

# MARINE CORPS WARFIGHTING LABORATORY

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*EXPERIMENTATION CAMPAIGN PLAN: 2004*



## UNITED STATES MARINE CORPS

MARINE CORPS WARFIGHTING LABORATORY  
MARINE CORPS COMBAT DEVELOPMENTAL COMMAND  
QUANTICO, VIRGINIA 22134-2100

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From: Commanding General, Marine Corps Warfighting Laboratory  
To: Distribution List

Subj: MARINE CORPS WARFIGHTING LABORATORY EXPERIMENTATION CAMPAIGN  
PLAN: 2004

Ref: (a) Expeditionary Maneuver Warfare Capability List: 2003

1. This document provides a concise summary of the Lab's experimentation efforts and priorities for 2004 in support of Marine Corps combat development objectives in the reference.

2. Some of the more significant changes from the previous ECP are summarized as follows:

a. The *Sea Viking* Advanced Warfighting Experiment has changed significantly, as a result of the deployment of I Marine Expeditionary Force in support of *Operation Iraqi Freedom-2* (OIF-2). The experiment has been refocused into an operational assessment of new technologies to be conducted in Iraq.

b. The Lab's Experiment Operations Division has supported the 1<sup>st</sup>, 2<sup>nd</sup>, and 4<sup>th</sup> Marine Divisions by providing comprehensive Stability and Support Operations (SASO) training for more than 18,000 Marines in preparation for deployment in support of OIF-2.

c. The Lab's technology development efforts have been refined into three categories: (1) to provide prototype technologies in support of experimentation, (2) Congressionally mandated initiatives, and (3) to respond to near term Science and Technology needs of the Operating Forces. The Lab's technology efforts are closely integrated with those of the Office of Naval Research.

3. The Lab's Experimentation Campaign Plan is continuously under review and will be updated annually.

T. D. WALDHAUSER

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To: Commanding General Marine Corps Warfighting Laboratory

Attn: Future Plans

3255 Meyers Avenue

Quantico Virginia 22134-5069

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# **The Lab**

## **Section I**

## 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).**

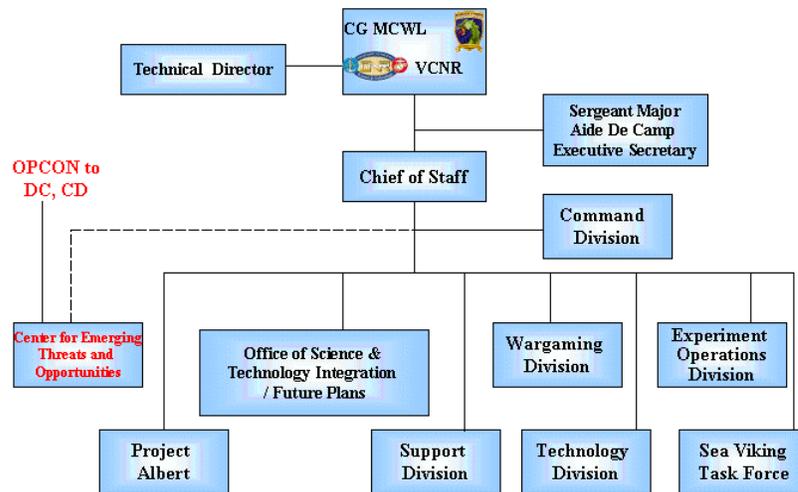
CETO began as a Congressionally mandated organization in partnership between the Lab and the Potomac Institute for Policy Studies. It is now resourced by the Lab and resides

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

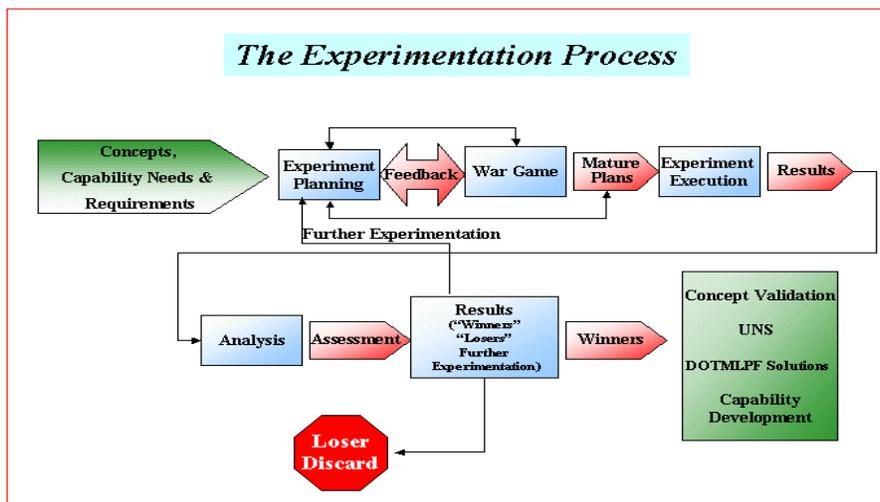
planning and executes the experiment. The Support Division assists both in planning and execution.

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.



# **Experimentation**

## **Section II**

## Experimentation

### Background

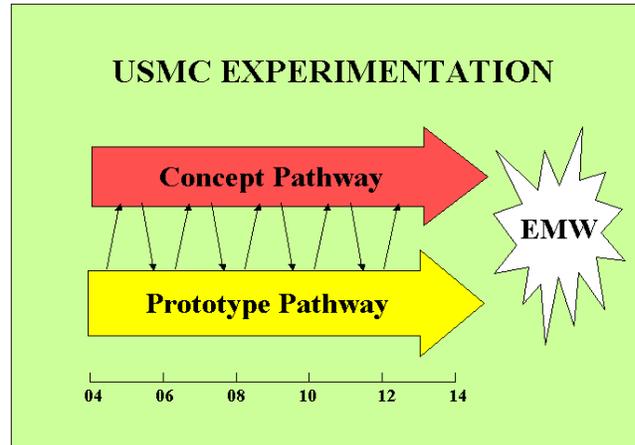
Experimentation efforts are guided by inputs from Defense Planning guidance, CMC Vision, Advocates, Marine Corps Combat Development Command (MCCDC), Office of Naval Research and a variety of other sources. Lab experimentation is conducted to meet Service Title X responsibilities and to provide Marine Corps contributions to Joint Concept Development and Experimentation (JCDE). Service experimentation conducted by the Lab is designed to improve current and future naval expeditionary warfare capabilities by:

- Conducting concept-based experimentation to develop and evaluate tactics, techniques, and procedures and technologies
- Supporting Marine Corps Advocates, MCCDC, Training and Education Command, and Systems Command to meet service-specific requirements
- Supporting Joint experimentation through MCCDC's Joint Operations Center, the Marine Corps' lead for U.S. Joint Forces Command's Joint Concept Development and Experimentation program (JCDE)
- Forwarding results of experimentation to MCCDC's Expeditionary Force Development Systems (EFDS) with recommendations for action

### A Two-Path Approach

The Marine Corps focuses on developing two products as the result of a two-path strategy on which we base our approach to innovation and experimentation. One product of experimentation consists of actionable recommendations that result from the testing

of new concepts and capabilities that focus on the mid- and far-term. These products are generated on the concept pathway. Another product consists of the prototypes that evolve from concept experimentation. These prototypes improve near/mid-term warfighting capabilities and are generated along the prototype pathway.



The two-pathway approach drives us to conduct experimentation that covers the entire spectrum of capability development. At the same time, we ensure that the two pathways are integrated and compliment each other to develop the capabilities required for the Marine Corps of the future as delineated in the EMW Capability List (ECL).

### Sea Viking

*Marine Corps Strategy 21* is the vision of future Marine forces with enhanced expeditionary power projection capabilities. The capstone concept, *Expeditionary Maneuver Warfare (EMW)*, focuses our warfighting concepts toward realizing this vision. Sea Viking is a Commandant of the Marine Corps directed experimentation and concept development campaign that assesses Marine Corps/Naval capabilities in a Joint context. It is an iterative campaign of concept development, experimentation, and

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assessment designed to develop capabilities for the future. The main effort is to develop and assess the composition and employment of the future seabased MEB and ESG (ESF) capability sets.

Sea Viking Dual Pathways. Initially, the Sea Viking campaign was developed primarily as a prototype development campaign conducted by the Lab. In May 2003 the Commandant of the Marine Corps expanded the scope of Sea Viking necessitating the addition of a conceptual development pathway within the Sea Viking Campaign as follows:

### **CMC Sea Viking Guidance**

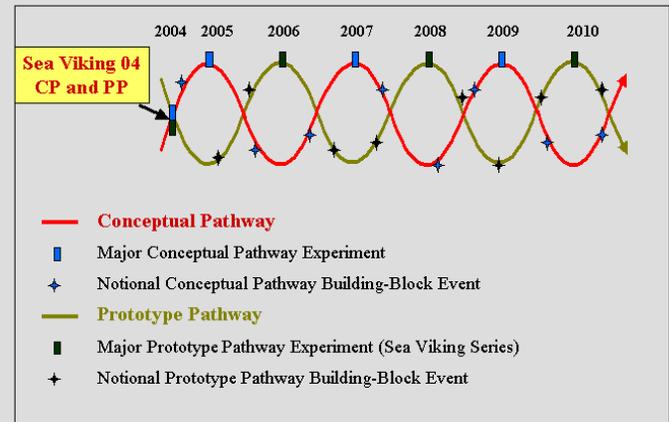
- Assess the future seabased MEB in a Joint Forcible Entry context
- Assess future MEB capability sets
- Assess seabased command relationships & interfaces across all warfighting functions

The Joint Concept Development and Experimentation Operations Center (JOC) at the Expeditionary Force Development Center (EFDC) joined the planning and took the lead for the concept development aspects of the experiment establishing the Sea Viking Concept Development (CD) pathway with support from elements of the Lab. The Lab maintains the lead for the prototype aspects of the experiment developing the Sea Viking Prototype Pathway (PP).

Using the dual pathway approach, the Marine Corps will continue the Sea Viking Campaign and plan, design, and conduct the phases along the two pathways. The initial phases along both pathways culminate in the fall of 2004. Following 2004, Sea Viking will be conducted annually, alternating between the two pathways with the conceptual pathway events culminating during the odd years and prototype pathway events during the even

years. Phases will alternate between pathways to maximize resource utilization and be complimentary from a capability development standpoint. This approach provides the opportunity to build on the previous years' findings as we develop the capabilities required to support EMW.

### **Sea Viking Battle Rhythm**



Sea Viking Conceptual Pathway (CP) SV 04 Experimentation. With the expansion of the Sea Viking Campaign, the conceptual pathway experimentation in 2004 will develop concepts of operations that examine command relations, seabased organizations and advanced “capability sets” that will be assessed in modeling and simulation command post exercises. Principal participants include II Marine Expeditionary Force, the U.S. Second Fleet and Joint Forces Command. The experiment will seek to develop future MEB Forcible Entry CONOPS. Specifically the experiment will address future MEB capability sets, organizations, and equipment; Seabased C2 to codify Naval/Joint command relationships, architectures, and interfaces; and examine the ability of a future MEB to provide a Standing JTF Forcible Entry capability. Products of SV 04 (CP) experimentation will guide

continued Sea Viking experimentation leading to refined capability sets and DOTMLPF recommendations for the future MEB T/O and T/E.



Sea Viking Prototype Pathway SV 04 Experimentation. The Sea Viking 04 (PP) experiment was initially designed to occur on the West Coast and designed to assess surrogate and prototype equipment, and develop tactics, techniques and procedures to support 2015 Marine Expeditionary Brigade required capabilities. Objectives, preliminary events and Marine Corps-specific resource requirements were identified and agreed upon. Late in 2003, I MEF, a principle participant was assigned the mission of returning to Iraq as part of Operation Iraqi Freedom 2 (OIF 2). The scope of I MEF's deployment precluded West Coast experimentation in 2004. However, the Lab's development of experimental technologies that enable today's commander to develop future operating concepts led to an intersection of current requirements and future capabilities. As a result, the AWE will now occur in Iraq with deployed forces.

The focus of SV 04 (PP) did not change. It remains tactical-level "on the move/over the horizon" (OTM/OTH) communications with the embedded position location information (PLI) required to build a common tactical

picture. The Lab's experimental Expeditionary Tactical Communications System (ETCS) will provide the technical backbone of this system. I MEF requested ETCS to augment legacy systems in Iraq.

Sea Viking Prototype Pathway SV 06 Experimentation. The next phase of Sea Viking (PP) is Sea Viking 06. The purpose of this phase will be to identify and assess selected capabilities required by a forward deployed, seabased MAGTF in order to conduct immediate Joint Forcible Entry Operations (JFEO). Focus areas will be:

- Battalion(-) vertical assault in concert with distributed operations
- STOM TTP and Tech Development
  - C2
  - ISR
  - Maneuver
  - Fires
  - Logistics

Distributed Operations Experimentation Also included in the Sea Viking 06 (PP) campaign is the effort to support the development of distributed operations, a new additive capability to a deployed ESG. The capability will provide an improved capacity to gather persistent and actionable intelligence, and conduct battlespace shaping and precision targeting missions. The Lab is developing an experimentation plan to examine selected equipment, TTPs, and POIs required to conduct distributed operations.

# **Technology Development**

## **Section III**

## Technology Development

### Background

The principal reason the Marine Corps Warfighting Lab develops technology is to support concept-based experimentation. Technologies developed for this purpose differ fundamentally from technologies developed within any other venue within Marine Corps Science & Technology because they are not necessarily intended to transition into acquisition.

There are also three other purposes that the Lab develops technology initiatives:

- (1) Technologies explored because the Lab is mandated through Congressional language and provided funding for a specific technology development purpose.
- (2) Technologies developed as a direct result of experimentation either as concept demonstrators or as prototypes emerging from experimentation that have proven to be strong candidate technology insertions into programs of record.
- (3) Technologies developed to meet emerging operational needs of the Operating Forces.

In addition, to developing technologies as described above, the Lab also assists ONR, MARCORSSYSCOM, or the Operating Forces in assessing candidate technologies for sufficient maturity for an extended operational assessment. In this regard, the Lab may also conduct assessments as part of a limited technical experiment for the purpose of developing a concept of employment or interim tactics, techniques and procedures for using the technologies by the Operating Forces.

### Prototypes and Surrogates

Concept-based experimentation typically requires technology that can represent capabilities not currently available in military equipment. In some cases, commercial off-the-shelf or government prototypes can be used in providing a capability not yet available with military equipment. For example, during *Hunter Warrior* the Lab used early prototypes of the FO/FAC system as a prototype for a target location data hand-off system. During *Urban Warrior*, the Lab used Libretto palm top computers as a prototype for future tactical hand-held computers.



However, in other cases, there is no available prototype and instead a surrogate that represents specific characteristics of a future capability can be approximated by a surrogate technology. During *Hunter Warrior* a system involving landlines and tower relays were a surrogate for a future over-the-horizon tactical communications system to support experimentation into the *Ship-to-Objective Maneuver* concept from over-the-horizon distances.

