans:*** - Continue all efforts of FY 2010, less those noted as completed above. - Complete development of a low-cost, autonomous autogyro aerial logistic delivery system for resupplying small dispersed combat units. This includes: development of a fluid particle separator for small scale water purification; development of load sharing and energy storage capability for enhancing the efficiency of military power generators; and development of a Modular Composite Bridging demonstration based on prior applied research success. - Complete technology demonstration of a full scale bridge constructed from lightweight versatile modular composite components. - Initiate development of advanced lightweight fuel to energy conversion concepts. This includes development of power management electronics for reducing power requirements for military radios. ***FY 2012 Plans:*** - Continue all efforts of FY 2011, less those noted as completed above. - Initiate demonstration of advanced concepts for mobile infrastructure.			

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603640M: *MC Advanced Technology Demo*	PROJECT 2223: *Marine Corps ATD*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
- Complete development of backpacks designed to minimize injurious peak oscillatory skeletal loading and generate electric power while walking. Narrative Clarification: This effort was planned for completion in FY 2011 but was delayed due to technical challenges.			
Title: MANEUVER	10.228	12.312	13.625
Description: 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 FY 2010 to FY 2011 increase in funding is to due to plans for a major demonstration of Integrated Armor Solutions that provide lighter weight armor materials with enhanced protection to vehicle occupants. The FY 2011 to FY 2012 increase in funding is to due to plans to initiate programs to address and enhance maneuver capability gaps in mobility aimed at the development of an autonomous vehicle capability that will provide mobility and logistics support to the dismounted Marine during Enhanced Company Operations (ECO). ***FY 2010 Accomplishments:*** - Continued Advanced Electromagnetic Armor technology development efforts. - Continued development of a test bed to demonstrate advanced survivability concepts. - Continued development of fuel efficiency and battlefield power systems for improved performance. - Continued development of a Combat S&T Vehicle demonstrator to enhance crew survivability and vehicle fuel efficiency. - Continued survivability improvements and technologies to mitigate acceleration and traumatic brain injuries to occupants to enhance tactical mobility and survivability. - Continued 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			

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603640M: *MC Advanced Technology Demo*	PROJECT 2223: *Marine Corps ATD*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
- Continued 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. - Continued 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. - Continued 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. - Continued studies to identify technology development plans to close identified force protection capability gaps. - Continued development of fuel efficiency and battlefield power systems for improved performance. - Continued 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. - Initiated efforts to evaluate current ground fleet platforms for their mobility and control capabilities as they relate to potential inclusion of an autonomous vehicle capability that will provide mobility and logistics support to the dismounted Marine during Enhanced Company Operations (ECO) ***FY 2011 Plans:*** - Continue all efforts of FY 2010. - Initiate efforts to demonstrate Integrated Armor Solutions that provide lighter weight armor materials with enhanced protection to vehicle occupants thereby enhancing tactical Mobility and Survivability in support of Distributed Operations. ***FY 2012 Plans:*** - Continue all efforts of FY 2011. - Initiate programs to address and enhance maneuver capability gaps in mobility such as efforts, transitioned from 6.2, aimed at the development of an autonomous vehicle capability that will provide mobility and logistics support to the dismounted Marine during Enhanced Company Operations (ECO).			
Accomplishments/Planned Programs Subtotals	80.157	78.087	83.932

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
• 0603236N: *WARFIGHTER SUSTAINMENT ADVANCED TECHNOLOGY*	0.000	0.000	2.141	0.000	2.141	0.000	0.000	0.000	0.000	0.000	2.141

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603640M: *MC Advanced Technology Demo*	PROJECT 2223: *Marine Corps ATD*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
• 0602131M: *MARINE CORPS LANDING FORCE TECHNOLOGY*	8.698	7.278	8.981	0.000	8.981	7.219	3.648	1.155	0.000	0.000	36.979

D. Acquisition Strategy

N/A

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.

