

The Lab

Why a Marine Corps Warfighting Laboratory?

The Marine Corps has a rich legacy of innovation including; amphibious warfare, close air support, maritime prepositioning, and tilt-rotor technology, but cannot rest on its laurels or current capabilities.

In a world of great uncertainty, rapid technological diffusion, and potentially volatile conflict, it is vital that the Marine Corps aggressively explore new operational concepts, innovative organizational designs, and advanced technologies to meet tomorrow's challenges.

The emerging security environment places a premium on a continuous transformation of capabilities in order to maintain our competitive advantage over potential adversaries. Potential adversaries can seek out asymmetric tactics, or elect to confront U.S. forces in complex terrain, such as dense urban settings to offset American technological advantages. The future suggests that U.S. military preeminence could be short lived unless we stretch the competitive boundaries of existing capabilities or develop entirely new competencies that distinctly alter future military operations.

The Lab is a key component of the Marine Corps expeditionary force development system in support of the naval transformation roadmap. It employs wargaming, modeling and simulation, and operational experimentation to test and validate tactics, techniques, procedures and technologies, that result in increased capabilities.

In short, the Lab operationalizes the Commandant's goals, stated in *Marine Corps Strategy 21*, to harness innovation and technology to ensure future Joint Force Commanders have the necessary naval expeditionary capabilities they will require.

Mission. The mission of the Marine Corps Warfighting Laboratory is as follows:

(The Lab) conducts concept-based experimentation to develop and evaluate tactics, techniques, procedures and technologies in order to enhance current and future warfighting capabilities.

Experimentation is conducted to meet Service *Title X* responsibilities. Service experimentation supports the Warfighting Advocates – Command Element, Ground Combat Element, Aviation Combat Element, and Combat Service Support Element – with the end results supporting the Marine Corps Expeditionary Force Development System—the process by which the Marine Corps translates concepts into fielded combat capabilities.

Joint experimentation is supported through the Marine Corps Combat Development Command's Joint Operations Center, the assigned lead for Marine Corps participation in Joint Forces Command's (JFCOM) joint experimentation program.

History

Established in October 1995, the Lab quickly established itself as a focal point for revolutionary ideas and innovation. Within 18 months, the Lab had developed a means for looking at change – called the *Sea Dragon Process*.

A major component of this process was a five-year experimentation plan – the Warrior

Experimentation Series – each phase intended to last approximately two years in length, culminating in an Advanced Warfighting Experiment (AWE). Each phase was given a title – *Hunter Warrior*, *Urban Warrior*, and *Capable Warrior* – reflecting the conceptual focus of the phase.

In 1997, the Lab executed *Hunter Warrior* as its initial major Advanced Warfighting Experiment involving West Coast Navy and Marine operational forces. This phase examined a number of concepts and issues related to sea-based power projection using emerging information technology, precision indirect weapons, and dispersed ground units in an extended battlespace.

Beginning in 1997, the *Urban Warrior* experimental phase focused on the implications of information technology and new tactics while operating in urban environments. The culminating event of this phase was a major urban experiment in Oakland, CA in the spring of 1999.

The *Capable Warrior* phase culminated in the summer of 2001 with an experiment in conjunction with the *Extended Littoral Battlespace Advanced Concept Technology Demonstration* to explore the impact of emerging broadband wireless technologies, intelligent agent decision support tools, and collaborative decision-making systems on sea-based operations in an extended battlespace with multiple maneuver units.

In 1998, the Commanding General of the Lab was assigned the additional responsibility of Vice Chief of Naval Research and assumed a major role in oversight of Marine Corps related Naval Science and Technology programs.

In 2002, the Lab switched from an odd year experimentation cycle to an even year cycle to

synchronize with the JFCOM schedule of experimentation and executed *Millennium Dragon 2002* (MD 02). MD02 supported the Marine Corps service contribution to JFCOM's *Millennium Challenge 2002* experiment. MD02 was conducted from 24 July to 15 August 2002 at MCB Camp Pendleton and at the former George AFB, Victorville, CA.

In 2003, the Lab continued to refine its Basic Urban Skills Training package for transition to the Training and Education Command and conducted a number of limited experiments focused primarily in urban combat and urban reconnaissance, surveillance, and target acquisition. The principal focus of effort for technology development was providing support for *Operation Iraqi Freedom* and subsequently for the return of Marine operational forces for follow-on operations using prototype technologies to support the *Sea Viking* experimentation campaign. *Sea Viking* is discussed in more detail in Chapter II.

