



# the 2017 MCWL/FD

# Initiative Portfolio

Updated September 15, 2016



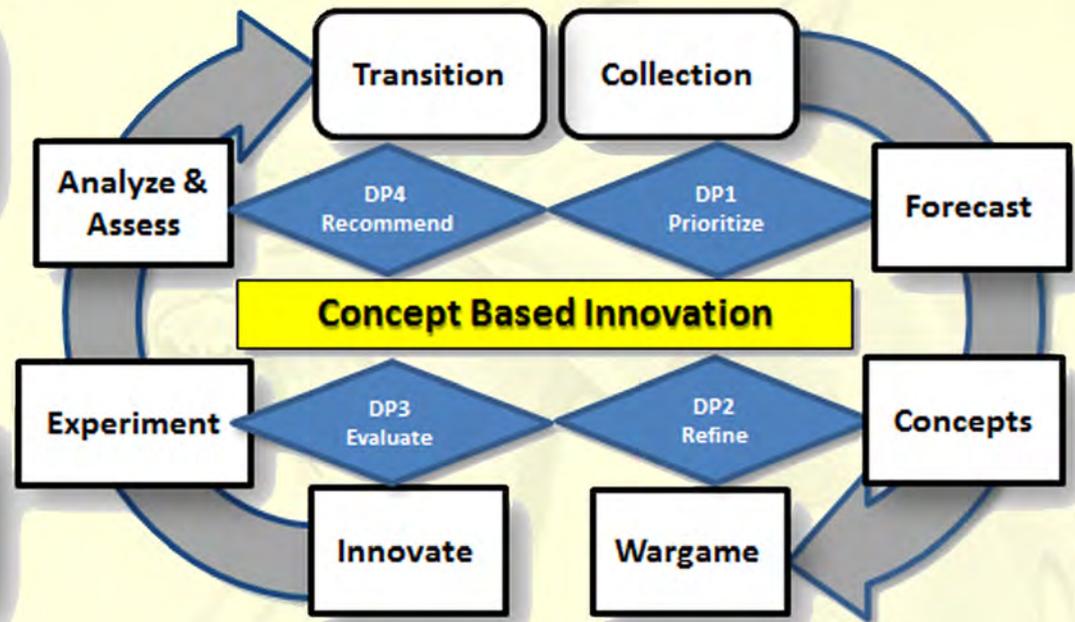
# MCWL/FD FY-17 Event Schedule (Sea Dragon 2025)



	Oct 16	Nov 16	Dec 16	Jan 17	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17
FAD				Futures Workshop 1-17		Futures Workshop 2-17					MCSEF Supplement	Flashpoints 17
	NFTE	NFTE	NFTE	NFTE	NFTE	NFTE	NFTE	NFTE	NFTE	NFTE	NFTE	NFTE
CAP	LOCE/EABC Functional DPTs, Naval Board, Joint Concept Review Committee / ONA Wargames / Concept Development Support / Joint Concept Workshop (Month) Plans Scenario Staffing Concepts and Programs Refresh HASC Sea Power Hearing SASC Shipbuilding Testimony HASC Sea Power Committee Quadrennial Defense Review (QDR) EAB Ops Defense Planning Guidance Review Plans Strategic Scenario Development Joint Concept Steering Committee Joint Concept Working Group Joint Concept Working Group Comprehensive Joint Assessment Joint Concept Working Group Comprehensive Joint Assessment											
WGD		Cargo UAS 1-17	ExMed 3-17	Critical Path			IW 6-17	21 <sup>st</sup> Century Fires 7-17				SOF I3 10-17
		MUM-T 2-17		NSG 17 4-17	EW 17 5-17				MW 17 8-17	PW 17 9-17		
S&T	CDT 17-1 WTI 1-17 C4/EW			ExMed		Talon Reach S&T OAG	CDT 17-3	CDT 17-5 WTI 2-17 C4 Tech				
ExDiv	AWA 17.1 LOE 17.1	CDT 17-2 ITX 17-1				V35 MCCR	CDT 17-4 WTI 2-17	CDT 17-6 CDT 17-7 RAVEN Ex		Talisman Sabre 17 MIX 17.1		CDT 17-8 31 <sup>st</sup> MEU CERTEX
Publication            General Officer Decision Point            Concept            Wargame            Limited Technical Assessment            MAGTF Integrated Experiment            Limited Objective Experiment            Concept Development Team												



# Futures Process



**“Concept-Based Development through Analysis-Based Assessment”**



# Contents:



## **MCWL Process & TEEP**

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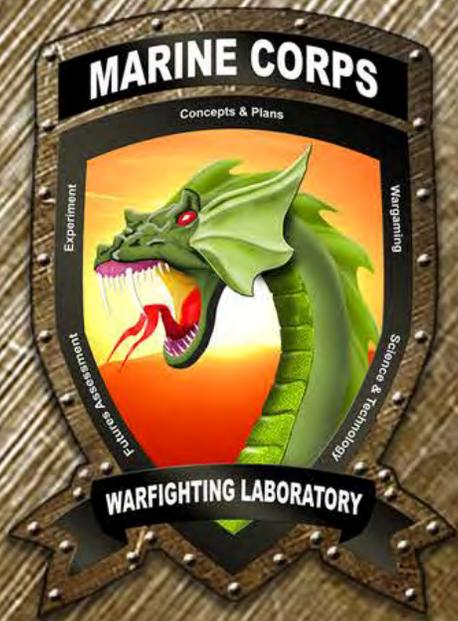
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# Futures Assessment Division

***We drive the future of the Marine Corps***



# World Futures Society Conference



**Description:** External organizations such as the World Future Society (WFS) are valuable partners in examining the future and assessing its impact on the future Marine Corps. Global developments in the fields of technology, logistics, energy, climate, demographics, and resources, all have effects on the USMC. Events such as this annual WFS conference, represent important opportunities to listen, observe, and note the latest developments, facts, and opinions, particularly where patterns and trends are converging and how it is driving us and our allies to plan the future force.



# Futures Workshops



**Description:** Futures Workshops are one to two day events focused on a specific aspect of the evolving conflict environment. Participants include selected representatives from across the Marine Corps Community of Interest to include DOD, academia, and diverse futures organizations. Workshops generally support the Marine Corps Future Security Environment Forecast Process. They are also pivotal in supporting the CG MCWL/FD's continual examination of the future and can focus on directed issues at his discretion. FY 16 and 17 Workshop details are currently under development.



# Notes from the Edge



**Notes from the Edge**  
*Insights into an Evolving Future*

VOL 5 -- ISSUE 8      AUGUST 2015

*A Product of the Futures Assessment Division*

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**FUTURE OF WORK**

**The Age of the Robot Worker Will Be Worse for Men.** Two Oxford researchers analyzed skills required for over 700 different jobs to determine how they may be affected by automation. The results showed intelligent machines could take over 47% of today's occupations; those traditionally performed by men are at a higher risk of being replaced. For instance, 95% of U.S. truck drivers are men whereas 93% of registered nurses are women. The former may be replaced by autonomous vehicles or delivery drones while the latter, with human care and judgment, is likely to be preserved.

[Worse For Men](#)

**The Future of Work: With Us, or Against Us.** The evolving impact of automation has created a [Rashomon](#) effect – contradictory interpretations of automation and its effect on society. Some argue that machine intelligence will replace all human labor while others say that automation and robotics will supplement the labor market and even create additional occupations. The construction and mining industries, for example, have paved the way for computerization efficiencies that are displacing human labor. Others however, are focusing on new possibilities. Cynthia Wagner, Managing Editor at *The Futurist*, presents a list of [70 jobs for 2030](#) including: robotician, space junk recycler, clone rancher, and avatar relationship manager. [The Future of Work](#), a special project by Stanford University addresses such controversial changes in the workplace.

[Work: With Us or Against Us](#)  
[Future of Construction](#)

**Description:** FAD analyzes long-range alternative future security environments and reports future force implications in order to assist CMC and senior leadership to posture the Marine Corps for future success. *Notes From The Edge* is a small sampling of FAD scanning that will provoke discussion and expand current paradigms of the future. Intended to broaden perspectives concerning both the general nature and eventual detail of the future we expect and more importantly, aspects of alternative futures not normally considered.