In other cases, the surrogate technology can be even more basic. During the experimentation leading up to *Urban Warrior*, the employment of a Marine with a clipboard with “yellow–stickies” carrying a controller radio simulated the battlefield “situational awareness” that could be afforded potentially to a small-unit leader by a not-yet-available

digital assistant in order to explore the information needs of tactical units in urban combat.

Typically, prototypes and surrogates have no use upon completion of experimentation. However, in some cases these systems are offered to the Operating Forces as residual capability upon completion of experimentation with the caveat that the Lab does not provide life cycle support, e.g., maintenance and spare parts.

## Congressionally Mandated Initiatives

Annually, Congress mandates and resources the development of specific technologies.



When the Marine Corps requests the Congressional resources it is with the expectation that the Marine Corps will use the resources to either complete a desired development program or initiate a program that the Marine Corps intends to fund in subsequent years.

However, there are other congressional initiatives that are not requested and are not precursors to Marine Corps acquisition programs. In these cases, the Lab focuses the program on achieving a recognizable deliverable product. The expectation is that absent congressional resourcing in subsequent

years, there will be no further Marine Corps funding of the initiative.

### FY 04 Congressional Initiatives

- **Mobile Counter Fire System**
- **Project Albert**
- **UAV/UGV wearable computers**
- **Transportable Tactical Landing System**
- **Rapid Deployment Fortification Wall**
- **Advanced Lightweight Strike Vehicle**
- **Teleoperated Rapid Aiming Platform**

## Technology Enhancement to a Program of Record

The Lab is a component of the overall Marine Corps Science and Technology (S&T) Enterprise. Although technology development in support of MARCORSSCOM acquisition programs is the responsibility of ONR – in most cases Code 353 or Littoral Combat Future Naval Capabilities (LC FNC) – there are occasions when a Lab initiative may emerge into a technology enhancement for a program of record.

In most cases, such a technology initiative will emerge from a technology prototype or surrogate initially developed for experimentation. For example, the Tactical Handoff System (Experimental) is currently identified as a block upgrade to the Target Location Data Hand-off System as a result of a Lab-developed Advanced Close-Air Support System (ACASS) which was proven to be both more advanced and more desirable to the Operating Forces than the prototype pathway of the program of record.

A second example is the continued development of advanced payloads for the

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*Dragon Eye* tactical UAV program – capitalizing on Lab residual expertise and existing experimentation opportunities with the Operating Forces – after *Dragon Eye* UAVs have entered production.

### Technologies Developed to Meet Emerging Operating Needs of the Operating Forces

*Operation Iraqi Freedom* – and specifically *Operation Iraqi Freedom 2* (OIF 2) – offered the opportunity for the Lab to develop technologies tailored specifically to the needs



of the Operating Forces in combat. These technology needs are situation specific and thus not necessarily applicable to the Marine Corps as a whole.

For example, the Lab responded to the need for an appliqué armor system for support vehicles such as the HMMWV and LVTS with the identification of a variety of potential commercial products. In coordination with ONR and the Army Rapid Equipping Force, the Lab assisted in the expedited testing of various commercial products and approaches to armor systems, aiding in the definition of

the protection standard and in quickly assessing the validity of various vendors protection claims.

In addition, the Lab responded to I MEF's



request for force protection sensors by providing lightweight night cameras for integration into an aerostat program. As a result, the MEF received an otherwise unavailable capability for 360-degree night surveillance around a key command element and airfield.

Following a final assessment the Lab will also deploy the Expeditionary Tactical Communications System (ETCS) that will meet I MEF's request for OTH voice and PLI data communication capabilities.

# **Wargaming**

## **Section IV**

**WARGAMING**

**Background**

Wargaming is a highly flexible exploratory and assessment methodology that can apply to a broad range of “war” related issues, as well as many outside of “war proper.” Regarding the latter, gaming methodologies have proven particularly useful in addressing the “combat” of fire and rescue operations, and Weapons of Mass Destruction (WMD) incident response. An operational definition of Wargaming is *“the artificial replication of a situation of competition or conflict not involving actual military force that is characterized by human decision-making which impacts the course of events throughout. It revolves around the interaction of two or more opposing forces guided by predetermined objectives, rules, data, and procedures designed to depict an actual or assumed real world situation.”* Wargaming is particularly suitable for

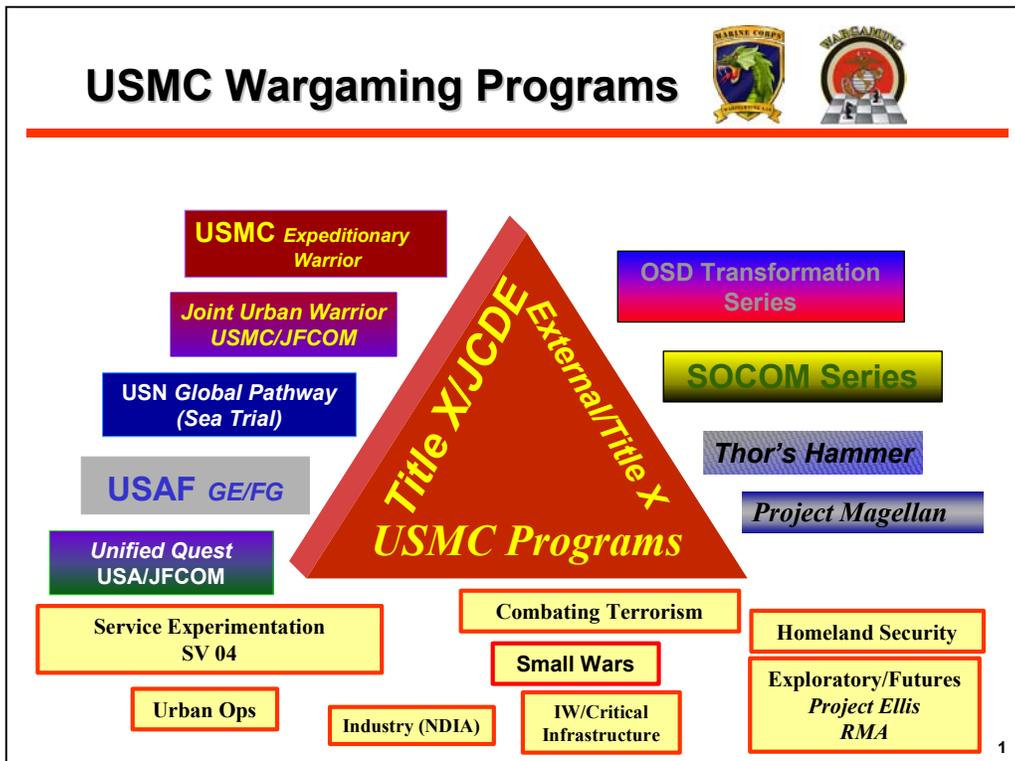
generating, refining, and assessing concepts, plans, issues, and technologies; assessing alternatives (courses of action, etc.); identifying capabilities and deficiencies; replicating conditions difficult to reproduce in peacetime; and reducing surprises.

**Key Programs**

The Marine Corps Wargaming Program, executed by the Wargaming Division of the Lab, is a comprehensive and innovative effort focused on advanced policy, concept, and operational exploration at several levels: Title X Wargaming, Joint and External gaming efforts, and a broad and diverse array of Service programs. This scope is illustrated in the graphic, and described in more detail below.

**Title X Wargaming**

Title X Wargaming consists of two broad components. The first is the management, oversight, and assessment of Marine Corps participation in other Service/Combatant



Command/Agency-sponsored Title X War Games. The second is the execution and assessment of the Marine Corps' Title X Wargaming Program, *Expeditionary Warrior*. Title X War Games generally address future visions and capabilities in the context of core Title X responsibilities of organizing, training, and equipping forces to execute each Service's statutory roles and functions. These programs, sponsored at high levels within each Service, are Joint in the sense of inviting other Service participation, and are expected to have major implications for the future direction and capabilities of the sponsoring Service.

Existing Title X Wargaming Programs sponsored by other Services include the Navy's *Global Series*, currently comprising distinct sub-components; e.g., *Unified Course (UC)*, the Army's *Unified Quest (UQ) Series*, and the Air Force's tandem *Global Engagement (GE)* and *Futures Capabilities Series*. These are large annual events, each with a planning cycle of 8-10 months.

The Title X venue is dynamic in terms of its precise scope and boundaries. For example, Joint Forces Command (JFCOM) has increasingly become involved in traditional Service-centered Title X gaming through co-sponsorship arrangements; e.g., the Army's *UQ Series* and Navy's *UC* component of the *Global Series*. Additionally, Special Operations Command (SOCOM) conducts its own wargaming program, and the USMC-JFCOM co-sponsored *Joint Urban Warrior (JUW)* is of the scope and visibility of traditional Title X programs.

In June 2002, the Commandant of the Marine Corps officially approved the re-establishment of a Marine Corps Title X Wargaming



Program (in the late-1980s and early-1990s the Marine Corps had pioneered what today is termed "Title X" gaming with the **CMC Policy and Strategy War Game Series**). The new program is designated *Expeditionary Warrior* and is designed differently than the other Service's Title X programs. It is intended to provide a highly flexible venue to address issues of pressing concern to the senior leadership of the Marine Corps. These may include near-term issues related to real-world events, as well as future concepts and capabilities – in both cases embracing an expanded view of Title X equities that includes Service roles and functions in addition to the responsibility to organize, train, and equip forces to execute them. As such, *Expeditionary Warrior (EW)* comprises a large annual war game supported by a 6-8 month Pathway of planning conferences, seminars, workshops, and other related events; e.g., other Service and Agency Title X war games and conferences as appropriate. The first event in the program, *EW 03*, was conducted 18-21 November 2002, and focused on USMC-SOCOM interoperability in conducting preemptive operations in the Global War on Terrorism (GWOT) as articulated in the *National Security Strategy (NSS)* of September 2002. *EW 04* was conducted 26-31 October 2003, and continued and extended the work of *EW 03* in exploring the interoperability of USMC and SOCOM forces within the same context of the GWOT and the *NSS*.

## Joint Concept Development and Experimentation (JCDE) War Games



The major Marine Corps JCDE program line – *Joint Urban Warrior (JUW)* -- was developed in response to JFCOM's designation as

the DOD Executive Agent for Joint Urban Operations (JUO). Due to the deep well of urban wargaming and experimentation experience in MCWL, Wargaming Division formulated the Joint Urban Warrior (JUW) program concept as the annual USMC contribution to the JUO initiative. To further the Marine Corps contribution to JUO, it was developed as a co-sponsored effort with JFCOM. Two significant events marked the beginning of this program - *Emerald Express 03 and 04-1*. They were designed to establish a foundation or baseline for future *JUW* events from lessons learned in recent operations involving urban warfare - Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF).

## External War Games

External war games are a broader and less well-defined aspect of the USMC Wargaming effort. Due to their extensive and ill-defined nature, the Wargaming Division must exercise a selective monitoring and participation responsibility. Among the many examples of these games are Office of the Secretary of Defense (OSD) *Transformation War Game Series*, and relevant gaming efforts of other Services not encompassed by Title X programs. By way of illustration, the former is sponsored by OSD/Net Assessment, OSD/Program, Analysis and Evaluation (PA&E), and the Department of Defense (DOD) Transformation Office, and is focused on testing and understanding the future course of force transformation. Additionally, SOCOM has begun it's own Title X *Future Force Series*.

## Marine Corps Wargaming Programs

Marine Corps wargaming programs embrace an extensive category of activities that are

planned and executed by the Wargaming Division. As such, they are Marine Corps efforts even though many include Joint, interagency, and even non-governmental participation.

**Experimentation Track Wargaming** functions as a means of exploring, vetting, and assessing prior to the commitment of resources. A component of the Lab Innovation and Experimentation (I&E) Process, it occurs at the front-end of an experimentation track in order to assess concepts, issues, etc. that shape the direction of the track as a whole. Examples of experimentation track gaming Include-- the *Urban Warrior, Capable Warrior / Culebra, and Coalition Warrior Series*. Currently, the thrust of this effort is support of the *Concepts and Capabilities Pathway* of the Marine Corps service experimentation program *Sea Viking 04 (CP)*.

**The Combating Terrorism Wargaming Program** is, though antecedents are evident in several other Wargaming Programs, a direct result of the 11 September 2001 terrorist attacks against the United States. It is broadly intended to examine the many facets of the global war against terrorism as the first 21<sup>st</sup> Century war.

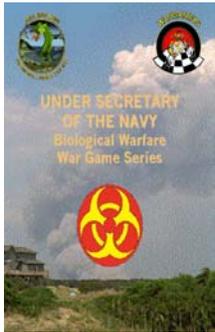
- The first component of this program is *Project Fast Train*, a series of small, fast turn-around "Red Teaming" efforts focused on discrete, near-term problems and issues associated with the war on terrorism. Principal participants are retired General Officers and senior DOD civilians.
- The second component is *Project O'Bannon*, an open-ended effort consisting of war



games, seminars, and workshops. These events are designed to explore the scope and dimensions of global terrorism and address the elements of a global campaign against terrorism, to include operational issues and appropriate technologies. A wide range of military, interagency, and external participants are involved.

**The Weapons of Mass Destruction**

**(WMD) Series** has been ongoing since the mid-1990s. Most recent efforts have focused on biological warfare, especially as it relates to domestic terrorism and Homeland Defense.



Additionally, command and control (C2), employment of the Marine Corps Chemical-

Biological Incident Response Force (CBIRF), and Third World nuclear proliferation have been addressed.

**Expeditionary/Naval**

- **The Tri-Marine Series**, revived in 2001 after a long period of dormancy, is conducted proximate to the annual Trilateral Staff Talks and is expected to continue as an annual effort. The focus is expeditionary operational problems of mutual concern for the U.S. Marine Corps, the Royal Marines, and the Royal Netherlands Marine Corps.
- **The Industry War Game Series** is conducted in conjunction with the National Defense Industrial Association (NDIA). This program helps maintain a dialogue with industry, and facilitates a larger role for industry in Marine Corps events.

- **The Dynamic Decision-Making Series** examines principally non-military organizations to leverage insights into decision-making and command and control issues applicable to the digital, nonlinear battlefield of the 21<sup>st</sup> Century. Previous organizations studied include the New York Mercantile Exchange (NYMEX), the Federal Aviation Administration (FAA), the Fire Department of New York (FDNY), and Silicon Valley Information Technology (IT) executives. Prior to 11 September, preliminary discussions concerning a project with the NYPD were underway, the future of which is indeterminate at this time.

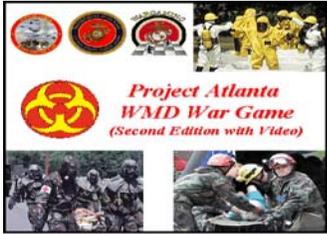
- **The Urban Warfare Wargaming Program** embraces a broad and diverse spectrum of activity that has cut across other Wargaming program lines. These have included Joint Wargaming efforts, the *Urban Warrior* and Project Metropolis experimentation series, Revolution in Military Affairs (RMA), US/UK Urban Non-lethal Weapons Wargaming Program, Project Ellis, Small Wars, and Cultural Intelligence seminars. This effort also integrates with the activities of the National Institute for Urban Search and Rescue (NIUSR), which also ties closely with Homeland Security described in the following paragraph.