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy			DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603640M: *MC Advanced Technology Demo*	PROJECT 2297: *Marine Corps Warfighting Lab - Core*	

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
2297: *Marine Corps Warfighting Lab - Core*	35.206	37.002	40.392	-	40.392	43.055	44.040	44.962	45.765	Continuing	Continuing

A. Mission Description and Budget Item Justification

The 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: Combat Service Support (CSS) and Force Protection; Command, Control, Communications, and Computers (C4); Intelligence, Surveillance, and Reconnaissance (ISR); Fires, Targeting, and Maneuver; 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 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:

- The Enhanced Company Operations (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 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.

- In Fiscal Year (FY) 2010 and beyond the MCWL experimentation 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.

- In FY 2011, MCWL experimentation will initiate a five-year campaign to encompass an examination of Enhanced MAGTF Operations (EMO) that fully exploit capabilities achieved in ECO experimentation to the greater MAGTF beyond the infantry company focus of the past in the areas of CSS, C4, ISR, and Fires, Targeting,

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603640M: *MC Advanced Technology Demo*	PROJECT 2297: *Marine Corps Warfighting Lab - Core*

and Maneuver. Additionally, FY 2011 investments will continue to support the immediate needs of deployed forces and exploit opportunities presented by emerging technologies.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Title: COMBAT SERVICE SUPPORT (CSS) AND FORCE PROTECTION	4.773	4.902	5.389
Description: 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 2012 and beyond funding for Defense Advanced Research Projects Agency (DARPA)-legged robot program was realigned from Warfighting Excellence to CSS and Force Protection. ***FY 2010 Accomplishments:*** - 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 (transitioned to Warfighting Excellence activity in FY 2010). - Continued assessment of unmanned ground logistics delivery technologies that support infantry small unit operations. - Initiated assessment of technologies for sustainment of tactical level units from the sea-base. - Initiated new investigations into point-of-wound stabilization and emerging technologies that support casualty evacuation (CASEVAC)/casualty extractions using robots. ***FY 2011 Plans:*** - Continue all efforts of FY 2010. ***FY 2012 Plans:*** - Continue all efforts of FY 2011. - Complete assessment of unmanned ground logistics delivery technologies that support infantry small unit operations. - Complete investigations into point-of-wound stabilization and emerging technologies that support CASEVAC/casualty extractions using robots. - Initiate research and assessment of technologies that reduce the demand required to support the MAGTF. - Initiate development, and test unmanned versions of current cargo vehicles.			
Title: COMMAND, CONTROL, COMMUNICATIONS, COMPUTERS (C4)	9.155	9.785	11.900
Description: 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			

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603640M: *MC Advanced Technology Demo*	PROJECT 2297: *Marine Corps Warfighting Lab - Core*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
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. The increase in the MCWL C4 activity funding from FY 2011 to FY 2012 is due to the assessment of enhanced Marine Air-Ground Task Force (MAGTF) communications concept demonstrators and the initiation ot the Internally Transportable Vehicle (ITV) based C4 concept demonstrator. The investigation and assessment of a MAGTF C2 architecture and an integrated C2 application in support of the Enhanced MAGTF Operations (EMO) concept also initiate in FY 2012. ***FY 2010 Accomplishments:*** - Continued C4 extended user assessments of selected prototype technologies in support of forces engaged in Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF). - Continued experimentation of concept demonstrators to support company and below alternative Command and Control (C2) architectures. - Completed C4 related small unit enhancements against irregular forces, including urban terrain. - Initiated assessment of network management systems for Capability Set (CAPSET) V (all C2 below Battalion) networks. ***FY 2011 Plans:*** - Complete C4 extended user assessments of selected prototype technologies in support of forces engaged in OEF and OIF. - Complete experimentation of concept demonstrators to support company and below alternative C2 architectures. - Complete assessment of network management systems for CAPSET V (all C2 below Battalion) networks. - Initiate assessment of fuzzy logic (artificial intelligence based) network management systems. - Initiate assessment of non-Radio Frequency based communications systems. ***FY 2012 Plans:*** - Continue all efforts of FY 2011, less those noted as complete above. - Initiate assessment of enhanced MAGTF communications concept demonstrators. - Initiate development and assessment of Internally Transportable Vehicle (ITV) based C4 concept demonstrator. - Initiate investigation and assessment of a MAGTF C2 architecture and an integrated C2 application in support of the EMO concept.			
Title: FIRES, TARGETING, AND MANEUVER ***Description:*** 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	1.534	1.648	1.811