# CETO Flashpoints Report



## 2014 Edition of *Flashpoints*

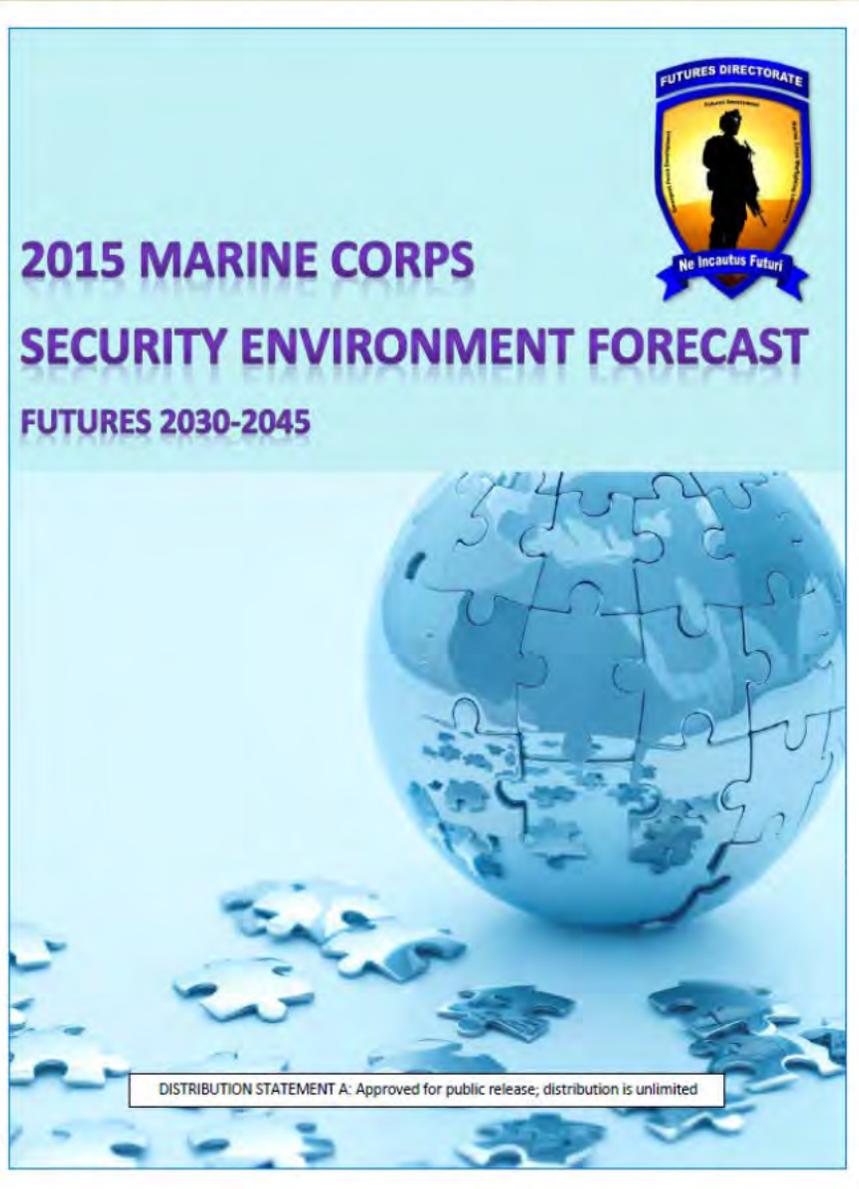


**Description:** *Flashpoints* is an annual product that provides the Marine Corps with an opportunity to work with other U.S. government agencies, international organizations, non-government activities, and other nations to develop solutions to problems before they lead to armed conflict or regional instability.

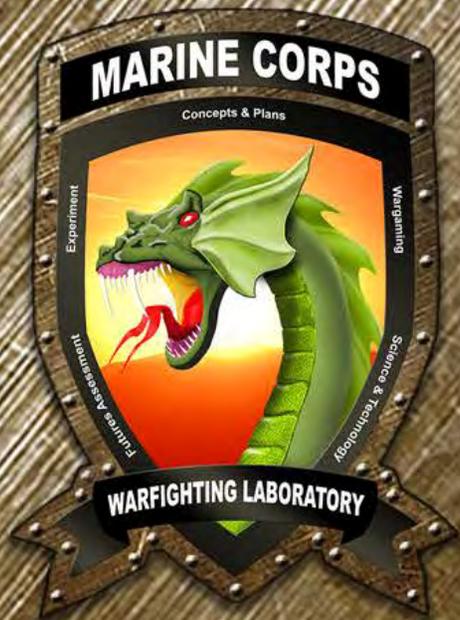
*Flashpoints* may also be found useful as a support assessment tool for other purposes to include: development of wargaming scenarios, objectives, and focus points; development and assessment of theater security cooperation plans and priorities; service assessment of potential support to specific engagement plans based upon service capabilities and resources; and multi-dimensional capability assessments across the range of military operations.



# Marine Corps Security Environment Forecast (MCSEF)



**Description:** MCSEF provides a bi-annual report of MCWL/FD's continual examination of the deep future. It aims to contribute to collective efforts that ensure the Marine Corps produces the right force in the right place at the right time. The Marine Corps must evolve and shape that force now for the future while guarding against strategic surprise and the risk of preparing too narrowly for a future we *want* rather than the future that eventually emerges.



# Concepts & Plans Division

***We drive the future of the Marine Corps***



# Littoral Operations in a Contested Environment Overview



**Description:** Following the Navy-Marine Corps Warfighter Talks on 10 June, 2015, a concept development team was formalized with Deputy Commandant for Combat Development and Integration (DC CD&I) and Naval Warfare Development Command (NWDC) wherein they were to develop the Littoral Operations in a Contested Environment Concept due the following year.

**Purpose:** Describe “naval operations in the littoral environment in light of emerging threats” in order to guide Navy-Marine Corps force development activities and provide fleet commanders options for future force employment.

**Problem Statement:** The Sea Services face a growing range of challenges in gaining access and operating freely in the littorals. In light of developing A2AD threats, our naval team must re-examine how we organize, train, equip, deploy, employ and sustain forces to conduct a range of naval operations, from crisis response in uncertain environments to raids and assaults in openly hostile environments.

**Central Idea:** Build on the core function of all domain access and the mutually reinforcing nature of sea control and power projection, develop a concept that refines how the naval team fights at and from the sea and how to confront evolving threats within the littorals.



# Expeditionary Advance Base Operations Overview



**Background:** The structure of the evolved Joint Force and the American model of expeditionary operations are founded on the fundamental assumption that US Forces have, or can readily achieve, sea and air control.

**Purpose:** Balance the joint force at the lower end with an operationally significant number of risk worthy, less expensive, adequately capable but lethal platforms and payloads. Develop a more amorphous forward basing infrastructure that clouds rather than clarifies enemy situational awareness and supports expeditionary capabilities forward

**Problem Statement:** Adversaries are evolving the next paradigm of warfare designed to eclipse our global forward basing and expeditionary warfare model. Competitors have taken our measure and found us to be fielding efficient capabilities that are deficient in number. Our most valuable capabilities are based in our most vulnerable locations.

**Central Idea:** EAB Ops is an inherently naval concept to support joint operations by advancing naval and joint sensors, shooters and sustainment capabilities to achieve sea control and denial.



# Army-Marine Corps Operating Concept Overview



**Background:** 22 June meeting with CMC/CSA produced an agreement to develop a multi-service operating concept. Three Phases: White paper, Wargaming/Experimentation, Concept Drafting and Refinement.

**White paper draft submitted to DC/CD&I 12 September.**

**Purpose:** Describe how future ground combat forces operating as part of joint and multinational teams defeat capable enemy organizations, secure terrain, and project power outward from land to maintain joint freedom of movement and action. Also identifies capabilities necessary to execute such operations in the projected operational environment.

**Problem Statement:** U.S. ground combat forces, operating as a joint and multinational force, are not trained, organized, equipped, nor postured to deter or defeat highly advanced enemies to win in future war.

**Central Idea: Multi-Domain Battle:** Combined Arms for the 21st Century calls for ready ground combat forces capable of outmaneuvering adversaries physically and cognitively through extension of combined arms across all domains. Through credible forward presence and resilient battle formations, future ground forces integrate and synchronize joint, interorganizational and multinational capabilities to create temporary windows of superiority across multiple domains; seize, retain, and exploit the initiative; and achieve military objectives.



# USMC - SOCOM Integration, Interoperability, and Interdependence (I-3) Overview



**Background:** For over a decade, forward-postured Marine Corps and Special Operations forces have operated together frequently and successfully in numerous missions spanning the range of military operations. Increasing demand for the unique and complementary capabilities these combined forces provide is evidence of their value, but that demand exceeds current capacity thus compelling the USMC and USSOCOM to seek new approaches for organizing and employing limited resources while concurrently strengthening collaboration and mutual support.