- **Homeland Security** focuses on the multifaceted issues of military support to civil authority. Much of the context for this effort has been chemical/biological incident response, particularly in antiterrorism scenarios that potentially involve the Marine



Corps' CBIRF, now part of the 4th MEB (AT). A number of war games have been directed toward this end.

**Project Atlanta** was a congressionally mandated effort exploring new technologies and critical organizational and command and control issues involved in military support to civil authority. Current efforts include collaboration with the Fire Department of



New York (FDNY) regarding the establishment of a wargaming program to address planning scenarios, course

of action development, and operational decision-making, as well as to make available appropriate Lab technologies to address specific FDNY operational issues. The Homeland Defense effort also supports the HQMC-sponsored **Metropolitan Critical Infrastructure Project**, which addresses



various aspects of military support to civil authority in national security events. To date, war games, or “tabletops,” have been conducted in

New York City with the NYPD, Seattle, and San Francisco, with the next event scheduled for Norfolk in the spring of 2004. **Project NCR (National Capital Region)**, an ongoing program, has examined insights and lessons learned from 11 September 01, and was originally intended to assist the CBIRF in integrating with the NCR, and specifically the Military District of Washington (MDW). Its future direction is ambiguous at this time. The recent establishment of Northern Command and the establishment of a Department of Homeland Security (DHLS)

are likely to generate significant efforts in this arena.

- **Small Wars** provides a venue to examine the aspects and issues associated with that operational area, which has recently loomed larger in importance in light of the Phase IV experiences of Operation Iraqi Freedom (OIF). In 1999, at the direction of the Commandant, a **Small Wars Center for Excellence** was established consisting of a dedicated web site and contractor Subject Matter Expert (SME) and technical support, supplemented when required by matrixed Wargaming Division assets.



A key component of the Small Wars program is the **Cultural Intelligence Seminar (CIS) Series**. Designed to



provide a “missing piece” in military planning, the CIS series focuses on developing a better understanding of cultural issues in

regions where USMC forces may be deployed in Small Wars situations. Non-defense agencies and Non-Governmental Organizations (NGOs) are the primary participant pool, with Marines being the ultimate beneficiaries.



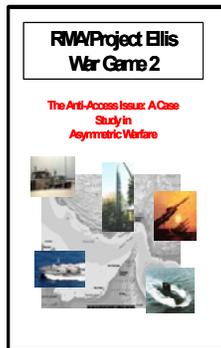
Another vital component of the Small Wars Program is the **Emerald Express Series**. It is designed as a

“lessons learned” venue to garner key insights from actual operations, e.g. the 26<sup>th</sup> Marine Expeditionary Unit’s (MEU) experiences in Kosovo and Turkey.

As noted earlier, this series has supported the *JUW* Pathway, with Emerald Express 03 and 04-1 examining insights and lessons learned from OIF urban operations.

- **Exploratory/Futures Gaming** is a long-range, open-ended effort to explore future and emerging operational concepts, organizations, technology, and “strategic futures,” among other topics.

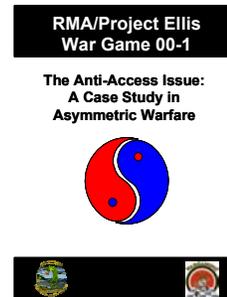
The first component of this effort is *Project Ellis*, which examines pivotal shifts in the strategic landscape that may result in major changes to US military strategy and the role of the Marine Corps. Named for Major Pete Ellis, whose identification of the shifting strategic landscape in the Pacific and the corresponding need for distinctive military capabilities had a decisive effect on the outcome of World War II. Project Ellis has examined, through workshops and war games, such issues as changing strategic assumptions, asymmetric warfare, counter anti-access strategies, and the impact of quantum technology shifts.



The second component is the *Revolution in Military Affairs (RMA) Series*, conducted under the aegis of OSD/Net Assessment, and oriented toward issues

of particular interest to the Marine Corps in that context. Conducted since 1995, it has covered an eclectic range of problems and issues to include support to Project Ellis, urban warfare, experimentation assessment, future OMFTS concepts, biological warfare, non-lethal weapons, and, quite significantly, an extensive Information Warfare (IW) effort. Exploiting industry as well as military expertise, the IW effort is directed toward computer network attacks against critical infrastructures.

Current *Project Ellis* and *RMA* efforts are focused on supporting the war on terrorism, more specifically *Project O’ Bannon* and *Expeditionary Warrior*.



# **Initiatives**

## **Section V**

### Command and Control Integration (CCI)

**Purpose:** To develop an advanced, object-oriented database and multi-system translator that enhances the commander's ability to make decisions and manage the battlespace by providing the capability to synchronize data across the currently fielded command and control systems within the maneuver, intelligence and fire support functional areas.

**Background:** Existing Marine Corps C4ISR architecture systems are not designed to present a consistent Common Tactical Picture (CTP). Maneuver, intelligence and fire support applications are not synchronized and there is no common source of trusted battlefield information. Therefore, the information portrayed in combat operations centers is often inconsistent, suffers from dissimilar timing delays, and there is no uniform method to allocate network resources across the applications. The lack of a reliable CTP that can be accessed by tactical units at the infantry regiment level and below, over the existing communications paths, is a significant shortcoming that CCI proposes to address.

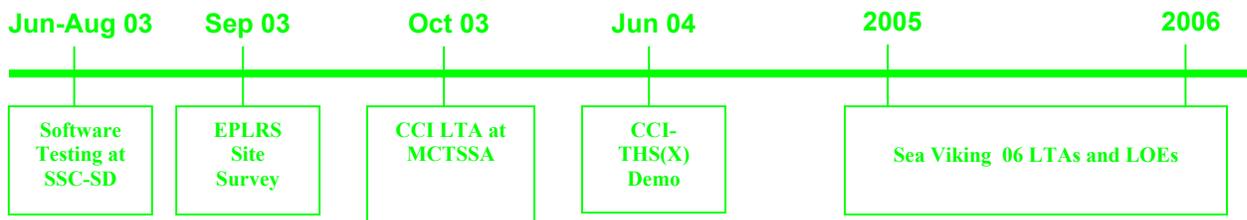


**Description:** The principal components of CCI include:

- An internal Object Model created in UML of all battlefield entities such as friendly and enemy assets, overlays, and operational events.
- Object serving communication software (Shared Net) that provides facilities for object subscription as well as replication and synchronization.
- The Shared Net Object Instance Store, a single software package that integrates the object model within the communication services framework.
- The CCI Translator, which provides transparent, bi-directional translation with existing systems into common object format.
- The CCI-C2PC interface consists of "under the hood" work to make C2PC a Shared Net client. The current architecture maintains use of the C2PC gateway.

**Deliverable Products:** The Lab is working with Marine Corps Systems Command to transition selected CCI components in 2005. Assessment reports.

**Milestones:**

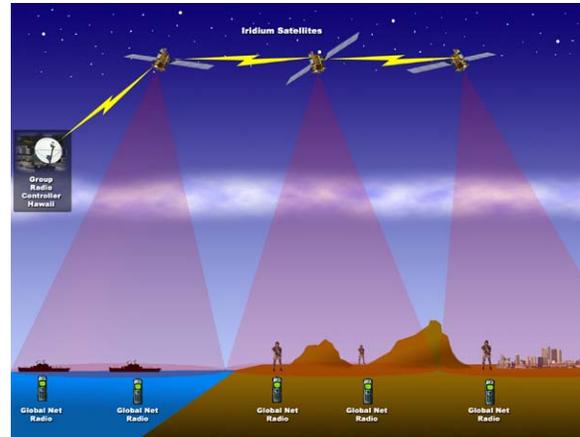


Action Officer: 784-1331

### Expeditionary Tactical Communications System (ETCS)

**Purpose:** The Lab is developing the ETCS in order to examine command and control during *Ship to Objective Maneuver (STOM)* and to provide a prototype experimental capability for Sea Viking 04.

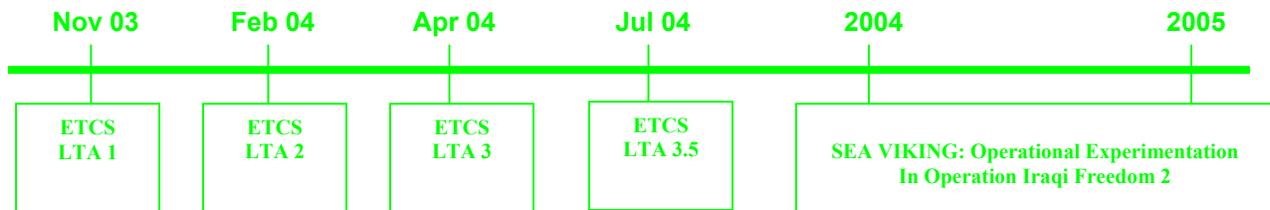
**Background:** There is a need in the Marine Corps for an Over the Horizon (OTH) and On the Move (OTM) communications capability to link tactical maneuver units and platforms with each other and back to fire support assets and the command element. The envisioned system must provide wide area 24/7 coverage, assured access at all levels in complex terrain, OTM capability, tactical level security and a robust network that does not need ground-based infrastructure. A tiered system architecture is needed to meet this requirement. This system architecture will potentially consist of a combination of tactical and high altitude unmanned aerial vehicles, and a near space segment (Low Earth Orbit (LEO) or Medium Earth Orbit (MEO) satellites). The requirement is addressed in the EMW Tactical Communications Relay Universal Needs Statement (UNS) #01082UA.



**Description:** ETCS is based upon the commercial IRIDIUM system, modified to provide a push-to-talk netted (one to many) voice and data capability. It will provide OTH and OTM communications between the seabased C2 nodes and elements ashore down to the dismantled company commander and reconnaissance team. This effort will include the integration of ETCS into Marine Corps C2 systems (IOS, AFATDS, DACT, etc.), to include OTM COC platforms to enable the passage of data in support of a common tactical database. In conjunction with the RSTA team, ETCS will also be integrated to link an unmanned ground sensor (UGS) to the seabase. ETCS will be installed on ships and at the conclusion of experimentation, the Lab will provide lessons learned and refined requirements statements to MCCDC for a long-term solution for MAGTF OTH communications.

**Deliverable Products:** Prototype system for operational experimentation in OIF 2 and requirements documentation.

**Milestones:**



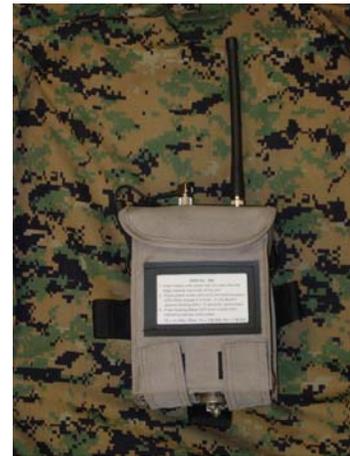
Action Officer: 784-4211

### Integrated GPS Radio System (IGRS)

**Purpose:** The Integrated GPS Radio System (IGRS) is a position-location-information (PLI) system developed by Stanford Research Institute (SRI) International to meet Marine Corps and other service PLI needs.

**Background:** The Lab has used IGRS during live-force experimentation, for data collection and analysis, since the Hunter Warrior Advanced Warfighting Experiment in 1997. IGRS I has been successfully used during several experiments, while IGRS II, which is currently under development, takes advantage of recent technological advances. The Lab currently owns over 500 IGRS I units and will procure 60 IGRS II units during fiscal year 2004.

**Description:** IGRS consists of individual VHF radio units, which transmit PLI for display at a PC-based control station. IGRS units are very compact (IGRS I units weigh 5 lbs and IGRS II 2.5 lbs) and can be mounted on vehicles and on individual personnel.



IGRS can be used to:

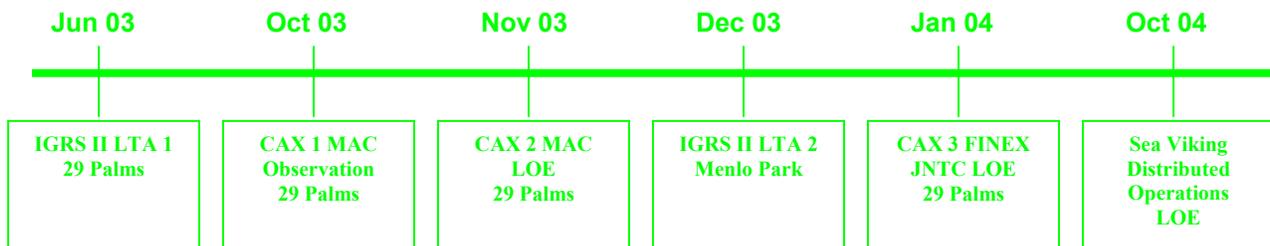
- Determine ground-truth for event reconstruction
- Simulate effects of fires
- Track movement of troops and vehicles
- Apply exercise controls
- Enhance personnel safety

IGRS II will also serve as an experimental system to gain insight as to how PLI should be used by operating forces. IGRS II will use a combination of legacy line-of-site technology, in addition to exploiting emerging OTM/OTH technology.

The Lab is also using IGRS, during several CAX events, to assist TECOM in meeting Joint National Training Capability objectives. Efforts focus on event reconstruction for after action reviews. The Lab will also help TECOM examine the feasibility of broadcasting CAX event data to external locations to help establish a more productive joint virtual training environment.

**Deliverable Products:** Commanders will likely place even greater reliance on PLI in the future. The Lab will continue to use IGRS as a test bed to further expand on its ground-truth recording and event reconstruction capabilities. In addition, the Lab will conduct experiments to help resolve tactical friendly-force PLI management issues.

**Milestones:**

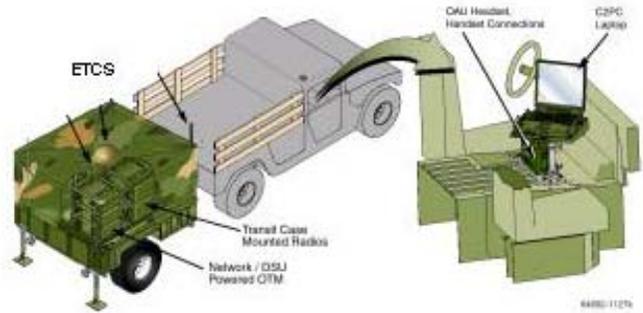


Action Officer: 432-1039

### On the Move Digital Combat Operations Center

**Purpose:** To provide an On the Move (OTM), Over the Horizon (OTH) Digital Combat Operations Center (DCOC) to the infantry battalion commander for surface and vertical employment during *Ship to Objective* Maneuver (STOM).