The Dragon as a Symbol of Change

Since its inception, the Lab has adopted the *dragon* as its unique emblem representing the Lab's commitment to an open exploration of change. The *dragon* has appeared within each successive logo used by the Lab. Its perhaps apocryphal source is that of an ancient Chinese proverb about change:

Change is like a dragon. You can stand in its way, in which case it will destroy you with its power. You can run from it, in which case it will rapidly overtake and bury you. Or you can jump on its back, and let it take you where it will into the future.



The *dragon* has been used throughout the history of the Lab in the nicknames for Lab-specific technologies such as the *Dragon Drone*, *Dragon Eye*, and *Dragon Warrior* unmanned

aerial vehicles, the *Dragon Fire* advanced mortar system, and the *Dragon Runner* unmanned ground vehicle.

Organization

The Center for Emerging Threats and Opportunities (CETO).

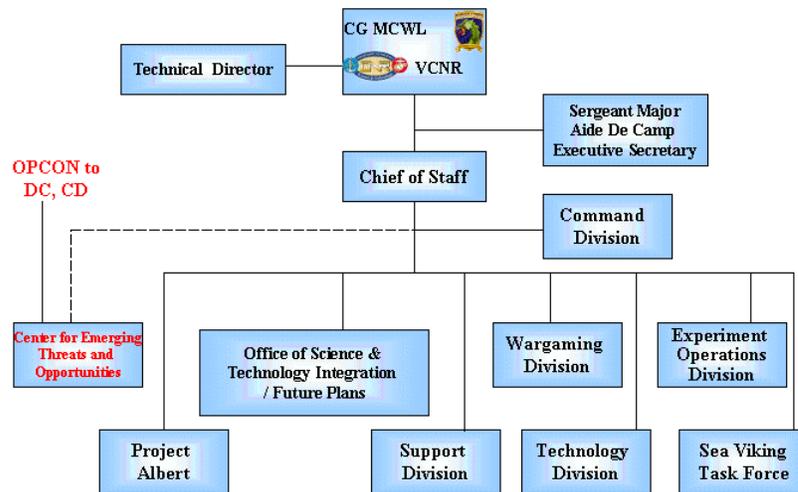
CETO began as a Congressionally mandated organization in partnership between the Lab and the Potomac Institute for Policy Studies. It is now resourced by the Lab and resides

under the operational control of the Deputy Commandant, Combat Development.

CETO's mission is to assist in focusing Marine Corps Science and Technology (S&T) and experimental efforts by developing and appraising promising concepts and technologies; and to serve as a catalyst to stimulate thought and debate on issues of importance to the USMC.

Much of CETO's current focus is on concept support efforts that aim to meet the requirements of Combatant Commanders. This overall effort incorporates providing direct support in developing new concepts for Director, Expeditionary Force Development Center, such as Distributed Operations; the Distributed Operations (DO) IPT; and related support tasks for the Commandant on new concepts, such as Sea Swap. CETO also identifies emerging threats through its research on Future Flashpoints and provides cultural intelligence seminars and training.

Organization Chart



Project Albert

Project Albert is a Congressionally mandated and resourced research effort to assess the general applicability of complex adaptive systems to land warfare, and to provide new methodologies for investigating the results of running such models, and incorporating those results with other, more traditional, methods of analysis.

**Office of Science & Technology
Integration/Future Plans Division**

The Office of Science and Technology /Future Plans Division is comprised of two Branches.

The Science & Technology (S&T) Integration Branch supports the VCNR in his role as the Executive Agent for Marine Corps S&T to develop the vision, policies, and strategies needed to exploit scientific research and technological development. The Branch integrates and focus S&T efforts and coordinates the Marine Corps S&T process as well as serving as the principal point of contact for the operational forces in coordinating S&T support for emergent needs. In addition, the Branch develops and publishes the biennial Marine Corps S&T Plan.

The Future Plans Branch develops and publishes experiment direction that establishes priorities and drives the experimentation process within the Lab. Examples include the Lab's annual Experimentation Campaign Plan and the Marine Corps Experimentation Plan in support of the Expeditionary Maneuver Warfare Capability List.

Support Division

The support division provides logistical support to the Lab both in garrison and in the field during experimentation.

Wargaming Division

The Wargaming Division supports the entire experimentation process from concept exploration to technology validation and refinement. The Division specifically serves as the Lab's office of record for Joint experimentation and for support to the *Sea Viking* Conceptual Pathway virtual experimentation. In addition they conduct the Marine Corps Title X Wargame and train Marines for participation in other services wargames.