**Purpose:** This conceptual framework describes how the USMC and SOCOM will strengthen integration, interoperability, and interdependence to provide Geographic Combatant Commanders with a broad range of capabilities and force options unique to this complementary relationship. More specifically, the concept will provide insight for how Marine and Special Operation forces should plan, train and forward-posture to form, evolve, dissolve, and reform rapidly and seamlessly to address the diverse range of missions prevalent in a complex, global operating environment.

**Problem Statement:** Because Marines and Special Operations forces do not habitually train to, prepare for, and conduct joint operations, the GCCs lack the incentive to assume risk in the employment of USMC-SOF force options, which limits the means available to address theater campaign plan priorities.

**Central Idea:** Institutional and operational emphasis on the development and maturation of joint Marine-SOF force options will present Geographic Combatant Commanders with a wider and more nuanced range of capabilities vital to addressing theater campaign priorities and threats in a complex, future operating environment.



# Marines Aboard Surface Combatants Overview



**Background:** The Marine Corps is continually refining ways to posture the nation's "911" force to ensure it can effectively respond across the globe to any conflict that the nation may call upon us to answer. There has been an increase in the capabilities of conventional nation state competitors, along with a significant increase in distributed warfare from weaker state and non-state actors against our national assets and interests abroad. Two of the challenges presented today are finding the appropriate force structure and then getting partner nations to allow our forces to base in their countries, which is only becoming more difficult and potentially misaligned to respond rapidly to erupting threats.

**Purpose:** To propose the development of a concept for reestablishing Marines aboard surface combatants in order to provide increased capacity for forward presence, engagement, and crisis response. The envisioned concept will provide a basis for near-term experimentation and practical application in order to more fully identify the opportunities, limitations, challenges, and potential mission sets associated with employing Marines on and from modern surface combatants.

**Problem Statement:** Due to the changing global security environment and an increase in the demand for small-unit, distributed mission requirements rampant throughout the military, the Marine Corps needs to explore nontraditional ways to increase our already agile, responsive, and resilient forward deployed, force projection warfighting capability presence on nontraditional naval platforms (combatants).

**Central Idea:** The addition of shipboard Marine detachments would go a long way to solving many of the challenges confronting the naval forces. The mission sets of the employed units would normally be in the lower end of the conflict spectrum, increased combatant aggregation would give the force greater range in missions. Aggregated forces could be and sent ashore to conduct a spectrum of assigned missions.



# Support for Strategic Analysis

**Marine Corps lead in representing and integrating USMC capabilities, capacities, doctrine, and concepts within future year Support for Strategic Analysis (SSA) scenario development and analysis processes as governed by DODD 8260 series, Defense Planning Guidance (DPG) and other applicable directives.**

**Integrate and coordinate the overall planning, direction, and timely development of future year USMC Concepts of Operations within Naval, Service, OSD and Joint force planning activities/studies and support subsequent analyses.**

**FY 2018 Defense Analytic Guidance (10 June 2016):**

**Develop NLT Winter 2016:**

**Scenario 3.1 Deny Excursion**

**Integrated Scenarios and CONOPS with coherent timelines and parameters framing the strategic environment for two directed force-sizing and shaping combinations.**

**Force-sizing and shaping criteria will be utilized for POM development, PPBE analysis, and assessments. Findings will be briefed at a DMAG preceding PBR-19.**

**Directed SSA Reform:**

**Senior Leadership Engagement**

**Degree of Consensus**

**Wargaming and Innovation**

**Analysis Sharing**



# Army Capabilities Integration Center (ARCIC) Engagement



**Description:** ARCIC develops concepts, learns, and integrates capabilities to improve the Army and the effectiveness of the joint force. Lieutenant General H.R. McMasters, USA is the Director, ARCIC – his USMC counterpart is Deputy Commandant, Combat Development and Integration (DC, CD&I), HQMC.

## **Discussion:**

- Hampton Roads is responsible for coordinating support to and participation in ARCIC activities to include wargames, studies and analyses, experiments, exercises, demonstrations, etc.
- Maj Hoffman, USMC, EFD-HR, serves as the USMC Liaison Officer to ARCIC – he works full-time at ARCIC Headquarters (Bldg. 950), Ft. Eustis.
- The overarching framework that guides ARCIC activities is the Army's campaign of learning entitled Force 2025 and Beyond. Key aspects of this construct include:
  - Unified Quest (Army's Title 10 Wargame) & Unified Challenge (Experimentation)
  - Army Warfighting Assessment (AWA)
  - Army Capstone and Operating Concepts
  - Army Warfighting Challenges (AWfCs)



# NWDC/FFC Engagement

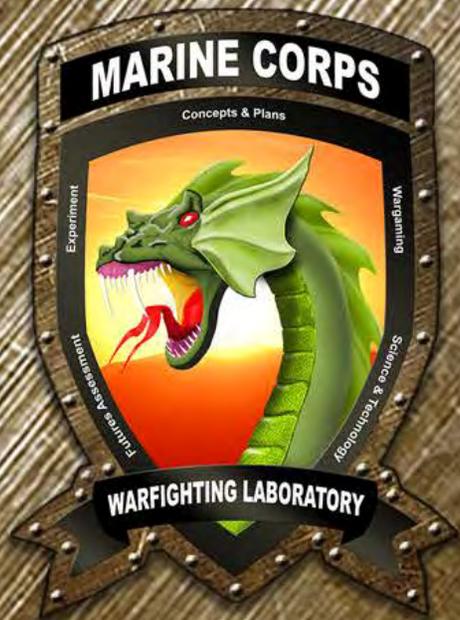


**Description:** Hampton Roads maintains an office at NWDC Headquarters (Bldg. 0-27), Naval Station Norfolk. The mission of the Expeditionary Warfare Collaborative Team (EWCT) is to coordinate Marine Corps support to and participation in NWDC/FFC naval integration activities to shape future expeditionary capabilities per Expeditionary Force 21.

## **Discussion:**

**-Major engagement activities include:**

- Concepts/CONOPS/TTPs: Littoral Ops in a Contested Environment, Multi-Service Seabasing CONOPS, Afloat Forward Staging Base, Joint High Speed Vessel, T-AKE**
- Exercises: BOLD ALLIGATOR, DAWN BLITZ, SSANG YONG**
- Wargames: LPD-17 C2, LHA/LHD Integration**
- Experimentation: Fleet Experimentation (FLEX) Campaign Plan, Alternative Platforms**
- Analyses: FFC-sponsored Warfighting Improvement Program (WIP)**



# Wargaming Division

***We drive the future of the Marine Corps***



# Expeditionary Warrior



**Description:** The Expeditionary Warrior (EW) series of wargames is conducted annually to explore issues deemed critical to the future of the Marine Corps. Previous iterations of the EW series highlighted issues associated with the deployment, employment, and sustainment of Marine Corps forces in the littorals.

**Purpose:** Examine emerging Marine Corps concepts and future force development with participants from across the Services, Combatant Commands, Joint Staff, Office of the Secretary of Defense, and multinational partners.

**End State:** EW provides CMC with insights and recommendations based on identified capability and capacity gaps and/or shortfalls.



# Marine Air-Ground Task Force (MAGTF) Warrior



**Description:** MAGTF Warrior (MW) is an annual wargame that looks at internal Marine Corps topics for future force development and can range from future challenges, concepts, and integration of emerging technology at the MAGTF level.

**Purpose:** MW 17 will tie in to Expeditionary Warrior 17 for force capabilities.

**End State:** MAGTF Warrior informs concepts, force capability.



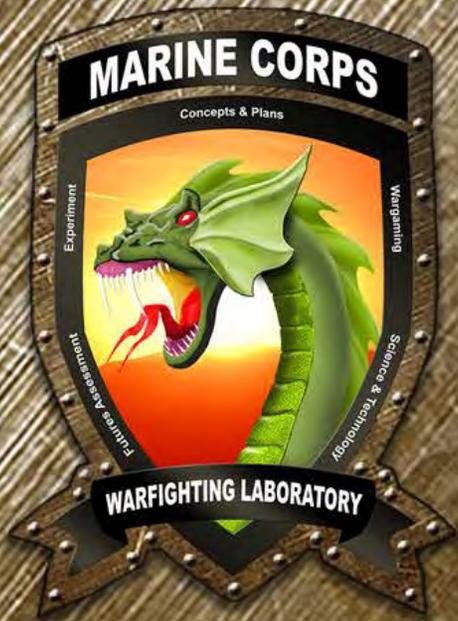
# Naval Services Game



**Description:** Naval Services Game (NSG) is an annual wargame that explores Navy and Marine Corps integration, in an effort to develop forward deployed Naval Forces with more integrated capabilities.