**Background:** STOM operations require the ability to rapidly maneuver over an expanded littoral battlespace. The STOM battlespace is non-linear, without secure rear unit COCs. This environment requires COCs that can operate OTM, both voice and data. Since the command element COC is seabased, they will also require OTH communications. The Lab's *Sea Viking*, STOM focused experimentation, will require an OTM/OTH COC capability both

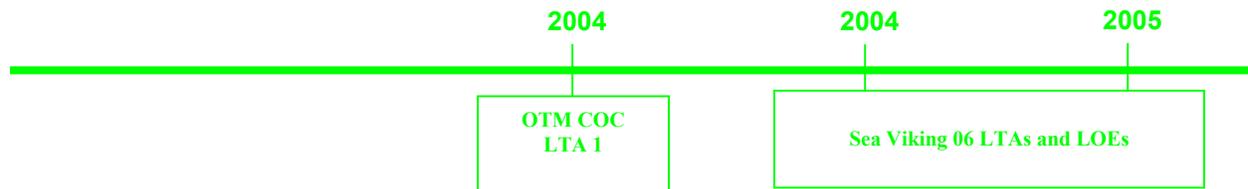


for experimentation in a 2006 Limited Objective Experiment. In order to provide this capability, the Lab is partnering with Marine Corps Systems Command (MCSC), the Office of Naval Research (ONR) and industry to develop an experimental OTM/OTH DCOC.

**Description:** The Lab is partnering with MCSC's Unit Operations Center (UOC) and Advance Amphibious Assault Vehicle programs, ONR's Littoral Combat Power Projection Future Naval Capability program, and General Dynamics to explore integration of the Lab's OTH Expeditionary Tactical Communications System (ETCS) and on the move capable C2 systems (C2PC/AFATDS) into battalion COC platforms. Platform options are an integrated towed trailer COC and multiple wirelessly connected HMMWVs/ Interim Fast Attack Vehicles (IFAV). In addition to COC platforms, this effort will integrate ETCS into a CH-53E. Helicopter integration will enable voice/data communications by the battalion or company commander while enroute to the objective. Integration of ETCS and ruggedized tablet PCs into the HMMWV/IFAV will provide OTH/OTM communications to the surface and vertical assault company commander.

**Deliverable Products:** TBD

**Milestones:**



Action Officer: 571-220-4440

**Project Phoenix**

**Purpose:** Project Phoenix has a three-fold purpose. (1) To continue the assessment of the M3M .50 cal weapon system aboard assault support helicopters to determine if it can effectively meet the requirement for a common defensive weapon system. (2) To examine rotary wing aircraft effectiveness and survivability during urban operations. (3) To discover and evaluate enabling technologies and training devices to aid the aviation fleet in training against man portable air defense (MANPAD) threats.



**Background:** The Lab began examining the urban environment in 1998 as part of the Urban Warrior series of experiments and has continued urban experimentation through Project Metropolis. Project Phoenix originated during Project Metropolis experimentation and was formed to examine the aviation aspect of urban operations. Project Phoenix has focused on examining the survivability of rotary wing assets against MANPAD and anti-aircraft 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 with various threats. In 2001 Project Phoenix was designated to assess the effectiveness and utility of the M3M .50 caliber weapon system as a possible system to meet the requirement for a common defensive weapon system for our assault support helicopters. The assessment is being done in cooperation with MAWTS-1, NAVAIR, HQMC, HMX-1, and Fabrique Nationale. The third phase of a four-phased assessment was recently completed at MAWTS-1.

**Description:** Project Phoenix examines the effectiveness of current tactics used by RW aircraft conducting urban operations and then incorporates different methods, such as using sniper assets to suppress enemy air threats, to determine the tactics' ability to enhance aviation's support during urban operations. In addition, Project Phoenix will complete the assessment of the M3M .50 caliber weapon system. In July '03, (4) CH-53E M3M .50 cal Ramp Mounted Weapon Systems (RMWS) were delivered to CJTF-HORN OF AFRICA for operational assessment with HMH-461. Transition of the M3M effort will be completed in FY '04 upon completion of CH-53E left/right side testing.

**Deliverable Product(s):** Assessment reports and recommended changes to tactics, techniques and procedures.

**Milestones:**



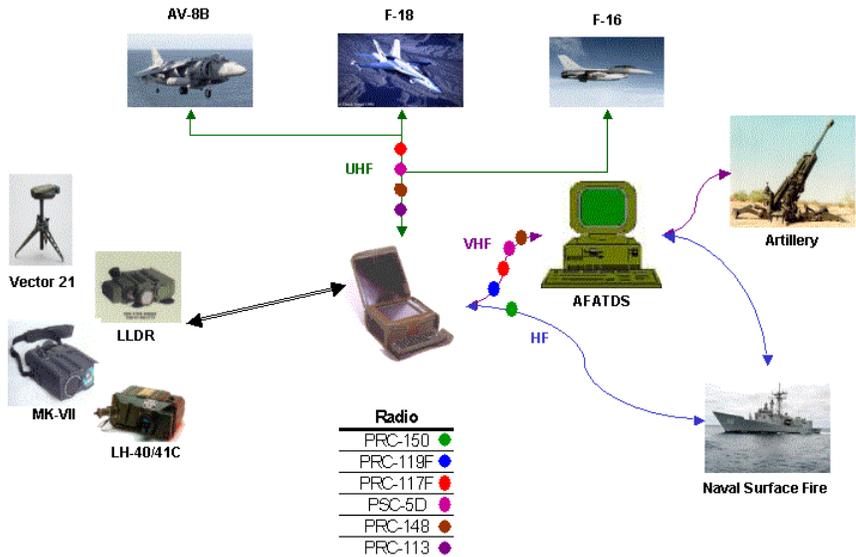
Action Officer: 432-1017

## Target Handoff System Experimental THS(X)

**Purpose:** THS (X) provides a universal combined arms targeting software that enables precision target location and digital mission handoff to fire support agencies.

**Background:** The Lab has been in support of Marine Corps Systems Command's (MCSC) Target Location Digital Handoff System (TLDHS) Program Manager in developing a material solution to the TLDHS Operational Requirements Document (ORD). In June 2002, the MCWL and MCSC established a technology transition agreement to transition THS (X) software into the TLDHS program. In April 2004, THS(X) was transitioned to MCSC as the Block III software for the TLDHS program.

Increased fire support capability is planned for Sea Viking 06.



**Description:** THS (X) is comprised of the following components:

- Ruggedized handheld computer with imbedded GPS, laser range finder, and MBITR radio with the ability to process lased target as a fire mission for ground, air, and naval surface fires simultaneously or separately and then pass that fire mission digitally to the firing agencies/aircraft.
- Simplified & intuitive Graphical User's Interface to ensure faster response/training.
- Scalable color map display with GPS centering for advanced situational awareness/mission execution/safety planning.
- Integration of Tactical COE client (C2PC) and Joint Multi-User Protocols.
- Develop Precision Fire Control Interoperability in support of Family of Interoperable Pictures (FIOP) architecture & philosophy.

**Deliverable Product(s):** Additional JCAS platform interoperability with the baseline THS(X) software.

**Milestones:**

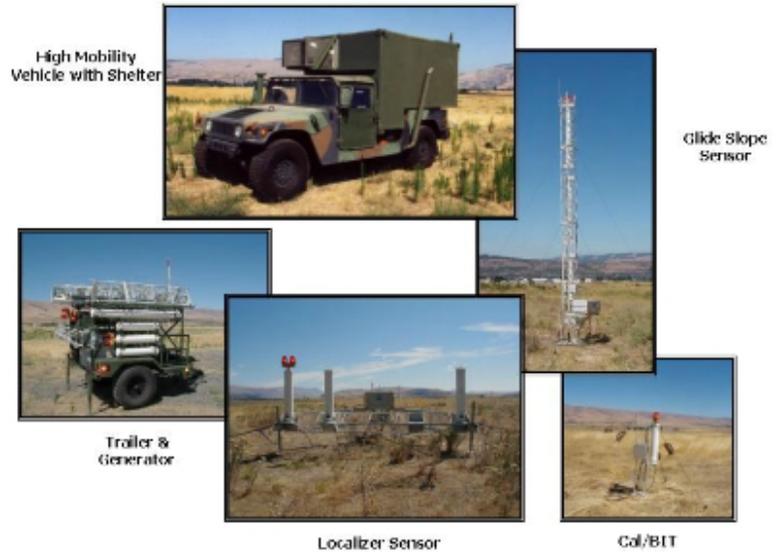


Action Officer: 432-0462

## Transportable Transponder Landing System (TTLS)

**Purpose:** To provide a rapidly deployable (HMMWV mounted or smaller), all weather, precision, non-emitting, terminal air traffic control capability--to be employed under instrument flight rules conditions.

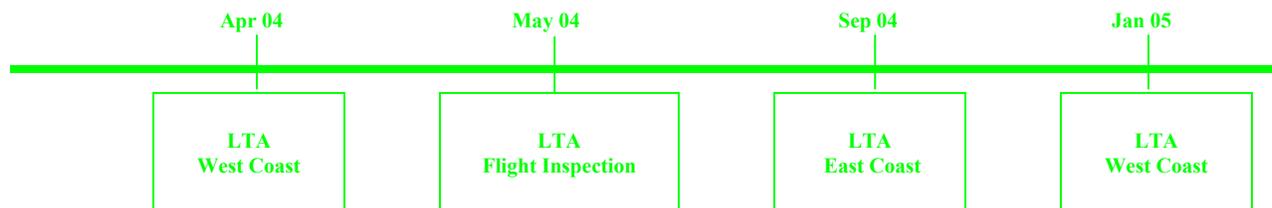
**Background:** During April 2001, the Marine Air Board identified a requirement for a non-emitting precision approach landing capability. Such a system would be used to provide an initial tactical precision approach capability with reduced footprint and electronic signature. Congress appropriated \$3.5M in FY04 to explore TTLS technology to determine if it has the potential to provide the Marine Corps a portable, low emitting precision approach landing system for aircraft.



**Description:** TTLS was originally developed under a Defense Advanced Research Projects Agency effort through NAVAIR and Advanced Navigation and Positioning Corporation. The system was designed to provide a precision approach capability by using inexpensive ground systems to provide position information for aircraft equipped with a transponder and standard Federal Aviation Administration Category I Instrument Landing System (ILS) equipment. In order for TTLS to suit Marine Corps tactical mission requirements, several capabilities must be developed. These capabilities include: multiple aircraft tracking and guidance; miniaturization of the system for mounting on a supporting ground vehicle; and reciprocal approaches/runway support. The Lab, in conjunction with NAVAIR and HQMC(Aviation) will assess the TTLS's ability to perform: Multiple Aircraft Tracking, 360 Degree Surveillance, and Primary and Reciprocal Runway Approach Guidance. Following the assessment, HQMC (Aviation) will determine suitability of TTLS for Marine Corps employment and acquisition.

**Deliverable Product(s):** Assessment reports and requirements documentation.

**Milestones:**

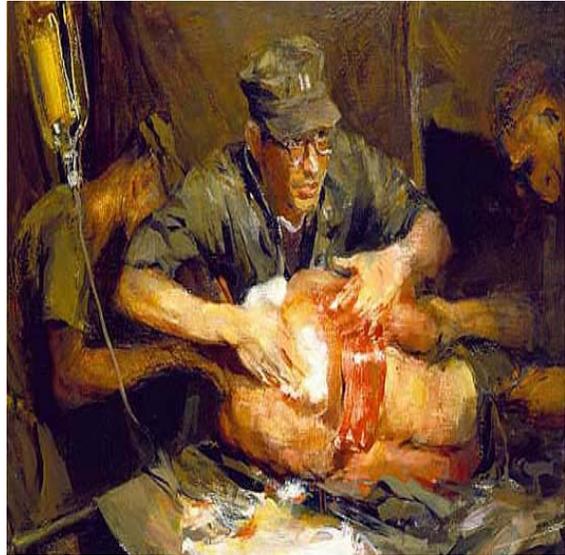


Action Officer: 784-0056

### Casualty Modeling and Simulation

**Purpose:** To support analysis into characterizing changes in wounding types and distributions of injuries in asymmetric warfare and Military Operations in Urban Terrain (MOUT).

**Background:** Currently, casualty estimation and distributions of wounds is based on data collected during the Vietnam and Korean conflicts. Changes in body armor, threats and warfighting environments (MOUT) may require adjustment of the historical distributions. Anecdotal evidence supports the hypothesis that future-wounding patterns will be different from the past.



**Description:** This modeling effort will produce analytical data using injury scoring of contemporary conflict databases. The model will conduct a comparative analysis of historical and contemporary conflicts wounding patterns (US, Russia, Israel, UK, FR, Croatia). The resulting analysis report will support advanced models under development at Naval Health Research Center and SPAWAR.

**Deliverable Products:** Analysis Report.

**Milestones:**



Action Officer: 703 432-0467

**Enroute Care**

**Purpose:** To improve the ability to transport unstable casualties from forward operating areas to the sea base.

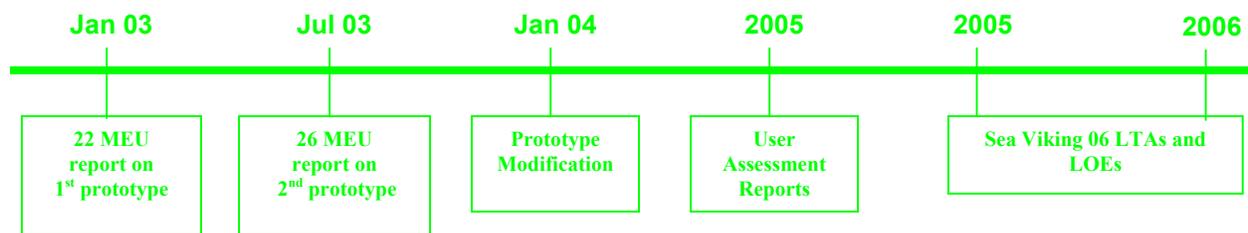
**Background:** Current Health Service Doctrine provides for maintenance of shore-based elements in order to provide resuscitative care. Following such care, the casualties are held in the shore base until they can be safely transported on opportune lift aircraft. The Enroute care initiative provides personnel and material to rapidly convert opportune transport to attended medical transport platforms and provide supervised medical transport for seriously injured but stabilized casualties. Reducing the time casualties are held on shore will decrease the shore based logistic requirements and improve clinical outcomes.



**Description:** The Enroute Care initiative provides personnel and equipment to rapidly convert opportune transport to attended medical transport platforms that provide supervised medical transport for seriously injured but stabilized casualties. Reducing the time casualties are held on shore will decrease the shore based logistic requirements and improve clinical outcomes. Concept of experimentation entails prototype development and field user evaluation.

**Deliverable Products:** Prototypes and assessment reports.

**Milestones:**



Action Officer: 703 432-0467

## High Speed Connector

**Purpose:** To assess the utility of commercially available High Speed Connector (HSC) to provide high speed, long range, and high-volume surface lift capabilities.

**Background:** The Marine Corps Combat Development Command, the Navy Warfare Development Command, and the United States Army Combined Arms Support Command, in conjunction with commercial industry, are cooperating in this effort. The Marine Corps goals are to explore the ability and compatibility of commercially available HSV with advanced hull, propulsion, and communications technology to support seabased operations.