Technology Division

The Technology Division identifies and develops technologies with advanced capabilities through Limited Technical Assessments (LTAs). Candidate technology solutions are used to support selected experimental or proof of concepts efforts. The technology solutions may be prototype systems solely developed by the Lab or in a coordinated effort with the Office of Naval Research (ONR). Additionally Program Managers from Marine Corps Systems Command can request the Lab's assistance in developing a capability for an on-going program of record. Since the division coordinates with other agencies some candidate solutions may be surrogate systems developed by Defense Advanced Research Project Agency, ONR, or commercial off-the-shelf systems available from industry. Experimentation may present opportunities to insert emerging technologies with advanced capabilities into concept-based experimentation. The Technology Division is a key participant in concept development, modeling and simulation, and technology development as mandated by Congress.

Experiment Operations Division

The Experiment Operations (ExOps) Division is the live-force experimentation arm of the Warfighting Laboratory. The ExOps division supports the Warfighting Lab's mission by executing four core functions:

- (1) Fulfill the experiment operations and experiment control responsibilities for all Advanced Warfighting Experiments (AWE) and the vast majority of Limited Objective Experiments (LOE)
- (2) Experiment with technical and non-technical solutions to warfighting challenges that result in the development of new Tactics, Techniques, and Procedures (TTPs)
- (3) Experiment with select commercial off the shelf (COTS) products that do not require technical development
- (4) Perform G-3 and S-3 functions for the Warfighting Lab and SPMAGTF(X).

In the course of every-day service-wide operations and training, certain functional areas have been identified as requiring special attention to enhance warfighting capabilities. Lab projects provide focus and dedicated resources to analyze needs and develop capabilities to address these critical areas.

Under the ExOps Division, the *Tactical Warrior* campaign examines the introduction of a variety of enhanced capabilities to infantry small units. Tactical Warrior experiments are relatively small in scale (company or platoon) and are designed to answer specific questions confronting the GCE in general and the infantry in particular. Tactical Warrior provides the Infantry Operational Advisory Group (IOAG), Ground Board, TECOM and the Marine Corps Ground

Advocate at PP&O an experimental venue through which near term capabilities can be examined. It is the Lab's primary vehicle to fight the "near battle" and remain responsive to the operating forces.

Recent experimentation efforts have focused on Distributed Operations and Night Operations, in addition to the fielding of the Advanced Combat Optic Gunsight.

Other projects that execute the Tactical Warrior campaign include:

Project Metropolis - The urban combat experimentation and training cell.

Project Rifleman - The infantry specific experimentation cell.

Project Phoenix - The aviation specific experimentation cell.

Project Metropolis has a four-fold purpose: (1) develop TTPs to enable Marines to survive, fight and win in Military Operations in Urbanized Terrain (MOUT), (2) develop a comprehensive urban warfighting Program of Instruction, (3) recommend improvements to existing and future training facilities, and (4) evaluate selected enabling technologies that enhance small unit combat capability. Project Metropolis experimentation systematically identifies weaknesses or problem areas across the spectrum of urban operations and designs experiments in order to find solutions. Project Metropolis partners with operating force units to conduct experiments at the platoon through battalion (reinforced) level. Experimentation is accomplished across all spectrums of conflict with symmetric and asymmetric threats in both high and low intensity combat environments. Project Metropolis takes a holistic approach to finding ways to prepare for the "three block war."

Project Rifleman experiments enhance the warfighting capability of the individual rifleman by assessing the effectiveness of emerging equipment and technology. The program has evolved into an experimental test bed for near term initiatives requested through the Marine Corps Advocates. Project Rifleman also assists the Marine Corps Systems Command's Marine Expeditionary Rifle Squad Program to make procurement decisions through experimentation.

Recent experimentation efforts have focused on the Personal Defense Weapon (PDW) and M203 Night Sights in addition to the design and fielding of the Squad Forcible Entry Kit.

Project Phoenix experimentation was formed to examine the aviation aspect of urban operations. The project has focused on examining the survivability of rotary wing assets against Man Portable Air Defense and Antiaircraft Artillery threats in the urban environment. At the same time, close-air support, casualty evacuation, re-supply, assault support, and reconnaissance operations have been examined to determine the effectiveness and ability of aircrews to perform these missions in an urban environment against various threats.

Recent experimentation efforts have focused on Rotary Wing Survivability and Aircraft Armoring in addition to the fielding of the M3M .50 cal machine gun.

The ExOps division also conducts experimentation in several secondary areas, for example with a position location information system designed to enhance training and experiment/exercise management, scenario reconstruction, and data retrieval capabilities. Additionally, the ExOps division

provides support to the Area Denial System Advanced Concept Technical Demonstration.