**Purpose:** Examine USMC integration in the Composite Warfare Commander (CWC) construct for the execution of sea control and power projection

**End State:** Develop insights for efficacy of USMC force integration into the USN CWC construct in a contested littoral environment



# Science & Technology Division

***We drive the future of the Marine Corps***



# Roles & Responsibilities

## **CG, MCWL / Futures Directorate:**

**MCWL / FD identifies future challenges and opportunities, develops warfighting concepts, and comprehensively explores options to inform the combat development process.**

## **Supporting roles and responsibilities:**

**-Experimentation & Technology Steering Group (ETSG)**

## **Vice Chief of Naval Research**

**-Serves as senior Marine Corps leader of the DoN Science & Technology (S&T) program after the Chief of Naval Research (CNR). Participates in top executive level financial and policy decision making with the CNR.**

**-S&T Program Execution at ONR**

**-USMC equities and alignment (all Codes throughout ONR)**

## **EA, Marine Corps S&T / S&T Proponent**

**-Establishes and coordinates USMC S&T objectives and prioritization**

**-Marine Corps Priorities & Alignment**

**-Marine Corps S&T Strategic Plan**

**-OST&E OAG Chair**

**-S&T Executive Steering Committee**

**-E2C Executive IPT Chair**

## **Represent DC, CD&I as the S&T Advocate**





# FY17-21 MCWL Projects (Aligned with Effort Lines)



## **Robotics and Autonomous Systems**

- Unmanned Tactical Autonomous Control and Collaboration (UTACC)
- Robotic Vehicle (Modular) (RV(M))
- Picatinny Pallet
- Intuitive Robotic Operator Control (IROC)
- Squad-X
- Expeditionary Drone Deployment System (EDDS)
- Tactical Robotic Controller (TRC)

## **21st Century Fires**

- 21st Century Fires ISO ELT
- Counter-UxS
- Stalker UAS

## **Intelligence Surveillance Reconnaissance**

- Computer Vision (formally Sensor Fusion)
- Tactically Exploited Reconnaissance Node (TERN)
- Robotics and Autonomous Systems Information Interoperability (RASI2) JCTD

## **Cyber / Electronic Warfare**

- Tactical Cyber / Electronic Warfare
- UAS in GPS Denied Environment (UGDE)

## **Expeditionary Logistics**

- Small Unit Water Purification (SUWP)
- Log in Transit Visibility
- Autonomous Littoral Connector (ALC)
- Tactical Air Delivery (TACAD)

## **Expeditionary Medicine**

- Resuscitative Care

## **Command and Control**

- MAGTF Integrated C2 (MIC2) MRZR

## **Force Protection**

- Integrated Explosive Hazard Detect / Defeat (IEHD2)
- MAGTF Signature Masking

## **Overarching Enabler Initiatives**

- Commercial Forecasting
- Marksmanship Technology Demonstration (MTD)



# Robotics and Autonomy Thrust Area



# Unmanned Tactical Control and Collaboration (UTACC)



**Description:** UTACC is a C2 framework that enables UxS's to act collaboratively, and team with manned operations, for ISR / RSTA. UTACC accepts mission-type orders for automated mission planning and executes the mission within the commanders intent. UTACC chooses how to best leverage the capabilities of each of a variety of UxS's, and dynamically re-plans in response to battlefield conditions. This is all done with only occasional user prompts, reducing the operator workload and allowing one-to-many control – putting Marines back into the fight.

**Purpose:** Conduct multi-UxS mission with minimal operator input. One operator controls many UxS's – without cognitive overload. Recognize and queue operator of intelligence requirements. Mission plan and execute ISR / RSTA mission as MUM-T.





# Picatinny Pallet



**Description:** Picatinny Pallet provides precision aerial resupply capability organic to maneuver units operating within complex and / or urban terrain, allowing units to reduce carried loads. Emergency use will provide critical supplies exactly when and where needed while minimizing manned system exposure to threat. This project will deliver prototypes capable of autonomous aerial resupply utilizing emerging commercial multi-rotor airframe technologies and will team with the NAVAIR Joint Tactical Aerial Cargo UAS program to adapt the Office of Naval Research Autonomous Aerial Cargo / Utility System for intelligent flight control.

**Purpose:** Reduce risk to personnel conducting manned resupply operations in contested terrain. Provide organic aerial resupply capability at the company level, which increases unit flexibility for conducting sustainment operations. Provide assured resupply for steady state and emergency operations that unburdens dismounted units over extended distances.



# Intuitive Robotic Operator Control (IROC)

Intuitive Robotic Control without a handheld controller

- Augmented Voice
- Hand Signals
- Haptic Sensors



**Description:** Demonstrate intuitive robotic control using Human Systems Interface Technologies (HSI). Operator – Robot interface more closely resembles human – human interface, enabler for organic squad robot, natural human control / communication without handheld controller.

- Leverage CRS Lessons Learned – Voice Command
- Hand Signals
- Haptic Sensors (touch) Control

**Purpose:** Conduct multi-UxS mission with minimal operator input, one operator controls many UxS's – without cognitive overload, recognize and queue operator of intelligence requirements, mission plan and execute ISR / RSTA mission as MUM-T.



# Participation in DARPA's Squad X



**Description:** Enable platoon and below to maneuver and distribute while maintaining the ability to fight concentrated and mass effects.

**Purpose:** Work with DARPA to explore – Precision Engagement – Enable the rifle squad to precisely engage threats out to 1,000 meters while maintaining compatibility with infantry weapon systems and human factors limitations. Non-Kinetic Engagement – Enable the rifle squad to disrupt enemy command and control, communications, and use of unmanned assets to ranges greater than 300 meters while maneuvering at a squad-relevant operational pace. Squad Sensing – Enable the rifle squad to detect line of sight and non-line of sight threats out to 1,000 meters while maneuvering at a squad-relevant operational pace. Squad Autonomy – Increase collaboration within Manned Unmanned Teaming along with enabling the rifle squad to improve their individual and collective localization accuracy to less than 6 meters in GPS denied environments through collaboration with unmanned systems maneuvering reliably in squad formations.



# Tactical Robotic Controller (TRC)



**Description:** A collaborative effort to support the developed common tactical controller for Battalion and below autonomous assets for joint Services (USMC, USN, USA). To provide support to current and planned robotic initiatives that lend themselves to control using this asset.

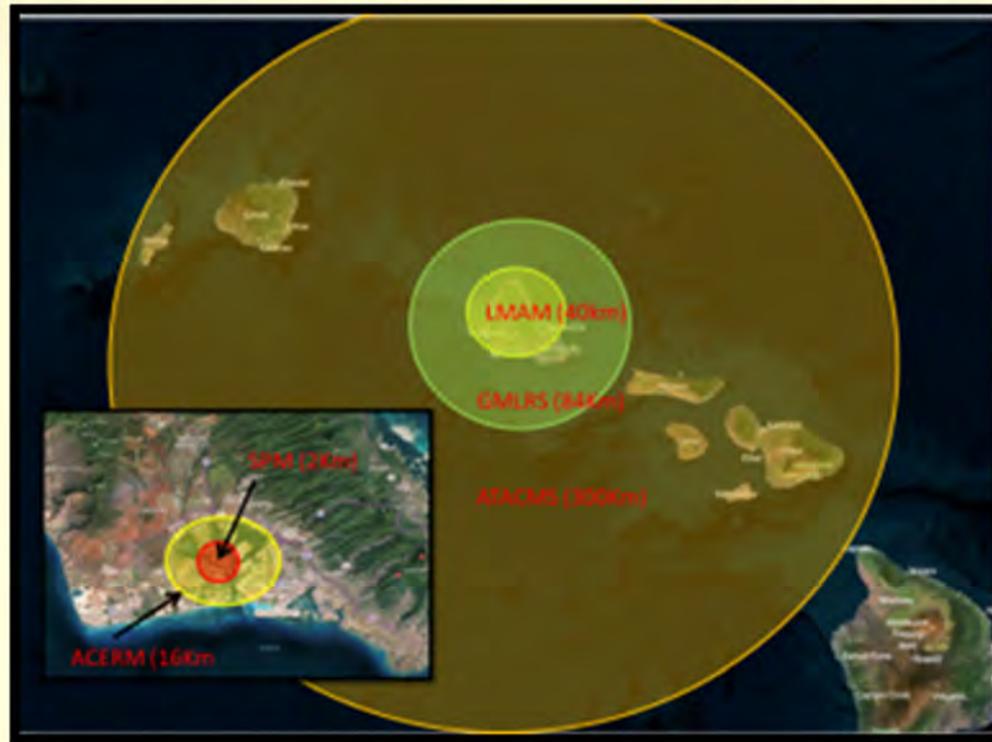
**Purpose:** To enable the small unit to display and control a myriad of sensor inputs in a fused network on a common controller for ISR, target identification and prosecution. To Lighten the Load of the MAGTF by reducing the number of operator control units required for operation of a combat formations organic unmanned assets, and providing a single end item requiring logistical support. To expand the TRC capability to encompass and shorten the sensor to shooter continuum by providing the small unit with a common capability to monitor, task, and / or control Reconnaissance, Surveillance, and Target Acquisition (RSTA) assets of the CLT.