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603640M: *MC Advanced Technology Demo*	PROJECT 2297: *Marine Corps Warfighting Lab - Core*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
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 2010 Accomplishments:*** - Continued assessment of small unit precision munitions/loitering weapons/armed Unmanned Aerial System (UAS) concept demonstrators. - Completed evaluation of alternative counter shooter technologies. - Initiated assessment of concept demonstrator precision targeting device. ***FY 2011 Plans:*** - Continue all efforts in FY 2010, less those noted as completed above. - Complete assessment of small unit precision munitions/loitering weapons/armed UAS concept demonstrators. - Initiate assessment of non-Radio Frequency based communications systems. ***FY 2012 Plans:*** - Continue all efforts from 2011, less those noted as complete above. - Complete assessment of concept demonstrator precision targeting device. - Initiate investigation, development, and testing of concept demonstrator technologies and TTPs for enhanced fire support and fire support coordination associated with the EMO concept. - Initiate investigation, testing, and evaluation of hybrid electric vehicles capable of providing mobility to ground combat forces.			
Title: INTELLIGENCE, SURVEILLANCE, AND RECONNAISSANCE (ISR) ***Description:*** 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. 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 2010 Accomplishments:*** - Continued additional Improvised Explosive Device (IED) investigations into promising detect and neutralize technologies. - Continued experimentation with TTPs and payloads for a Research Surrogate (formerly referred to as Tier II) UAS concept demonstrator to provide persistent ISR at regimental and battalion levels. - Continued efforts to develop the TTPs required for small infantry units to employ UGVs, UASs, and unattended ground sensors. - Continued assessment of an integrated company level C4 ISR network. - Completed development and experimentation with a system that integrated tactical human intelligence collection, fusion, and visualization tools.	5.179	4.974	4.842

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603640M: *MC Advanced Technology Demo*	PROJECT 2297: *Marine Corps Warfighting Lab - Core*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
- Initiated investigations into rotary wing/hovering tactical level UAS concept demonstrators. ***FY 2011 Plans:*** - Continue all efforts of FY 2010. - Complete experimentation with TTPs and payloads for a Research Surrogate UAS concept demonstrator to provide persistent ISR at regimental and battalion levels. ***FY 2012 Plans:*** - Continue all efforts of FY 2011, less those noted as complete above. - Complete investigations into rotary wing/hovering tactical level UAS concept demonstrators. - Initiate and complete experimentation with sensors tailored to the requirements of a Combat Logistics Patrol - Initiate development and testing of a sensor kit for manned/unmanned UGVs. - Initiate assessment of Vertical Takeoff and Landing (VTOL) micro UAS with a perch-and-stare capability.			
Title: MARINE CORPS WARFIGHTING LABORATORY (MCWL) OPERATIONS (SUPPORT) ***Description:*** 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 2010 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. ***FY 2011 Plans:*** - Continue all efforts of FY 2010. ***FY 2012 Plans:*** - Continue all efforts of FY 2011.	8.147	8.851	9.513
Title: WARFIGHTING EXCELLENCE ***Description:*** 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	6.418	6.842	6.937

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603640M: *MC Advanced Technology Demo*	**PROJECT** 2297: *Marine Corps Warfighting Lab - Core*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
(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 2012 and beyond funding for DARPA-legged robot program was realigned from Warfighting Excellence to CSS and Force Protection. ***FY 2010 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 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. - 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 experimentation of simulation based training technologies to enhance small unit leader decision-making ability. - Initiated a MCWL-DARPA partnership for the development and demonstration of a legged robot in an effort to "Lighten the Load" of individual Marines. ***FY 2011 Plans:*** - Continue all efforts of FY 2010. ***FY 2012 Plans:*** - Continue all efforts of FY 2011.			
Accomplishments/Planned Programs Subtotals	35.206	37.002	40.392

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603640M: *MC Advanced Technology Demo*	PROJECT 2297: *Marine Corps Warfighting Lab - Core*

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.