**Description:** The Swift (HSV-2) is a 98-meter, 45 knot, dual hull, shallow draft, commercial catamaran that has been modified to meet military experimentation requirements for rotary wing aircraft, roll-on/roll-off vehicles, small boats, and a state-of-the art command and control system.

Current Marine Corps experimentation has been centered on its capabilities within the context of Expeditionary Maneuver Warfare. Future experimentation will address how to capitalize on high speed technologies as enablers to 1) enhance and extend operational reach of our current MPF capabilities, 2) capture lessons learned we can apply to integrating HSC capabilities in order to support MPF (F) operations, 3) capitalize on the HSC's littoral mobility capabilities for operational and logistical support for Combatant Commanders. During FY04 planned experimentation will include use of the Swift in MPF/JLOTS and causeway exercises. Further experimentation will examine operational maneuver, including conduct of raids, sustainment, ESG support, and Human Assistance/Disaster Relief.

**Deliverable Products:** Experimental design for Marine Corps limited objective experiments (LOE), assessment reports and requirement documentation.

### Milestones:



Action Officer: 784-1089

Joint Expeditionary Field Fortification

**Purpose:** To assess Commercial-Off-the-Shelf (COTS) expedient fortification construction systems.

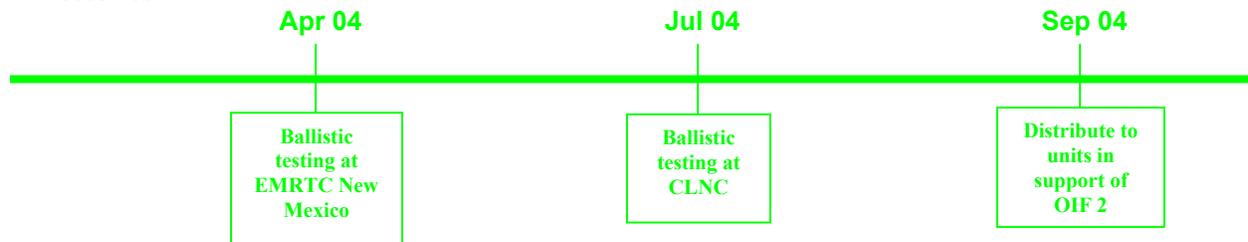
**Background:** The Marine Corps' current expedient fortification capability is the sandbag, which is manpower intensive and is one-time use. An "easy-to-build, scalable and reusable" force protection structure is needed in the rapidly changing asymmetric environment that our Marines operate. By leveraging modern materials and techniques, we can increase force protection while decreasing the manpower hours needed to construct expedient fortifications. The Director, Logistics Plans, Policies and Strategic Mobility Division at Headquarters Marine Corps Installation and Logistics has asked the Lab to conduct experimentation in the areas of counter mobility and survivability, both of which fall under this initiative. Congressional support has been garnered with funding specifically allocated for experimentation with this innovative technology.



**Description:** The Rapid Deployment Fortification Wall (RDFW) is an expandable, stackable, modular wall made of tough, lightweight, environmentally responsible plastic that can be employed to rapidly construct field fortifications for bunkers, stand off blast and ballistic protection units, other hardened shelters and revetments. As a result of recently released congressional funding, this effort will be integrated with the MAGTF Utility Tractor-Tactical assessment being conducted in part at the Marine Corps Engineer School. Assessment will include construction of bunkers, revetments, obstacles, as well as looking into application for runway/roadway crater repair.

**Deliverable Products:** Prototypes, assessment reports and requirement documentation.

**Milestones:**



Action Officer: 784-1089

## Logistics Warrior

**Purpose:** In partnership with the operating forces and the CSS Advocate, the Sea Viking CSS Team will develop a draft concept paper to recommend organization, equipment and employment TTPs for CSS elements operating ashore. The long-term end state is to enhance the capabilities and survivability of a future CSSE in support of Ship to Objective Maneuver (STOM) and to provide input to the Expeditionary Force Development System (EFDS).



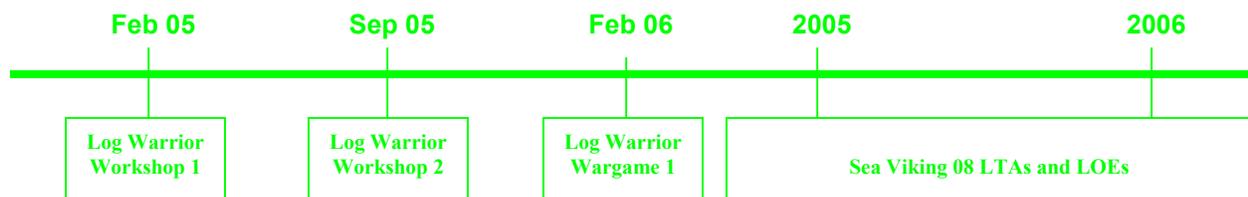
**Background:** Combat Service Support units have the same requirements as combat arms units to provide command and control to their mobile CSS detachments (MCSSD), but currently do not have the maneuver, intelligence and fires C2 systems tools. This capability deficiency is even more noticeable in STOM where CSS units are maneuvering on a non-linear battlespace over long distances without supporting friendly units. A draft concept paper and a recommended functional organizational structure that will be required for mobile CSS detachments to operate in a STOM environment will need to be defined.

**Description:** A concept paper will be drafted and refined through various workshops and wargamed in order to recommend organization, equipment and employment TTPs for CSS elements operating ashore supporting a STOM operation. During Sea Viking '08, the concept will be further assessed through live experimentation.

- Interim Enhancements
  - Recommended concept paper of surface maneuver CSSE capable of supporting combat forces ashore during a STOM.
- EFDS
  - Assessment of interim enhancements.

**Deliverable Products:** Concept of employment and assessment reports.

### Milestones:



Action Officer: 432-1008

## MAGTF Utility Tractor Tactical (MUTT)

**Purpose:** To assist the engineer community/advocate to assess small, multi-use, utility tractors in support of the Marine Air Ground Task Force.

**Background:** Recent lessons learned from Operation Enduring Freedom included a lack of Material Handling Equipment (MHE) for the purpose of Rapid Runway Repair (RRR)/Airfield Damage Repair (ADR), basic field fortification and rapidly constructed revetments. Candidate MHE solutions in support of Expeditionary Maneuver Warfare, must be small enough for CH-53E transportability, yet durable and rated with an operating capacity to support Forward Operating Bases during contingency operations.



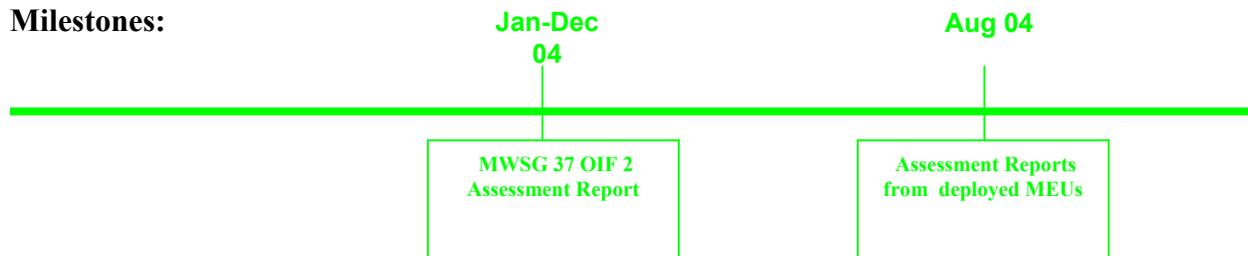
**Description:** Bobcat front-end and compact track loaders exist on GSA schedules for procurement, yet tactics, techniques, and procedures (TTP's) as applied to 21<sup>st</sup> century warfighting concepts are needed for their operational employment. The Lab has provided the following MUTT variants for operational experimentation by Marine operating forces:

- Bobcat A220 All-wheel Steer and Bobcat T200 Compact Track Loaders
- Attachments include: auger, backhoe, 4-in-1 combination bucket, wheel saw, pallet forks (hydraulic), breaker, angle broom, vibratory roller. Attachments are interchangeable between loader types.

Marine Wing Support Group-37 is assisting in the development of TTPs and is conducting the ADR/RRR assessment. Second Combat Engineer Battalion is assisting in the development of TTPs and is conducting the field fortification/revetment construction assessment. The Marine Corps Engineer School is assisting in the development of all associated TTPs and is providing input as to fielding and technology management. The Lab will provide overall assessment supervision and, through the US Army Tank Automotive Command, acquire the necessary transportability certification for this technology for rail, highway, marine, and air systems.

**Deliverable Products:** Assessment reports and refined and validated requirement documentation for future loader acquisition.

**Milestones:**



Action Officer: 784-1088

### Medical Assault Pack (MAP)

**Purpose:** To provide Field Corpsman/ First Responder personnel the capacity to treat two to four severely injured casualties, in a combat environment, before replenishment is necessary.

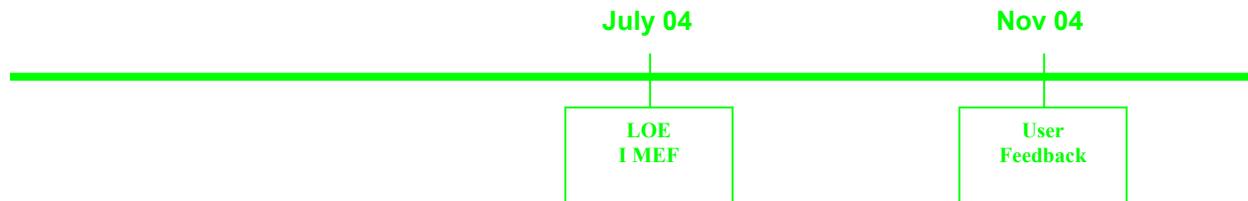
**Background:** The Medical Assault Pack (MAP) is composed of medical devices appropriate for use by the Field Corpsman/ First Responder. Providing division medical department personnel with adequate medical supplies in the field environment is crucial to sustaining operating forces in combat. Achieving this goal without overbearing the individual war fighter has historically presented a challenge.



**Description:** The MAP, being much larger than the insufficient Unit 1 but much smaller than the cumbersome Molly Pack, is a compact, comprehensive field portable medical bag also capable of storing personal non-medical equipment needed in a hostile environment. The medical equipment supplied in the MAP is specifically intended for use by the front-line field Corpsman and expressly tailored for this purpose.

**Deliverable Products:** The Subject Matter Experts (Division medical department personnel will physically conduct evaluations) will review and provide formal recommendations.

**Milestones:**



Project Officer: (703) 432 - 0467

Mine Countermeasures (MCM)

**Purpose:** To develop a Mine Counter Measures capability set for operational assessment by a deploying Marine Expeditionary Unit (MEU).

**Background:** The Institute for Defense Analyses (IDA) and the Office of Naval Research (ONR) study *MCM from Beach Exit Zone to Objectives* recommended near to far-term MCM initiatives to ensure that the Marine Air-Ground Task Force will be a viable component of Expeditionary Maneuver Warfare. The Commanding General, Marine Corps Warfighting Laboratory/Vice Chief of Naval Research recommended four MCM experimentation evaluations during fiscal years 2003 and 2004.

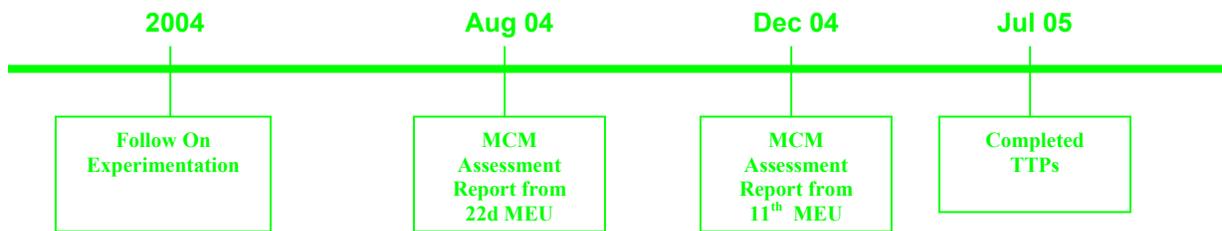


These four evaluations will include: (1) lightweight full-width mine rollers and mine extractors mounted on Light Armored Vehicles to breach assault lanes and clear mines on combat roads and trails, (2) hydrema (medium weight) and Keiler (heavy weight) flails to rapidly clear both antipersonnel and antitank mines for laydown/beddown sites and for use in route clearance, (3) individual protective systems to enhance survivability of dismounted personnel during mine clearance operations, and (4) hand held detectors experimentation, including the Hand held Standoff Mine Detection System.

**Description:** The Lab is focusing on the following MCM areas: (1) development of a Marine Expeditionary Force (MEF) MCM Capability Set (2) follow-on experimentation of candidate technologies (3) coordination with the ONR on near- and far-term S&T initiatives. This effort will produce specifications for a MEF MCM Capability Set, tailored and scalable Tactics, Techniques, Procedures (TTPs), and MCM kits for experimentation by I MEF, II MEF, and Marine Corps Combat Engineer School.

**Deliverable Products:** Prototype capability sets, TTPs, assessment reports and requirement documentation.

**Milestones:**

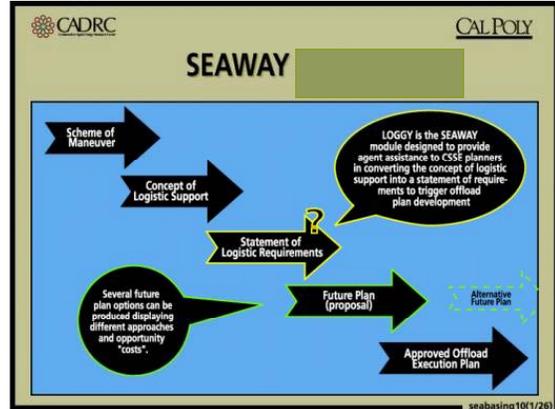


Action Officer: 784-1088

SEAWAY Version 2.0

**Purpose:** To provide an adaptive tool for translating courses of action into statements of logistics requirements and Combat Service Support offload plans for use in wargaming and concept assessment.

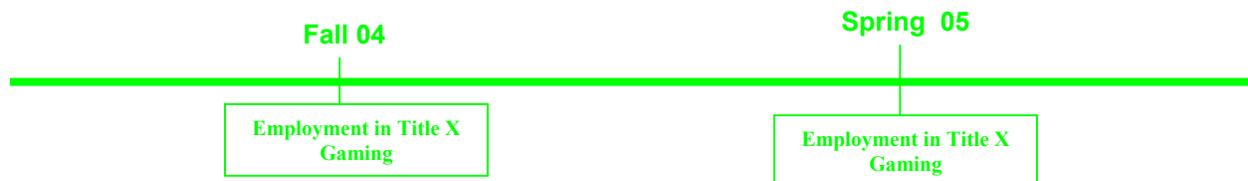
**Background:** To transition from *seminar wargaming* to computer assisted *analytic wargaming* requires tools to bring precision to discussion of future concepts. This specifically includes feasibility of seabased EMW/STOM concepts in order to identify the assets and quantities required for operational frames. Additionally, SEAWAY provides an adaptive C2 capability to execute the logistic planning, monitoring, and continuous in-stride re-planning vital to successfully executing sea based sustainment.