Output from the Division takes the form of TTPs and training syllabi, recommended doctrine, X-Files, Universal Needs Statements, assessment reports or other initial programmatic documents, operational force training, after action reports, and experimentation support to the other divisions within the Lab.

Sea Viking Task Force

The Sea Viking Task Force is a division-level organization tasked with planning, coordinating, and conducting experimentation directly related to the *Sea Viking* prototype pathway.

Operation Respond / Coordination of Technology Support to Operation Iraqi Freedom 2 (OIF 2)

The Commanding General, Marine Corps Warfighting Lab has been appointed by the Deputy Commandant, Combat Development as the Executive Agent for Science and Technology Support for OIF 2 and implicitly other operations in the global war on terrorism. In this capacity, he is the coordinator for Operation Respond.

Operation Respond is a Secretary of the Navy mandated venue for the Operating Forces to identify emerging OIF 2 and OEF (Afghanistan) needs and a mechanism to rapidly respond to these requests. The Lab is the focal point for receipt and processing of Operation Respond requests and acts as a clearinghouse to ensure appropriate action. Where appropriate, action may include submitting the request and a recommended solution to a War Council involving the Deputy Commandant, Combat Development

and members of the Secretary of the Navy's representative for identification of appropriate resources.

The Lab coordinates with DARPA, ONR, the Army Rapid Equipping Force, and other agencies as required to facilitate the testing and operational assessment of new technologies requested by the Operating Forces specifically or as candidates to provide a requested capability. In addition, the Lab supports the Marine Corps Improvised Explosive Device Working Group in coordination with the Army's IED Task Force and the OSD counter-terrorism Task Force.

Innovation and Experimentation Process

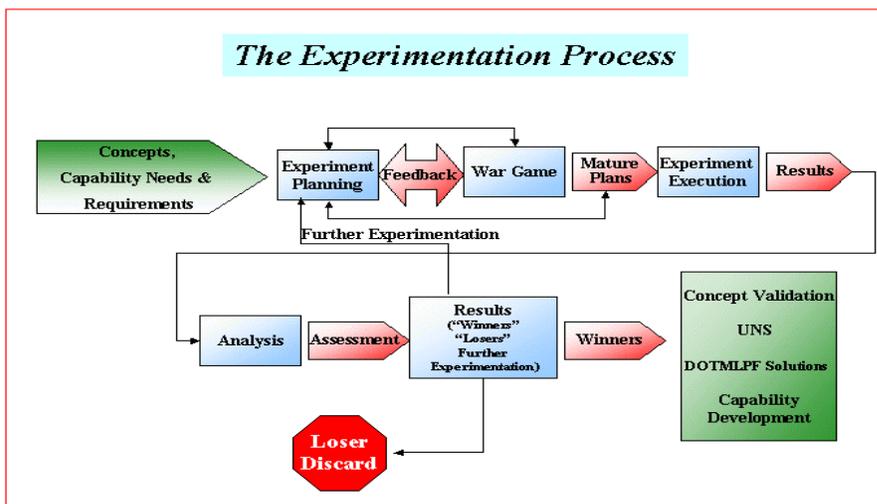
The OSTI/Future Plans Division and the Sea Viking Task Force, in conjunction with the EFDC and inputs from the advocates, determines the concepts or ideas for experimentation. The Wargaming Division refines the concept and provides capability insights. The Technology Division identifies equipment and technology candidates for the proposed experimentation. The Experiment Operations Division conducts detailed

planning and executes the experiment. The Support Division assists both in planning and execution.

The Experimentation Process the Lab uses, as shown in the diagram below supports the Expeditionary Combat Development Process and is designed to provide experimentation results necessary to support assessing the needs of the operating forces (current Marine Corps), the programmed force (Next Marine Corps), and exploring new concepts for warfighting (Marine Corps After Next).

Joint Experimentation Support

The Marine Corps experimentation philosophy is targeted at producing the right mix of Marine Corps capabilities for the Joint Force Commander. The key to producing the right mix of capabilities is to ensure that Marine Corps capabilities support joint concepts and where appropriate embed or merge Title X requirements and processes with Joint venues and processes. The goal of this integrated approach is to produce complimentary service and joint Doctrine, Organization, Training, Material, Leadership, Personnel and Facilities (DOTMLPF) recommendations.



Based on this philosophy the Lab examines the direction of United States Joint Forces Command's experimentation to identify those unique future Marine Corps capabilities that have the potential to contribute to Joint capability development.