# 21st Century Fires Thrust Areas



# 21st Century Fires ISO ELT



**Description:** Provide ELT with suite of munitions that provide robust, responsive, and accurate fires for distributed operations.

**Purpose:** Determine weapons and equipment in order to provide organic fire support to ELT. Conduct target acquisition and prosecution from UxS platforms. Determine airspace / cyber / FS coordination considerations. Determine manpower, logistics, and training implications. Determine NSFS requirements and technical solutions.



# Counter Unmanned Systems (CUxS)



**Description:** Develop an integrated, expeditionary suite of networked capabilities to detect, identify, track, cue, and kinetically or non-kinetically prosecute enemy unmanned air, ground, and surface / sub-surface systems.

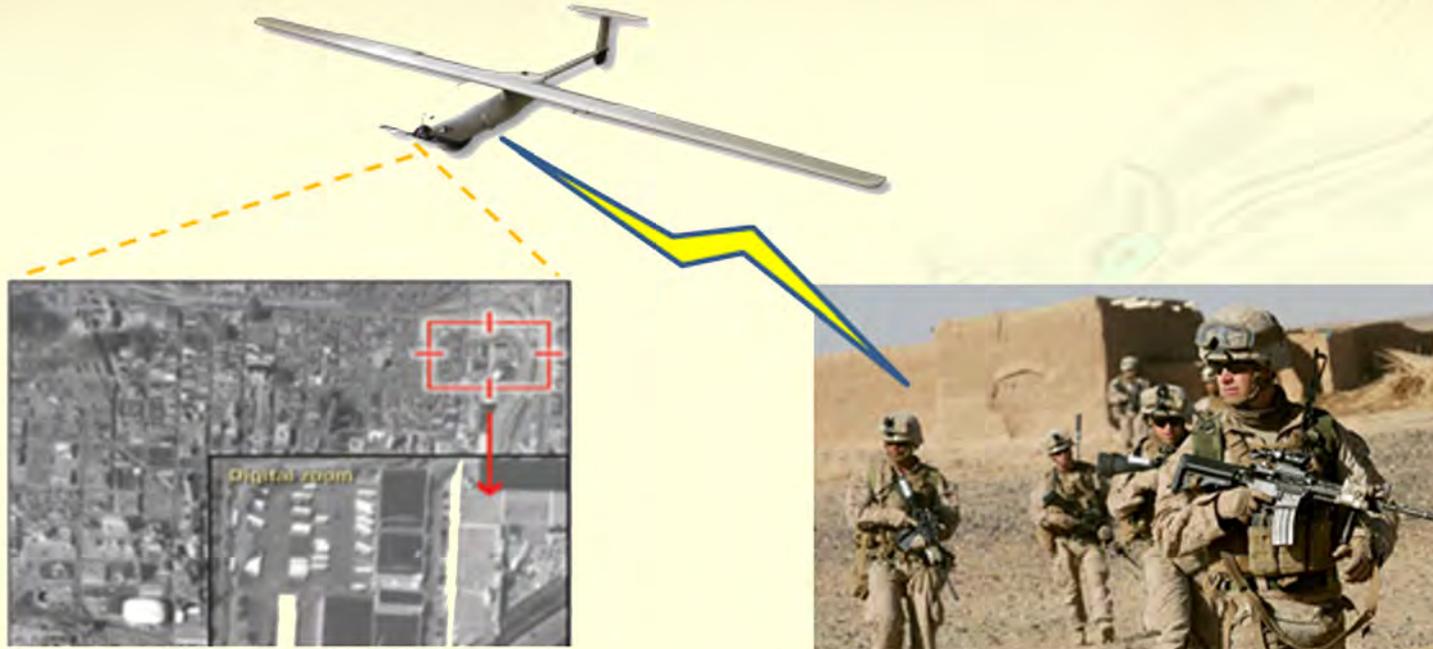
**Purpose:** Demonstrate the ability to execute an end-to-end C-UAS killchain in a distributed operational environment.



# **Intelligence Surveillance and Reconnaissance Thrust Area**



# Computer Vision on Small UAS



Computer Vision

Alert Supported Unit of Detection

**Description:** Develop interfaces that analyzes image data to find and alert small units of information critical to a small unit's mission, such as people holding weapons, white trucks or other things of interest to the small unit. The system will identify the items and send alerts to the unit's leader asking for confirmation of alert and follow on orders, such as continue to prosecute target, move to a specific location or move to next named area of interest in preprogrammed mission route.

**Purpose:** Enable squad, platoon, and company-level echelons with a multi-functional organic aviation platform capable of automated ISR, target designation, and support of kinetic and non-kinetic effects.



# Participation in DARPA's Tactically Exploited Reconnaissance Node (TERN)

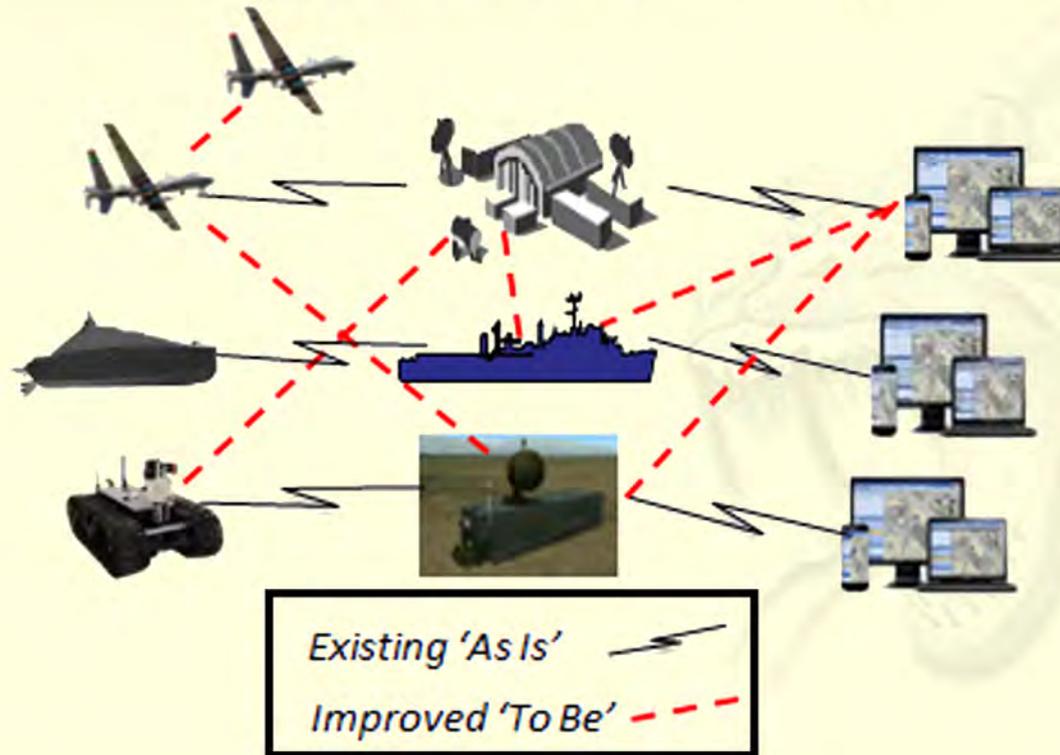


**Description:** Demonstrate an unmanned VTOL vehicle that provides the amphibious Marine Air Ground Task Force (MAGTF) with an organic capability for unmanned persistent Shipborne ISR, Electronic Warfare, Digital Interoperability and Kinetic Strike Capability.

**Purpose:** Design and build a demonstration vehicle. Integrate TERN development into MQ-X UAS roadmap for deployment in 2024.



# Robotic and Autonomous Systems Information Interoperability (RASI2 JCTD)



**Description:** RASI2 will align existing Service programs by using the National Information Exchange Model (NIEM)-conformant standardized data exchange method for creating automated, machine-to-machine information exchanges across Service and functional robotic and autonomous systems.

**Purpose:** The RASI2 effort goal is to implement NIEM-conformant, XML data exchanges by developing software tools used to exchange standardized data; by producing enabling artifacts on data exchanges to Programs of Record (POR); and by coordinating cross-Service, cross-functional use of standardized data exchanges. The effort will provide baseline system specifications, technical and prototype demonstration results, Certification & Accreditation artifacts, architecture Operational Views and Systems Views (Ovs / SVs), and Test Reports.