**Description:** SEAWAY is a prototype adaptive logistic C2 system developed under ONR/MARCORSYSCOM with specific wargaming and assessment features for the Lab and Wargaming Division. It employs intelligent agent technology to manipulate information and data for logistic planning and execution. SEAWAY’s software agents assist wargame staffs or capability assessors to develop logistics requirements for given schemes of maneuver, and to assess the risk and feasibility of courses of action. But, unlike most current systems, the creation of an offload plan to support the JTF from the sea base is only the first step. As information is received highlighting changes in the operational, the weather, or the inventory picture, SEAWAY continuously modifies the plan and creates follow-on sequels for staff review. SEAWAY can be artificially stimulated with situational inputs in order to produce alerts, warnings, implications, and option comparisons. Equipped with a gaming interface, SEAWAY offers an integrated synthetic maritime expeditionary environment. It is a near real time operational framework in which weather, operational picture, inventory, and forces can be manipulated individually or collectively at the same time. It is also allows introduction of virtual systems such as a new ship or helicopter to assess impact and value.

**Deliverable Products:** Wargaming plans to employ the SEAWAY Version 2.0 in wargaming events through FY's 04-05 until the release of Version 3.0 or the integration of the program into the Common Logistics Command and Control System.

**Milestones:**



Action Officer: 784-6881

## Tactical Medical Coordination System (TacMedCS)

**Purpose:** To develop a prototype system to enhance casualty evacuation via an *individual casualty locator* and provide an electronic, redundant patient treatment record retrievable from external locations.

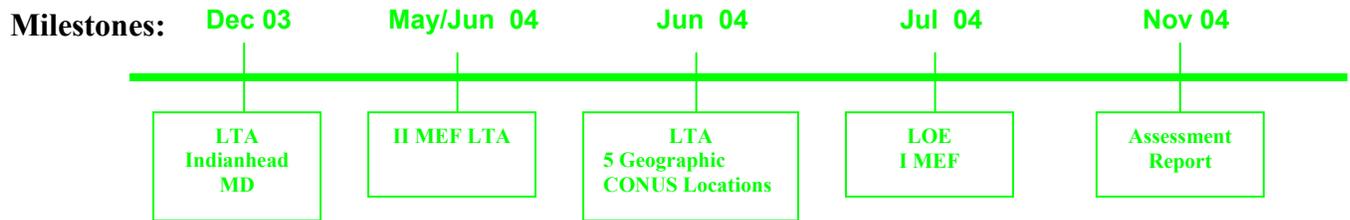
**Background:** Since a current system does not exist, the Lab in collaboration with Marine Corps Systems Command and the Navy Medical Department is developing a prototype system to enhance casualty evacuation. The system is intended to ease locating casualties for evacuation and to provide treatment record redundancy. The relevant operational requirement document is the Theater Medical Information Program (TMIP). The JV2010 *En route Care Seminar* also indicated that this capability is needed.



**Description:** The Tactical Medical Coordination System will provide In Transit Visibility/ Total Asset Visibility (ITV/TAV) for casualties. This system exploits passive Radio Frequency Identification (RFID) technologies to automate some of the casualty evacuation process. This system differs from Common Access Card (CAC) and other alternative approaches to digital medical information. TacMedCS is appealing because it is a Radio Frequency based system, which doesn't require contact with the device to be able to read and write data. There is no need to remove clothing or protective gear. The tag has been tested through MOPP gear, Kevlar body armor, and various other forms of military clothing. The tag is passive. It will only transmit approximately one foot away, and only when interrogated with a RFID scanner.

The System includes four basic components: a tag, handheld RFID tag scanner, lap top computer system, and central database server. Database information will be password protected and iridium satellite communications equipment used in this system will include standard commercial encryption approved for Department of Defense users.

**Deliverable Products:** Prototype hand-held concept demonstrator and assessment reports.

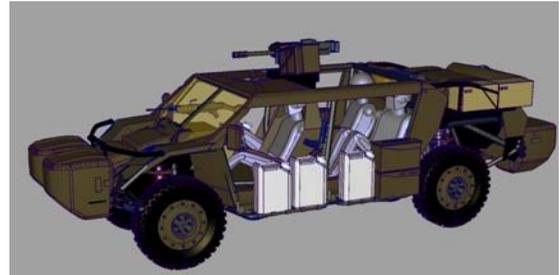


Project Officer: (703) 432 - 0467

Advanced Light Strike Vehicle (ALSV)

**Purpose:** To design, on paper, an ALSV that meets the Marine infantry combat effective and combat suitable requirements using the most advanced prototyping tools available. Once Marine Infantry advocates approve the paper design, the Lab in conjunction with industry, will build a working prototype and assess its performance in a wide range of environments and mission scenarios.

**Background:** The single greatest challenge in vehicle design is the internal MV22 transportability Key Performance Parameter (KPP). The specific Marine Corps mission requirement shortfall driving the vehicle design is the need for a motorized offensive strike platform transportable in the MV22. Mission effective and mission suitable production vehicles (Commercial Off-the Shelf) transportable by the MV22 do not exist.



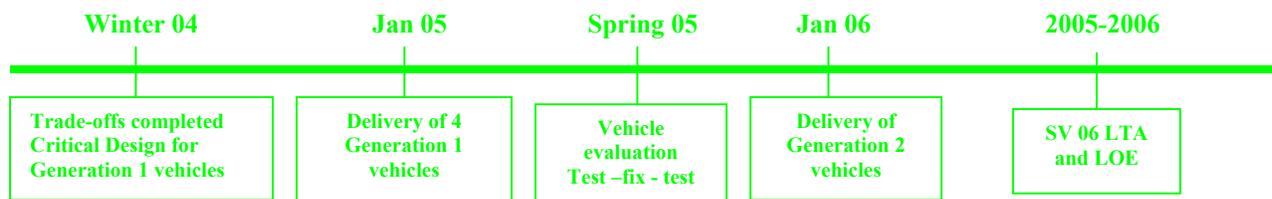
A team comprised of Marine Corps operational/mission subject matter experts (SMEs), Navy vehicle design and aircraft design SMEs, and partnered commercial entities will, starting with the KPPs, design from the ground up the optimum light strike mission vehicle internally transportable by the MV22. The combination of technical expertise, extensive vehicle design tools, and state-of-the-art prototyping processes are expected to provide substantial cost avoidance and shortened development time.

**Description:** The design phase will incorporate proprietary technologies, independent research and development, and emerging technologies to design a working prototype ALSV. Additionally, this team will leverage all lessons learned from past vehicle design efforts, and efforts to adapt commercial vehicles to internal transport aboard MV22s.

- MV-22 Internally Transportable (design must be capable of aircraft certification)
- Capable of mounting heavy machine guns (M-2 and MK-19)
- Must carry 2 crewman, plus driver
- Incorporates latest mature technology for suspension and drive train
- Diesel powered motor capable of using JP fuels
- Automatic transmission
- Tubular frame
- Trafficability better than or equal to the HMMWV

**Deliverable Product(s):** Four working prototype vehicles.

**Milestones:**



Action Officer: 784-3425

### Body/Extremity Protection

**Purpose:** To examine developmental efforts to improve body armor/extremity protection against ballistic/blast/shrapnel.

**Background:** Operation Respond received a request from 3/11 asking for lower torso body armor for their HMMWV gunners. Reports indicate a protection coverage gap in the lower torso areas, while standing to operate turret-mounted weapons. Marine Corps Systems Command and the Naval Research Lab have developmental efforts underway to improve body armor/extremity protection against ballistic/blast/shrapnel. However, no near-term major advances in materials are expected for 6 months. The science behind the philosophies of tradeoffs between level of protection, acceptable levels of injury (from a medical perspective), weight/mobility/heat, and threats (ballistic, blast, and shrapnel) is developing.



The Vietnam-era M-53s are completely out of the system and surplus. The Lab liaison with a local manufacturer produced Kevlar shorts that cover more of the femoral arteries.

**Description:** The “Ballistic Shorts” are made to provide National Institute of Justice Level IIIa protection from the waist to the mid-thigh. They are supported by rapidly-removable suspenders and are made up of overlapping front and rear sections to ensure full protection of the lower torso.

**Deliverable Product(s):** The Lab is providing 10 pairs that have been rapidly manufactured to partially satisfy 3/11’s request for 80 pairs. These will be used for fit/function tests, and to determine full I MEF requirement.

**Milestones:**



Action Officer: 784-3425

## Dragon Eye Unmanned Aerial Vehicle (UAV)

**Purpose:** To provide the small unit leader an over-the-hill reconnaissance capability using a backpackable UAV system with interchangeable modular payloads.

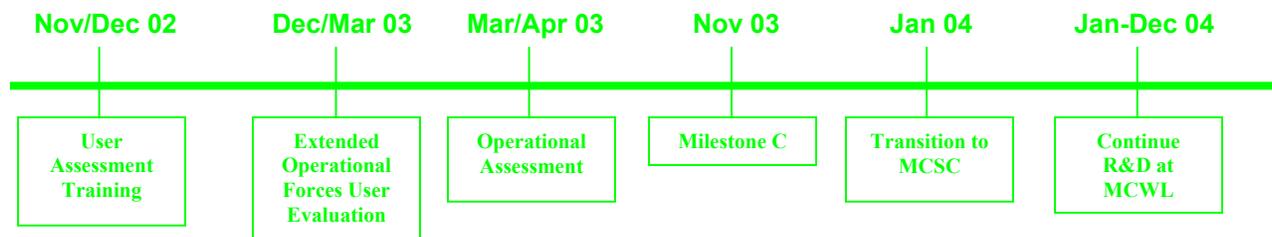
**Background:** The impetus for the project came from the Secretary of the Navy's Over-the-Hill Reconnaissance initiative, and the Interim Small Unit Remote Scouting System requirement. The Dragon Eye (DE) UAV, is a combined project of the Lab and the Marine Corps Systems Command (MCSC). This UAV is intended to support Marine Corps Systems Command (MCSC) to develop a prototype lightweight, backpackable UAV capable of providing real time day/night video imagery. The MCSC, Program Manager Scouting Systems is the office of record and the Interim Small Unit Remote Sensor System (ISURSS) is a sub-requirement of the Tactical Remote Sensor Suite Operational Requirements Document (ORD).



**Description:** Dragon Eye is a 5.5-pound, battery-powered, modular UAV capable of fully autonomous flight. Made of lightweight Kevlar material, this system is designed to disassemble into five separate pieces, and carried in its container attached to an individual Marine's ALICE pack. Missions are programmed via a wireless modem that is integrated into a ten-pound ground control station. After being launched, DE flies to pre-assigned GPS waypoints via an onboard autopilot, which has the ability to be reprogrammed in flight. Its sensors include full motion color and low light black and white cameras, each having the capability to transmit a video line of sight to a range of ten kilometers. An infrared camera is currently in testing and development. Dragon Eye flies up to speeds of 45 knots, and has a battery endurance of up to 60 minutes. Ten Dragon Eye prototype systems were provided to I MEF for evaluation, and tactics, techniques and procedures development.

**Deliverable Product(s):** Assessments based on operational experimentation, i.e., varied mission type payloads.

### Milestones:

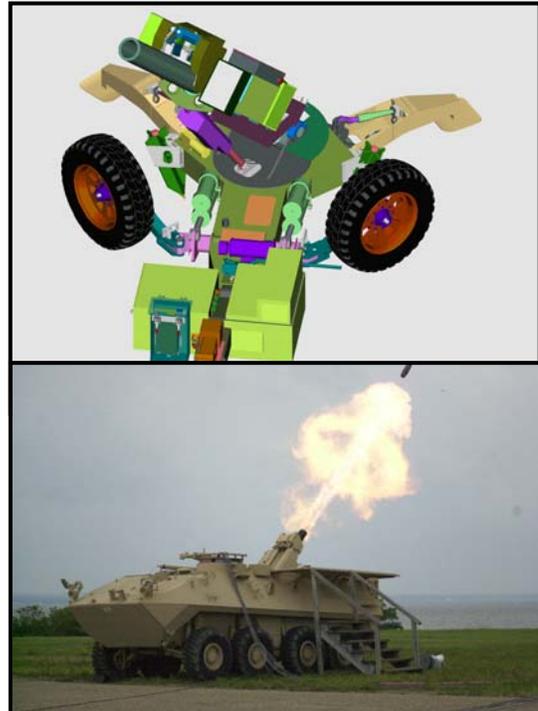


Action Officer: (703) 432-0464

## Dragon Fire II

**Purpose:** Provide a concept demonstrator of an Expeditionary Fire Support System (EFSS) that has the potential to be as mobile as the ground forces it supports as stipulated in the EFSS Mission Need Statement (MNS).

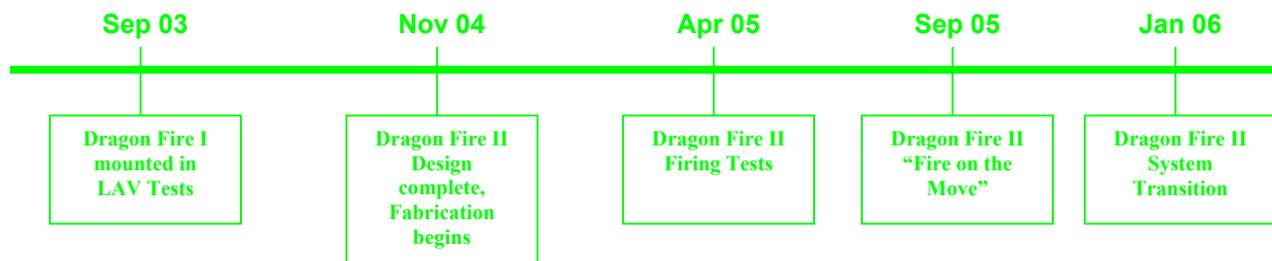
**Background:** In 1997, the Warfighting Lab developed and experimented with the Dragon Fire, an indirect fire concept demonstrator. Since then, MCCDC has published the EFSS MNS for a light, mobile fire support system configured to support the requirements of Expeditionary Maneuver Warfare. The Dragon Fire II is the next generation system, which will incorporate all of the “lessons learned” from the first Dragon Fire experiments to make this system an advanced technology candidate for the EFSS and EFSS-LAV requirements.



**Description:** A compact, automated 120mm rifled mortar that can be readily deployed from amphibious shipping either internally within an MV-22 or CH-53, towed by a HMMWV or LAV, or internally loaded and fired from a LAV. The Dragon Fire II can be emplaced and displaced rapidly, has configuration options and on-board communications, navigation and fire control. It is a rifled, recoiling mortar that can traverse 6400 mils and is self-loading. DF II has a range of 8,200M (13,000M with rocket assisted projectile) and a rate of fire of 10 rounds/min for 2 minutes and 4 rounds/min indefinitely. It has on-board digital communications and will be capable of full sensor-to-shooter (and remote) operations. Development of the LAV mounted configuration of this system will include experiments to develop a fire-on-the-move capability to increase unit agility and responsiveness.