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy			DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603640M: *MC Advanced Technology Demo*	PROJECT 4027: *Naval Innovative Science and Engineering*	

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
4027: *Naval Innovative Science and Engineering*	0.428	-	-	-	-	-	-	-	-	0.000	0.428

A. Mission Description and Budget Item Justification

Funding supports research and development efforts as directed under Section 219 of the fiscal year 2009 Duncan Hunter National Defense Authorization Act.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Title: Naval Innovative Science and Engineering	0.428	-	-
Description: Funding supports research and development efforts as directed under Section 219 of the fiscal year 2009 Duncan Hunter National Defense Authorization Act. ***FY 2010 Accomplishments:*** Section 219 (Naval Innovative Science and Engineering) included in the FY 2009 Duncan Hunter National Defense Authorization Act, established mechanisms whereby the director of a naval laboratory may utilize up to three percent of all funds available to the laboratory to sponsor individual projects for: 1. Innovative basic and applied research that is conducted at the laboratory and supports military missions; 2. Development programs that support the transition of technologies developed by the defense laboratory into operational use; 3. Development activities that improve the capacity of the defense laboratory to recruit and retain personnel with needed scientific and engineering expertise; and 4. The revitalization and recapitalization of the laboratories.			
Accomplishments/Planned Programs Subtotals	0.428	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

Not applicable.

E. Performance Metrics

The overall metrics of Section 219 is to increase retention and recruitment; number of advanced degrees, patent awards, and technical papers; successful technology transition to the warfighter; and laboratory ability to conduct innovative research.

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy			DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603640M: *MC Advanced Technology Demo*	PROJECT 9999: *Congressional Adds*	

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
9999: *Congressional Adds*	23.122	-	-	-	-	-	-	-	-	0.000	23.122

A. Mission Description and Budget Item Justification

Congressional Interest Items not included in other Projects.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011
Congressional Add: California Central Coast Partnership Research ***FY 2010 Accomplishments:*** This effort provided for research into; power and energy, operational environments, maritime domain awareness, information analysis and communication, Naval warrior performance and protection, survivability and self defense, and platform mobility at the California Central Coast Research Partnership.	2.788	-
Congressional Add: Enhanced Small Arms Protective Insert ***FY 2010 Accomplishments:*** This effort provided for research to develop a new Enhanced Small Arms Protective Insert (E-SAPI) that will have the same performance as the current E-SAPI, but at a lower weight and with the same protection level to enhance the war-fighter's performance and effectiveness.	1.593	-
Congressional Add: Future Immersive Training ***FY 2010 Accomplishments:*** This effort provided research to improve the Future Immersive Training Environment Joint Concept Technology Demonstration, an interoperable & reconfigurable hardware and software integrated training capability that enables the warfighter to train to accomplish close combat tasks in a realistic, fully immersive training environment that creates and reinforces complex (tactical and human dimension) decision making skills.	9.480	-
Congressional Add: Marine Air-Ground Task Force Situational Awareness ***FY 2010 Accomplishments:*** This effort designed, developed, tested and demonstrated the Marine Air Ground Task Force (MAGTF) situational Awareness Prototype decision support system.	2.689	-
Congressional Add: Ground Warfare Acoustical Combat System of Netted ***FY 2010 Accomplishments:*** This effort investigated cost-effective, light weight, man-wearable shot/fire event detection systems that enable quick response to direct shots or indirect fire from snipers, front line combatants,	4.979	-

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603640M: *MC Advanced Technology Demo*	PROJECT 9999: *Congressional Adds*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011
or other field assets. Proof of concept experimentation with GWACS and/or other GWACS-type systems was conducted to determine the concept's utility within a Marine Corps rifle unit.		
Congressional Add: Near Infrared optical (NIRO) Augmentation System	1.593	-
FY 2010 Accomplishments: This effort developed and demonstrated technologies that supported development of counter sniper technologies in support of maneuver warfare, small unit distributed operations, and fixed installation protection.		
Congressional Adds Subtotals	23.122	-

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Congressional Interest Items not included in other Projects.