# Cyber / Electronic Warfare Thrust Area



# Tactical Cyber / Electronic Warfare

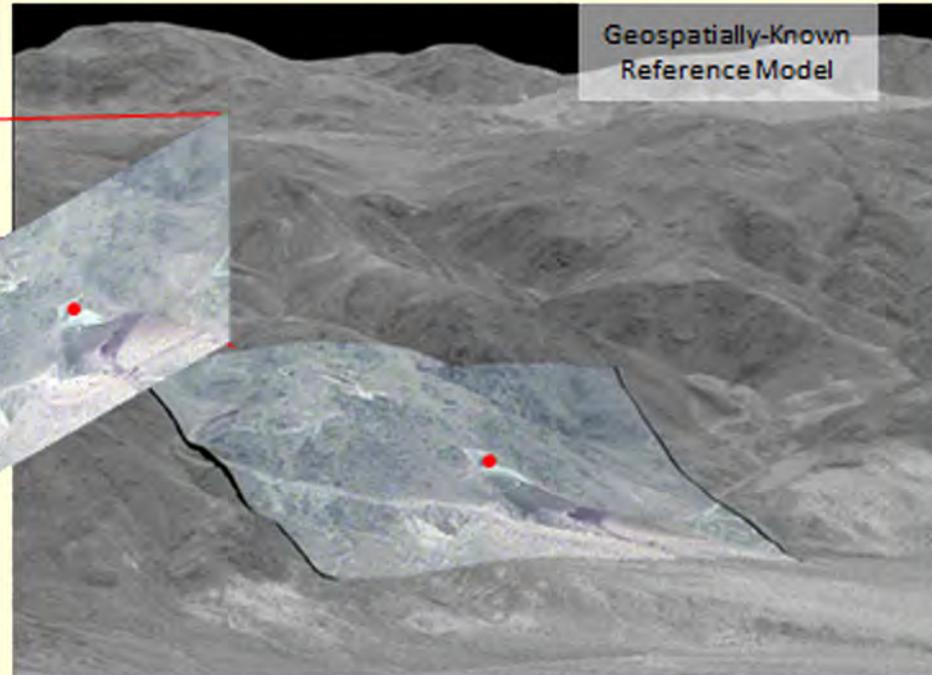


**Description:** Tactical Cyber / EW will facilitate the seamless flow of Cyber (DODIN Ops, DCO, OCO) and EW (ES, EP, EA) capabilities to the individual dismounted Marine, on-the-move and over-the-horizon; and back to every level of command.

**Purpose:** Develop EWSA-TSOA-JTCW-JBCP-KILLSWITCH integration and demonstration at a tactical level in a live force scenario, integrate DARPA's RadioMap in COC and mobile environment, demonstrate organic EA, ES, and DF (Direction Finding), and demonstrate DARPA's PlanX in a limited technical assessment.



# UAS in a GPS Denied Environment (UGDE)



**Description:** Unmanned systems rely heavily on Global Positioning Systems (GPS) for navigation and targeting / sensor operations. This project will provide the ability to conduct UAS operations in a GPS degraded or denied environment.

**Purpose:** Identify material solutions that enable UAS operations in a GPS denied or degraded environment, including hardware / software applications and alternative methods of navigation.



# Expeditionary Logistics Thrust Area



# Autonomous Littoral Connector (ALC)



**Description:** Utilize an autonomized connector to conduct littoral staging and autonomous resupply. This connector will autonomously provide operational and tactical maneuver from seabases in alignment with EF-21 concepts. ALC will develop and incorporate existing navigation and sensor perception capabilities (e.g. ACTUV, USV, Riverine, CARACaS), testing of autonomous systems which are integrated into a LCM-8 and development of autonomous surface craft CONOPS and TTPs.

**Purpose:** Autonomize a surrogate connector to deliver equipment, fuel or supplies from ship-to-shore and throughout the littoral environment ISO distributed operations and / or SPMAGTF operations. Explore the concepts associated with “Littoral Staging”.



# TACAD Supply Glider



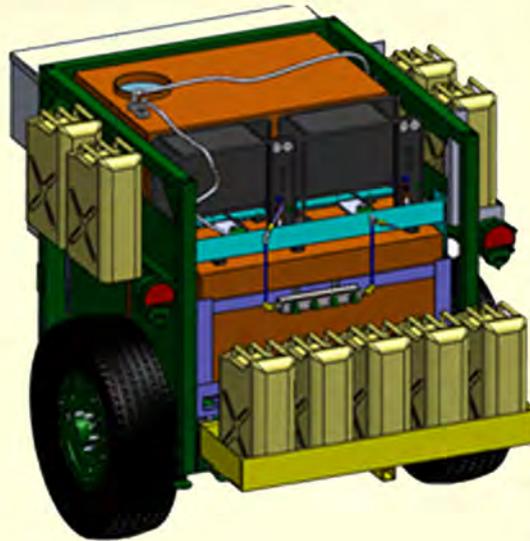
Yates ElectroSpace Silent Arrow

**Description:** Disposable cargo glider for standoff precision aerial resupply. Glider folds for transport and wings unfold after deployment. Can be either dropped from a sling or deployed via static line from internal transport.

**Purpose:** To demonstrate capability to deliver cargo to multiple resupply points from one rotary wing (manned or unmanned) mission, while minimizing parent aircraft flight time.



# Water Purification On Demand (POD)

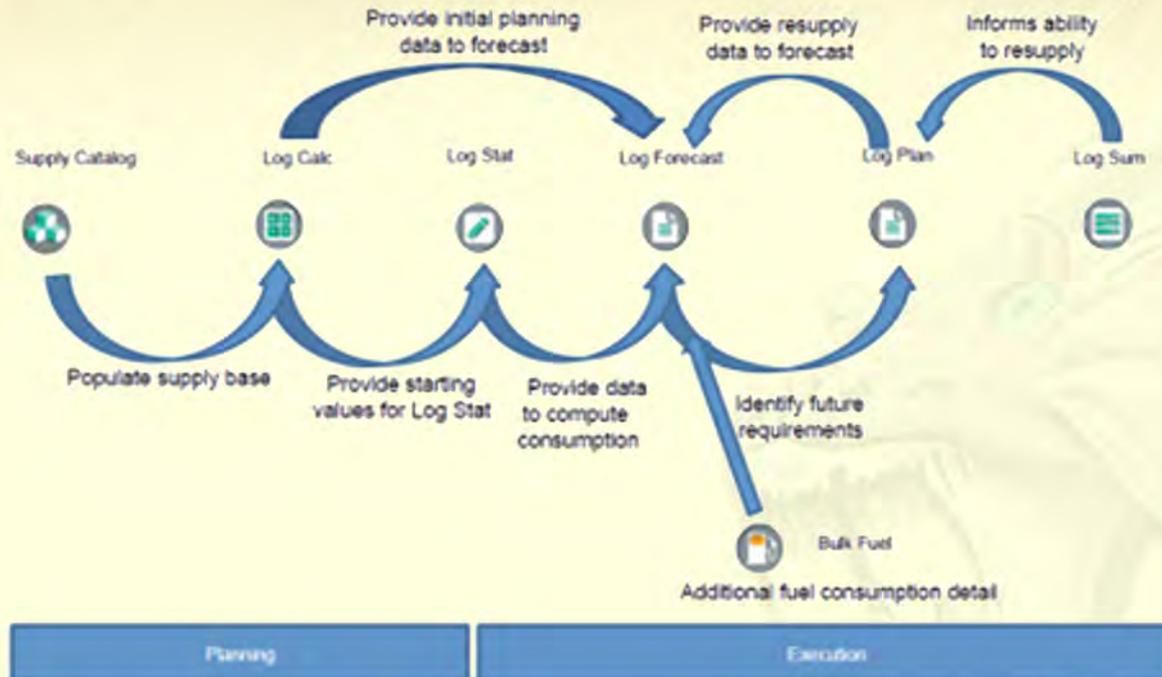


**Description:** Development of a family of fresh and salt water purification systems that directly supports distributed operations at the platoon, squad and fire team level. This family of system includes a platoon system mounted on a trailer, a backpack that supports a platoon and a handheld pump which supports a fire team of Marines. The concept of purification on demand (POD) informs the requirements for the platoon water purification system (PWPS) CPD, the individual water purification system (IWPS) ICD and is inline with EF-21 CONOPS. Water POD reduces ground resupply convoys and enables greater distribution capabilities to dismounted forces. POD necessitates highly mobile capabilities that sustains the warfighter without compromising mobility or lethality.