**Deliverable Product(s):** Prototype(s) for operational experimentation and requirements definition/development.

### Milestones:



Action Officer: 784-3425

## Dragon Runner Unmanned Vehicle

**Purpose:** To improve a small unit’s situational awareness and force protection by extending their limit of observation through the use of mobile ground sensors.

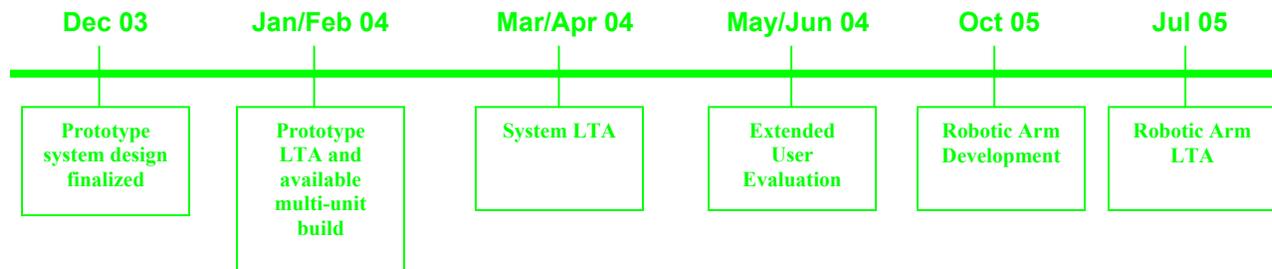
**Background:** Small units have always relied on their own eyes and ears for tactical Reconnaissance Surveillance and Target Acquisition (RSTA) and force protection. In today's battlefields, small unit leaders are increasingly called upon to enter urban or similar complex hostile environments. In such environments, tactical units need a small, low-risk, organic capability to rapidly conduct RSTA and small unit force protection. Such a capability will significantly mitigate the high risk to personnel operating in asymmetric environments. The Dragon Runner will be deployed at the small unit level within the ground combat element. It will increase the employing unit's RSTA capability to observe tactical objectives and danger areas beyond the unit's line of sight. Dragon Runner will accomplish this by providing real-time, "around the corner", imagery directly to operational elements at the small unit level given the tactical situation. Dragon Runner also provides a man-portable limited tactical force protection capability while in “Sentry Mode” by increasing the real-time feedback to the small unit leader.



**Description:** Initial prototype systems are comprised of three components: Vehicle, Operator Control System and Handheld Controller. The current system features an all wheel drive, skid steer vehicle, improved 6x zoom camera that provides color as well as black and white real-time imagery, mission payload interface, custom backpack, and an improved handheld controller that includes single joystick operation, transfective display, tactile alerts, and an On-Screen-Display that provides system status to the operator at the touch of a button.

**Deliverable Product(s):** Prototypes and assessment based on operational experimentation.

### Milestones:



Action Officer: 784-0056

### Dust Abatement

**Purpose:** To develop materials and tactics, techniques, and procedures for rapidly upgrading, repairing, or constructing expeditionary or contingency airfields in theatre with a low logistics footprint.

**Background:** The Marine Corps requires an organic capability to control dust in expeditionary landing zones for rotary wing operations in arid and semi-arid climates containing aridisol type soils. This need to control dust was identified in recent operations in Afghanistan and Iraq where dust conditions severely limited visibility causing “brown-out” conditions.

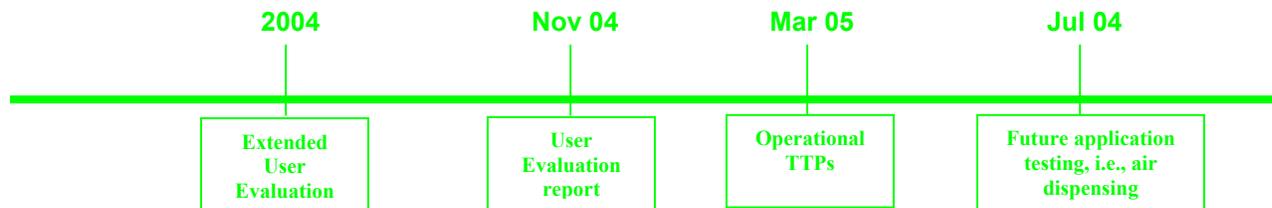


**Description:** Marine Wing Support Groups require a dust palliative that will control dust in an austere, arid and semi-arid climate. The palliative must be applied “as is” or able to be pre-mixed with water and stored for up to 3 months with no degradation in product quality.

**Deliverable Product(s):** The Lab and Marine Wing Support Group-27 have conducted assessments of several commercially available products and have selected the top three performers for an extended users evaluation during OIF 2.



**Milestones:**



Action Officer: 784-1088

## Explosive Resistant Coating

**Purpose:** To conduct experimentation with various poly-urea materials categorized as Explosive Resistant Coatings (ERC) to determine how effectively these coatings improve the protection of personnel from ballistic and blast threats when ERC is applied to armor substrates.

**Background:** The Marine Corps requires optimum personnel protection from Improvised Explosive Devices (IEDs) within the constraints of armor material availability, and the capacity of vehicles to carry parasitic armor while remaining mission capable. The Lab examined ERC and determined that when applied to substrates with hardness equal to, or greater than, High Hard Steel (HHS) the added protection level is cost effective. The added weight per square foot from ERC is less than the weight penalty from thicker steel armor. For example 1/2 to 3/4 inch ERC on the exterior of 3/16ths HHS equals the protective qualities of 3/8ths inch Rolled Homogeneous Armor (RHA), and weighs approximately 2.3 lbs less per square foot. Achieving such positive results will reduce the weight of parasitic armor on vehicles, thereby increasing operational availability of vehicles in OIF.



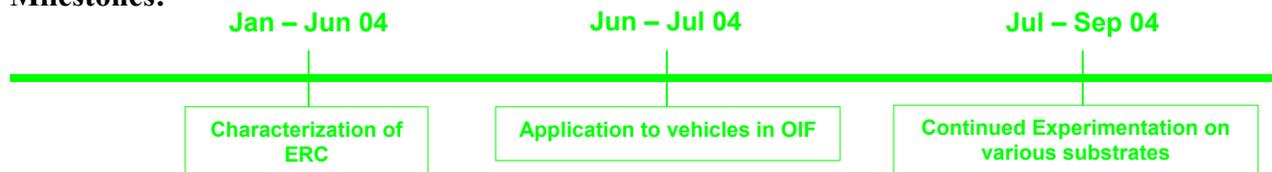
Additionally, the armor coating process is relatively straightforward, cost effective, and can be applied in a field environment with minimal training.

**Description:** ERC is produced by mixing a 1:1 ratio of two components: 1) an isocyanates quasi-prepolymer and a resin bond. ERC is sprayed onto surfaces and dries in 6 to 12 seconds.

**Deliverable Product(s):** The Lab in conjunction with Naval Surface Warfare Command, Dahlgren, Naval Surface Warfare Command, Carderock, and Army Research Laboratory has fully characterized the properties of ERC when applied to 3/16ths inch HHS. The Lab, Marine Corps Logistics Command, and MCSC have developed an integrated solution for upgrading all 3/16ths inch HHS in OIF using ERC to achieve a level of protection equal to 3/8ths inch RHA.

The Lab is experimenting with ERC in combination with ceramic materials to further learn its potential for armor applications; specifically, semi-permanent and permanent blast shields, buildings, walls, and checkpoint protective barriers.

### Milestones:



Action Officer: 784-3425

Project Metropolis

**Purpose:** Project Metropolis (PROMET) has a four-fold purpose: (1) Develop TTPs to enable Marines to survive, fight and win in MOU. (2) Develop a comprehensive urban warfighting Program of Instruction. (3) Recommend improvements to existing and future training facilities. (4) Evaluate selected enabling technologies that enhance small unit combat capability.

**Background:** The Lab began examining the urban environment in 1997 as part of the Urban Warrior series of experiments. Unable to accomplish all the objectives and finding that the Marine Corps faced profound challenges regarding training, techniques, tactics and procedures as well as technological and equipment shortfalls PROMET was formed in June '99. PROMET evolved into the repository for urban expertise in the Marine Corps. It has resulted in a wholesale revision of urban doctrine that is still underway and continues to uncover shortfalls and responded to those identified by the advocates and the operating forces. It has been designated as the lead agent for the Marine Corps regarding participation with the Joint Urban Operations Cell at JFCOM. PROMET has become the umbrella organization under which a series of projects have formed.



**Description:** PROMET experimentation systematically identifies weaknesses or problem areas across the spectrum of urban operations and designs experiments in order to find solutions. PROMET 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. PROMET takes a holistic approach to finding ways to prepare for the “three block war”. PROMET has recently been heavily involved in the preparation of Battalions of the 1<sup>st</sup>, 2<sup>d</sup>, and 4<sup>th</sup> Marine Divisions for Operation Iraqi Freedom (OIF) 2. Creating an Iraqi village type environment at the former married quarter area of March Air Reserve Base, PROMET trained six Battalions of the 1<sup>st</sup> Marine Division during Jan to Mar '04. 1<sup>st</sup>, 2<sup>d</sup>, and 4<sup>th</sup> Marine Divisions have requested the assistance of PROMET to train a further 11 units in preparation for OIF 2 during Apr to Jul '04. This training places heavy emphasis upon creating an environment that closely replicates the people and threat forces that the Marines will face in Iraq. Results so far from Marine Battalions deployed to Iraq in Mar '04 have been favorable.

**Deliverable Product(s):** Urban Warfighting Program of Instruction (POI) and TTPs, Basic Urban Skills Training (BUST) POI. Urban Combined Arms Exercise Assessment of Urban Training Facilities and technology assessments. Computer Based Training for the BUST POI.



Action Officer: 703-432-1062

Project Rifleman

**Purpose:** Enhance the warfighting capability of the individual rifleman by conducting experimentation to assess the effectiveness of emerging equipment and technology.

**Background:** Project Rifleman has evolved into an experimental test bed for near term initiatives requested through the advocates. Project Rifleman also assists the Marine Corps Systems Command’s Marine Expeditionary Rifle Squad, to make procurement decisions by defining concepts through experimentation.

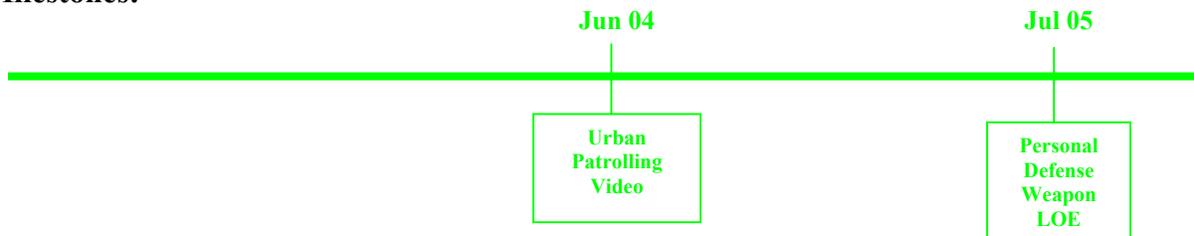


**Description:** Based on input from the operating forces and advocates, Project Rifleman is focused on experimentation aimed at:

- Identify robust squad and platoon level urban entry breaching capabilities of various types and methods.
- In conjunction with the Infantry Weapons Requirements Office of the Marine Corps Combat Development Command, examine the effectiveness of a family of rifle grenades spread throughout the Marine Rifle Squad vice designated grenadiers operating the M-203.
- In conjunction with the Marine Expeditionary Rifle Squad Program of the Marine Corps Systems Command, examine application of emerging enhanced blast explosive 40mm ammunitions.
- Develop a visual training aid for urban patrolling techniques.
- In consortium with the Marine Expeditionary Rifle Squad Program and Dismounted Digital Advanced Communication Terminal Program of the Marine Corps Systems Command, examine utility of small unit leaders' digital communication devices and their impact on operations of squads and platoons.
- Examine the utility of a variety of training devices to make experimentation more realistic (paint ammunitions, paint grenades, claymores, mortars, protective garments).
- Examine utility of personal defense weapons.

**Deliverable Product(s):** Technology assessments and supporting TTPs.

**Milestones:**



**Action Officer:** 432-1021  
432-1027

## Squad Advanced Marksman (Rifle)

**Purpose:** To provide Marines the capability to provide precision fire in support of the rifle squad, provide precision fires in support of an assault, and aid in the observation and adjusting of supporting arms.

**Background:** Riflemen are trained to engage high-contrast black and white targets with the M16A2 service rifle at ranges out to 500 yards. Riflemen have great difficulty identifying partially camouflaged or concealed targets at half of this distance, with the naked eye in low-light conditions. Additionally, this limitation makes it difficult for rifleman to distinguish combatants from non-combatants and hinders their ability to prioritize, identify or engage high payoff targets within groups with the standard service rifle using iron sights. Rifle squads have no optical equipment to observe the effects of their fires or note mil values in relation to other Marines (to determine precisely when to shift and cease-fire in assaults). Units may find it necessary to serve as a support or assault element at any moment regardless of original assignment. To safely conduct hasty fire and maneuver, units need to be capable of providing adequate suppression to assume either mission and maintain momentum. Using the Squad Advanced Marksman Rifle (SAM-R) optic will allow the user to accurately and safely provide shifts for machine gun fire and aid in the corrections of call for fire (mortars/artillery).

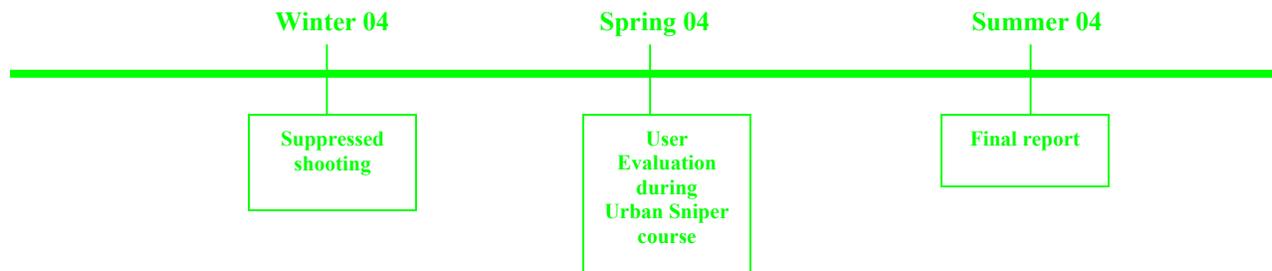


**Description:** The Lab will assess the SAM-R in the below configuration:

- M-16A4 (flat-top receiver).
- Free floated stainless or chrome-lined match barrel.
- M-16A1 trigger assembly.
- Pop-up front and rear sight assemblies.
- 3.5 x 9 variable power scope with a first focal plane reticle.
- Clip-on Night Vision Device

**Deliverable Product(s):** Assessment reports and requirement documentation.

**Milestones:**



Action Officer: 784-0056

Tactical Warrior

**Purpose.** To conduct experiments under the Tactical Warrior campaign to examine the introduction of a variety of enhanced capabilities for infantry small units.

**Background:** The rise in power of the advocacy process within the Marine Corps has created a need to respond quickly and concisely to operating force needs. The Tactical Warrior experiments help define concepts and requirements as well as experiment with new equipment and technologies. The Tactical Warrior experiments complement the expeditionary force development process by involving representatives from HQMC Plans, Policies and Operations (PP&O), Marine Corps Systems Command, and Training and Education Command (TECOM) from experiment design through completion, allowing all to benefit from the knowledge attained.



The first Tactical Warrior limited objective experiment, TacWarrior I, took place in September '01 and looked at information flow and communications architecture within the rifle platoon. TacWarrior II was completed in October '02 and examined the concept of the Squad Advanced Marksman and continued experimentation with small unit communications integrating the Personal Role Radio (PRR) and ANPRC-148 radio.

**Description:** 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 IOAG, Ground Board, TECOM and the 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. Although it is not exclusively urban in orientation, a significant portion of the capabilities examined will have an urban context and therefore dovetail nicely with the continuing efforts of Project Metropolis.

**Deliverable Product(s):** After action reports, X-Files, and recommendations to advocates.

**Milestones:**



Action Officer: 784-3785

**Telepresent Rapid Aiming Platform (TRAP)**

**Purpose:** To determine if the Telepresent Rapid Aiming Platform (TRAP) has military applicability for Force Protection.

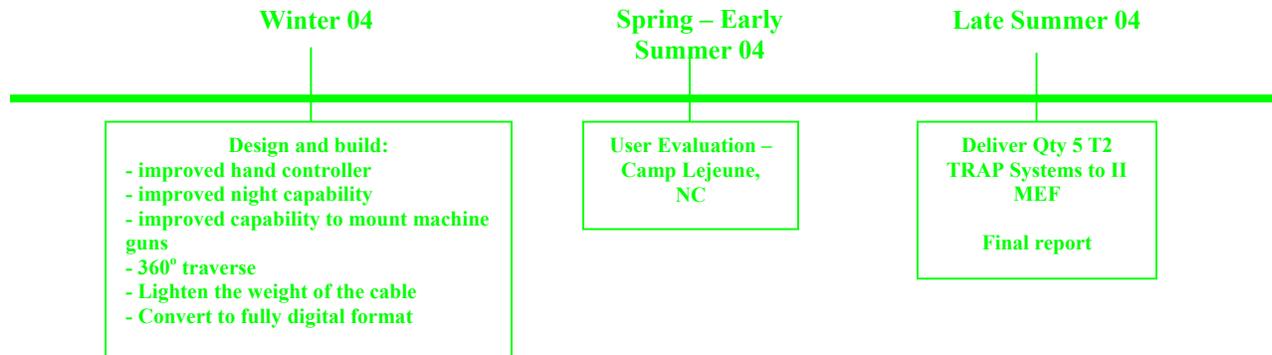
**Background:** Currently police departments in a few large urban areas have incorporated the TRAP system into their policing tactics. Scenarios for experimentation will replicate real world current operations that occupy today’s Marines. Experimentation will identify the vulnerabilities of the TRAP in a force protection posture as well as identify the Tactics Techniques and Procedures (TTPs) necessary to operate the system to its best advantage.



**Description:** The TRAP is a tripod configured firing platform for 5.56, 7.62 or .50 caliber rifles. The tripod has electric servos that traverse and elevate the weapon as well as actuate the trigger. Two cameras, an observation/scan camera mounted on the tripod and a bore-sighted aiming camera coupled to a riflescope and mounted on the weapon, enable the operator to observe a sector of fire for enemy activity and to aim the weapon on target. The TRAP operator remotely controls the mounted weapon. The operator conducts all observation, manipulation of the weapon’s attitude and firing from a protected, remote location via a control box connected to the tripod using a single 20 to 300 foot long cable.

**Deliverable Product(s):** A recommendation to the Marine Corps Combat System Command as to the applicability or non-applicability for the military force protection mission.

**Milestones:**



Action Officer: 784-3425

## 12 Gauge HE Cartridge

**Purpose:** To examine the cartridge and ascertain its potential as an enhancement for close combat missions, particularly combat in urban terrain.

**Background:** The cartridge is a private development that has completed several years of engineering and testing. The objective of this design is to provide Marines armed with a standard shotgun the capability of defeating reinforced targets, materiel targets, protected targets and other targets requiring a high explosive or armor-piercing warhead.



**Description:** The FRAG-12 cartridge is an experimental 12 gauge high explosive projectile with blast and fragmenting effects and with the HE-AP projectile, a shaped charge penetrator.

The FRAG-12 is designed to have two types of effects: high explosive fragmentary and high explosive shaped charge. With the HE fragmentation warhead, it is designed to have blast and fragmentation out to a 2 meter casualty radius and with the shaped charge, it is advertised to be able to penetrate 4 inches of aluminum armor and over 1 inch of steel. Both cartridges are said to have a 200m effective range. These cartridges will be tested to evaluate their performance and their application to existing and emerging requirements.

**Deliverable Product(s):** The test data and any remaining cartridges and equipment will be transferred to MARCORSSYSCOM for their use.

### Milestones:



- ° Develop test and safety plans
- ° First 100 rounds of ammunition acquired
- ° Firing tests in progress
- ° Analyze data for potential combat effectiveness/investigate potential requirement

Action Officer: 784-3425

# **Glossary**

## **Section VI**

**GLOSSARY**

ACA	Aircraft Coordination Airspace
ACE	Aviation Combat Element
ACTD	Advanced Concept Technology Demonstration
AD/C CD	Assistant Deputy Commandant Combat Development
AFATDS	Advanced Field Artillery Tactical Data System
AFB	Air Force Base
AJC2	Adaptive Joint Command and Control
ARG	Amphibious Ready Group
AT	Anti-Terrorism
ATA	Airborne Target Acquisition
ATF	Amphibious Task Force
AWE	Advanced Warfighting Experiment
BAA	Broad Agency Announcement
BLOS	Beyond Line of Sight
BLT	Battalion Landing Team
BUST	Basic Urban Skills Training
C2	Command and Control
C2IT	Command, Control and Information Technology
C2PC	Command and Control Personal Computer
C4ISR	Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance
CAS	Close Air Support
CCI	Command and Control Integration
CCIR	Commander's Critical Information Requirements
CDR	Combat Decision Range
CDS	Combat Development System
CE	Command Element
CECOM	Communications-Electronics Command
CETO	Center for Emerging Threats and Opportunities
CID	Combat Identification
CINC	Commander-in-Chief
CJCS	Chairman of the Joint Chiefs of Staff
CMC	Commandant of the Marine Corps
COA	Course of Action
COC	Combat Operations Center
CONUS	Continental United States
COTS	Commercial of the Shelf
CPLAN	Campaign Plan
CROP	Common Relevant Operational Picture
CSSE	Combat Service Support Element
CSW	Coalition Special Warfare

## EXPERIMENTATION CAMPAIGN PLAN -- 2004

CTP	Common Tactical Picture
CVBG	Carrier Battle Group
D/C CD	Deputy Commandant Combat Development
DACT	Data Automated Communications Terminal
DARPA	Defense Advanced Research Projects Agency
DASC	Direct Air Support Center
DISN	Defense Information System Network
DoD	Department of Defense
DOTMLPF	Doctrine, Organization, Training, Material, Leadership, Personnel and Facilities
EBO	Effects Based Operations
ECP	Experimentation Campaign Plan
EFDS	Expeditionary Force Development System
EFSS	Expeditionary Fire Support System
EMW	Expeditionary Maneuver Warfare
EPLRS	Enhanced Position Reporting Location System
ESG	Expeditionary Sensor Grid
ETALS	Enhanced Target Acquisition and Locating System
EUT	End User Terminal
FAC	Forward Air Controller
FAM	Familiarization
FCS	Future Combat System
FIE	Fly-In-Echelon
FM	Frequency Modulation
FO	Forward Observer
FORP	Forward Observer Review Panel
FSSG	Force Service Support Group
FTUV	Family of Tactical Unmanned Vehicles
FY	Fiscal Year
FYDP	Five Year Defense Plan
GCE	Ground Combat Element
GOTS	Government of the Shelf
GPS	Global Positioning System
HIMARS	High Mobility Artillery Rocket System
HMMWV	High Mobility Multipurpose Wheeled Vehicle
HSV	High Speed Vessel
I&E	Innovation and Experimentation
IAS	Intelligence Analysis System
ICBT	Interim Brigade Combat Team
IFAV	Interim Fast Attack Vehicle
IP	Internet Protocols
IPB	Intelligence Preparation of the Battlefield
IPR	Intra Platoon Radio
IPT	Integrated Process Team
ISR	Intra Squad Radio

## EXPERIMENTATION CAMPAIGN PLAN -- 2004

ISR	Intelligence, Surveillance and Reconnaissance
ISURSS	Interim Small Unit Remote Sensor System
ITV	Internally Transportable Vehicle
JCDE	Joint Concept Development and Experimentation
JCIET	Joint Combat Identification Evaluation Team
JFC	Joint Force Commander
JFMCC	Joint Force Maritime Component Command
JIMP	Joint Vision Implementation Master Plan
JIP	Joint Interactive Planning
JOA	Joint Operations Area
JOC	Joint Operations Center
JRB	Joint Requirements Board
JROC	Joint Requirements Oversight Council
JSIR	Joint Intelligence, Surveillance and Reconnaissance
JTFHQ	Joint Task Force Headquarters
JTRS	Joint Tactical Radio System
JV2020	Joint Vision 2020
JWCA	Joint Warfighting Capabilities Assessment
LAS	Local Area Sensors
LAV	Light Armored Vehicle
LCAC	Landing Craft Air Cushioned
LEO	Low Earth Orbit
LFOC	Landing Force Operations Center
LOE	Limited Objective Experiment
LOI	Letter of Instruction
LPP	Littoral Penetration Point
LTA	Limited Technical Assessment
MAA	Mission Area Analysis
MAGTF	Marine Air Ground Task Force
MARCORSYSCOM	Marine Corps Systems Command
MARFORPAC	Marine Forces Pacific
MAWTS	Marine Aviation and Weapons Tactics Squadron
MBC	Mortar Ballistic Computer
MBITR	Multiband Inter/Intra Team Radio
MC	Millennium Challenge
MCCDC	Marine Corps Combat Development Command
MCIA	Marine Corps Intelligence Activity
MCOTEA	Marine Corps Operational Test and Evaluation Activity
MCSC	Marine Corps Systems Command
MCSIT	Multiple C4I IMMACCS Translator
MCWL	Marine Corps Warfighting Lab
MD	Millennium Dragon
MEB	Marine Expeditionary Brigade
MEF	Marine Expeditionary Force
MEFFV	MAGTF Expeditionary Family of Fighting Vehicles

## EXPERIMENTATION CAMPAIGN PLAN -- 2004

MELIOS	Mini Eye Safe Laser Infrared Observation Set
MEO	Mid Earth Orbit
MEU	Marine Expeditionary Unit
MFSS	Mobile Fire Support System
MNS	Mission Needs Statement
MOUT	Military Operations in Urban Terrain
MP SIDS	Man Packable Secondary Imagery Dissemination System
MPF	Maritime Prepositioning Force
MPF(F)	Maritime Prepositioning Force, Future
MPSRON	Maritime Prepositioning Squadron
MROC	Marine Corps Requirements Oversight Council
MSBL	MAGTF C4I Software Baseline
MTVR	Medium Tactical Vehicle Replacement
MWS	Modular Weapons System
NAWC-AD	Naval Air Warfare Center Aircraft Division
NOE	Nap of the Earth
NSWC	Naval Surface Warfare Center
OAG	Operational Advisory Group
OC	Olympic Challenge
OCU	Operator Control Unit
OD	Olympic Dragon
OMFTS	Operational Maneuver from the Sea
ONA	Operational Net Assessment
ONR	Office of Naval Research
OPTEMPO	Operations Tempo
ORD	Operational Requirements Document
OSTI	Office of Science, Technology and Innovation
OTH	Over the Horizon
OTM	On the Move
PC	Pinnacle Challenge
PD	Pinnacle Dragon
PM	Program Manager
POI	Program of Instruction
POM	Program Objective Memorandum
PRE-FICCS	PRE First In Command and Control System
PTAM	Precision Target Acquisition Mobile
PWS	Pintle Weapon System
RAP	Rocket Assisted Projectile
RCSS	Robotic Combat Support System
RDO	Rapid Decisive Operations
RHC	Ruggedized Handheld Computer
RLT	Regimental Landing Team
ROCS	Recon Observation Confirming Sensors
RSTA	Reconnaissance, Surveillance and Target Acquisition
RST-V	Reconnaissance, Surveillance, Target Acquisition Vehicle Program

## EXPERIMENTATION CAMPAIGN PLAN -- 2004

RW	Rotary Wing
S&T	Science and Technology
SA	Situational Awareness
SACC	Supporting Arms Coordination Center
SAR	Synthetic Aperture Radar
SATCOM	Satellite Communications
SCLA	Southern California Logistics Airport
SE&I	Systems Engineering and Integration
SECDEF	Secretary of Defense
SINCGARS	Single Channel Ground and Airborne Radio System
SJFHQ	Standing Joint Force Headquarters
SLA	Service Level Agreements
SLEP	Service Life Extension Program
SLOC	Sea Line of Communication
SOC	Special Operations Capable
SPMAGTF(X)	Special Purpose Marine Air Ground Task Force, Experimental
SRS	Standardized Robotic System
STOM	Ship to Objective Maneuver
TACC	Tactical Air Coordination Center (Navy)
TARDEC	Tank Automotive Research, Development and Engineering Center
TCO	Tactical Combat Operations
TECOM	Training and Education Command
THS (X)	Target Hand Off System (Experimental)
THR	Tactical Handheld Radio
TLDHS	Target Location Digital Handoff System
TRADOC	U.S. Army Training and Doctrine Command
TTP	Tactics, Techniques, and Procedures
UAV	Unmanned Aerial Vehicle
UCATS	Universal Combined Arms Targeting System
UCAX	Urban Combined Arms Exercise
UGS	Unattended Ground Sensor
UGV	Unmanned Ground Vehicle
UGV/S JPO	UGV Systems Joint Program Office
UHF	Ultra High Frequency
UNS	Universal Needs Statement
UOC	Unit Operations Center
USJFCOM	United States Joint Forces Command
VCNR	Vice Chief of Naval Research
VHF	Very High Frequency
VoIP	Voice over Internet Protocol
VT	Vehicle Teleoperation
WMD	Weapons of Mass Destruction
WTBN	Weapons Training Battalion
WTI	Weapons and Tactics Instructors



**Marine Corps Warfighting Lab**

**3255 Meyers Ave.**

**Quantico, VA 22134**

**<http://www.mcwl.quantico.usmc.mil/>**