**Purpose:** Development of concepts of support and associated TTPs which enable rapid water extraction, bulk source water storage IOT reduce time on source, purification on the move, minimized footprint, improve transportability options, and reduce electrical power requirements.



# Logistics In-Transit Visibility (LITV)



**Description:** This program is a logistics planning and execution tool that is the culmination of calculating mission requirements and marrying up trained personnel with available equipment in order to determine a units transportation capabilities and remaining capacity. Additionally, it incorporates the development of multiple function based applications which facilitate horizontal and vertical information sharing (I.e. Dispatch, Operations Sections, Convoy Commander as well as Higher, Adjacent and Supporting / Supported Commands) in support of logistics assets visibility and transportation operations. This includes the integration of real-time logistical information from transportation assets with operational necessities in support of specified missions as determined required by tasking authorities. By automating some logistical calculations and monitoring functions, unit commanders are enabled to make command and control decisions faster based on real time logistical information and determine the most efficient use of limited assets.

**Purpose:** Inform requirements concerning development of logistical Common Operational Picture (COP) in near real time IOT reinforce commanders situational awareness of their distribution of forces, assets availability, decrease parts latency in the supply chain and enable greater C2 of assets as best supporting the CONOPS.



# Expeditionary Medicine Thrust Area



# Resuscitative Care



**Description:** In EF-21 scenarios, the time that casualties are held on the ground and the time required to transport them back to the seabase will increase dramatically. This leads to the necessity of investigating resuscitative care and holding technologies, en route care technologies, casualty surrogates / simulators, and casualty movement technologies.

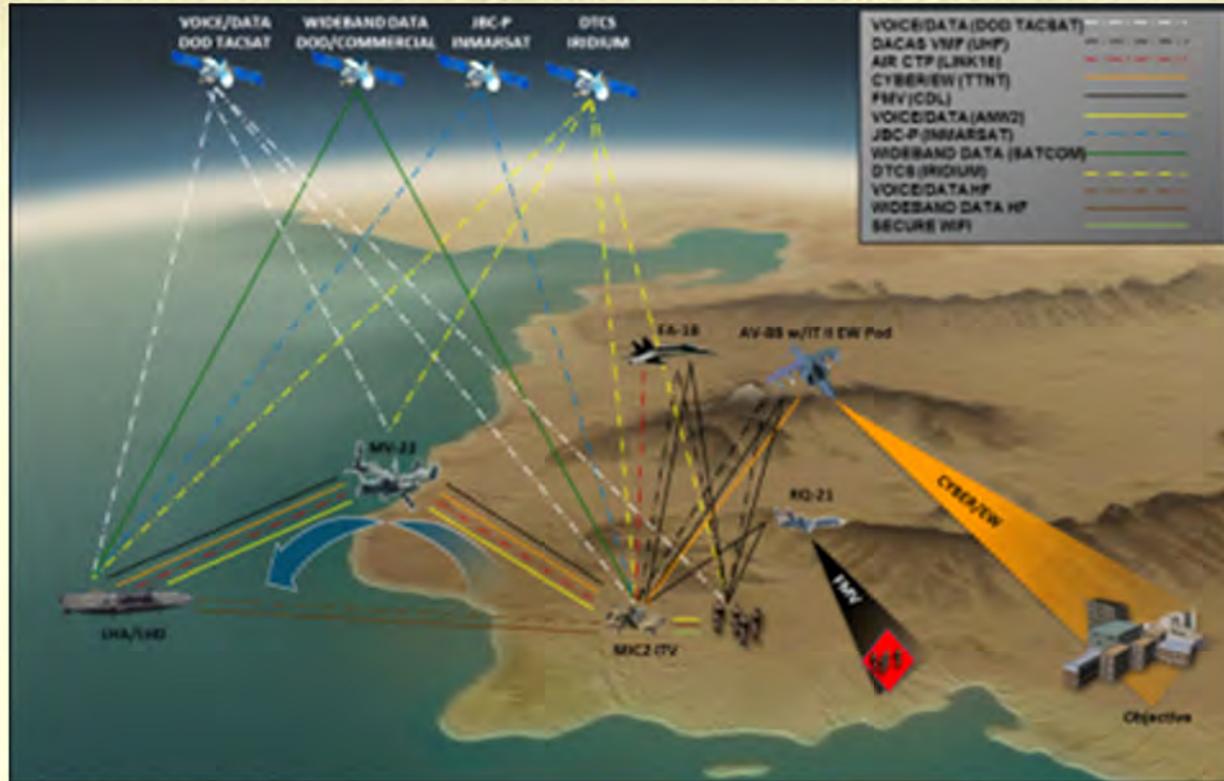
**Purpose:** If casualties, who are between levels of care, are moved and monitored more effectively, the probability of survivability will improve. Identify and test current and / or future medical technologies to enhance survivability, with resuscitative care, while holding patients (ashore and afloat) and to facilitate CASEVAC.



# **MAGTF Command and Control Thrust Area**



# MAGTF Integrated C2



**Description:** MAGTF IC2 will be a black core, service-oriented, IP-based network with open architecture that allows voice, data and full motion video sharing down to the individual Marine and at every level of command. The system will support multiple applications to allow effective awareness and communication across every warfighting function, over-the-horizon, on-the-move and within amphibious ships. The system will function in a variety of operational environments, to include the mega-city, the jungle, the open desert and mountains.

**Purpose:** Merge IC2 and NOTM ITVs into single platform, investigate RF signature reduction, integrate “Minotaur” with KILLSWITCH, and provide ACCESS for long range communications.



# Force Protection Thrust Area





# Integrated Explosive Hazard Detection / Defeat (IEHD2) “Honey Badger”



**Description:** Short-range active interrogation system was designed and successfully tested to non-invasively determine existence of explosives through solid mediums while under water with very high probability. Can be easily modified to operate in open-air for confirmation of IEDs / mines without disturbing them.

**Technical Approach:** Technique uses a neutron emitter that produces gamma particles when explosive material is present. Capability enables maneuverability through conformation of IEDs / mines existence without putting Marines in harms way or disrupting the threat.

**Purpose:** Modify interrogation system to operate in open air and scale to fit on a Talon robot, while maintaining a near 100% determination confidence.



# MAGTF Signature Masking



**Description:** To develop technologies which will either mask signatures generated by MAGTF elements across the signature spectrum (seismic, aural, electronic, or visual) or will enable the MAGTF to deceive adversaries as to the true point of engagement.

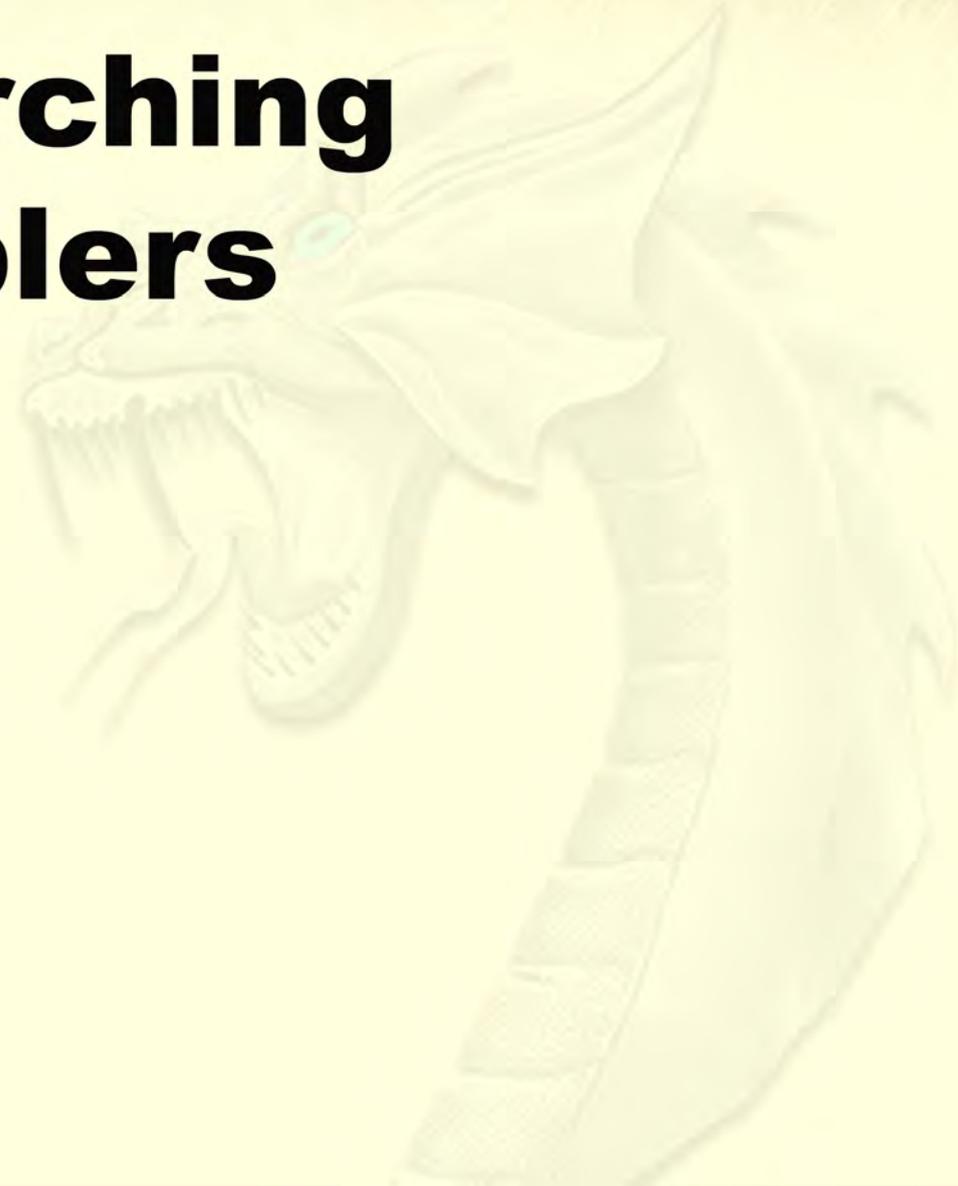
**Technical Approach:** As technologies are perfected systems would be integrated together to increase functionality.

**Purpose:** Achieve “cloaking” capabilities for each type of perception available to adversaries on the modern battlefield.

**End State:** FY17 effort will develop thermal and visual (human) camouflage system for a two man fighting position.



# Overarching Enablers





# Commercial Forecasting



**Description:** Provides a means to ensure proactive awareness and leverage of foreseeable developments in commercial technologies in support of MCWL and CDD missions.

**Goal(s) / Objective(s):** Identify commercial innovations which will impact future Marine Corps capabilities and leverage commercial dual use investments to preserve military S&T resources.

**Technical Approach:** Provides a planned and / or, "on-call" analytic resource that conducts deep market research in specific topic areas (as requested by MCWL) and identifies multiple solutions from non-traditional sources and markets, as well as recommendations to develop specific solutions.

**End State:** Commercial Forecasting provides the USMC with insights and recommendations for future experimentation based on technology developed by the commercial industry and academia.



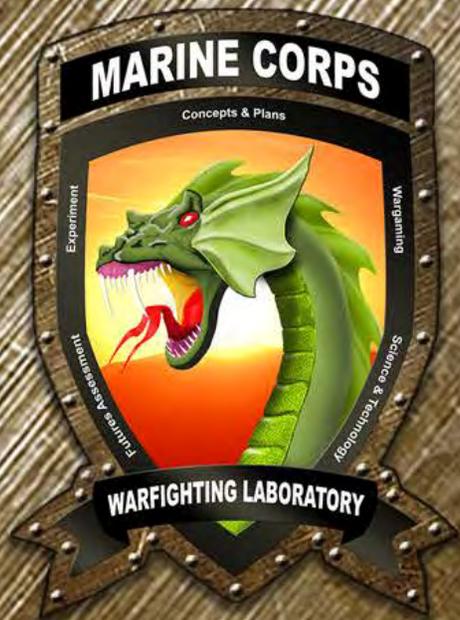
# Marksmanship Technology Demonstration



**Description:** Demonstration and further development of small arms and small arms training technologies.

**Goal(s) / Objective(s):** A regularly scheduled event to assess, test, and draft requirements documents to address marksmanship capability gaps.

**Technical Approach:** The assessment of potential science and technology solutions to identified marksmanship capability gaps, in order to properly define requirements documents and submit needs statements.



# Experiment Division

***We drive the future of the Marine Corps***



# Sea Dragon 2025



**Description:** Sea Dragon 2025 (SD25) is an iterative approach designed to address the Commandant's guidance to assess the Marine Corps Force 2025 Table of Organization and Equipment (T/O&E) of the next generation Marine infantry battalion which will be selected in 2016 in the context of MEU MAGTF. Through a series of live-force, limited objective experiments during scheduled pre-deployment training program events, MCWL in partnerships with operating forces and training establishments, will progress Marine Corps Force 2025 development and understand its impacts upon METs and GFM requirements.

**Goal(s)/Objective(s):**

**Assess the influence and challenges attributable to the MCF 25 re-structuring of the infantry battalion.**

**Identify potential DOTMLPF implications and associated recommendations for implementation of MCF 25.**



# Capability Development Team Events 2017



**Description:** CDTs will consist of small groups of personnel from MCWL and other outside SMEs who will arrange to gain access to exercises on a not to interfere basis. There will be no experiment design or scenario requirements levied on the exercise forces. This initiative includes for both execution of the CDTs for the targeted exercise and other travel needed to coordinate accommodation of the CDTs with the host units.

## **Goal(s)/Objective(s):**

- 1. Provide a source of data to identify capability gaps, potential solutions, and input to CONOPS related to emerging warfighting concepts.**
- 2. Provide data collection opportunities focused on specific warfighting challenges related to follow-on experiments.**
- 3. Enable collaboration with operating forces that supports future integration of experimentation with host units and within specific exercises.**



# LOE 1/18.2 Army Warfighting Assessment 18.1



**Description:** AWA is the U.S. Army Training and Doctrine Command's (TRADOC's) premier Joint annual warfighting readiness event. It is conducted in a single, integrated venue at Fort Bliss, TX, White Sands Missile Range, and Holloman Air Force Base.

## **Goal(s)/Objective(s):**

**Assess potential opportunities for USMC experimentation in future AWAs.**

**Observe and evaluate US Army capabilities in the areas of IW/cyber capabilities, Joint and Coalition C2 systems, autonomous systems, logistics demand reduction, fires and maneuver.**

**Evaluate requirements for a successful integration of USMC experimentation in subsequent AWAs.**

**Provide USMC force scenario input to the joint and coalition force participants.**



# Alternative Platforms LOE 1/18.3 (Bold Alligator 2017)



**Description:** BA-17 is an East Coast joint forcible entry amphibious landing exercise. This experiment will focus on developing sustained sea-based operations from an alternative platform.

**Goal(s)/Objective(s):**

**Embark the MEB LCE command element aboard the SS Wright and conduct C2 of LCE units ashore from the ship.**

**Embark and employ an Air/Ground Integrated Intermediate Logistics Element (AGIILE) aboard the SS Wright to give the MEB a robust intermediate logistics capability**

**Embark and assess a containerized medical suite capable of providing limited Role 2 care.**

**Embark and assess a containerized forensics exploitation module to support forces ashore.**

**Experiment with lightweight Lift-on / Lift-off surface connectors to move units or sustainment ashore.**

**Assess the ability of the ATF to protect the SS Wright in an A2/AD environment, and the operational impacts to the MAGTF commander that such protection necessarily entails.**



# Bold Alligator 17 DCO URBAN EX



## Description of Event:

BA provides an opportunity to integrate DCO Urban Development into an existing OPFOR Exercise. This scenario seeks to experiment with small boat insertion leveraging existing capability resident within the NECC. This will provide alternate method of insertion of a company sized element projecting force over the horizon and effect penetration into an urban littoral. The Camp Lejeune MOUT site will facilitate this experiment event and will reduce resource intensity given its proximity to MCWL and NECC.

## Possible Objectives:

1. Enhance the capabilities of infantry units to conduct DCO.
2. Develop and evaluate the practicality of using small boats to land a company sized landing force.
3. Identify limitation and capabilities of NECC small boats to land a company sized force from the sea-base
4. Evaluate the suitability and impact of using small boats to move casualties back to the CRTS.
5. Develop and evaluate planning considerations to integrate an NECC small boat detachment with the MAGTF
6. Develop and evaluate urban specific TTPs and the required training
7. Assessment of POR and experimental C2 systems in an urban environment to include communications in subterranean areas.
8. Evaluate the impact of experimental medical capabilities to provide enhanced care at or near the POI.
9. Assess the tactical advantages, disadvantages of unmanned air and ground systems in support of distributed company operations in urban terrain.
10. Assess the ability to detect and defeat enemy unmanned systems.
11. Evaluate the impact of OTK technologies and processes to compress the intelligence cycle and provide more responsive intelligence to tactical landing force elements.
12. Evaluate the impact of specified LDR technologies on the sustainment requirements for distributed company operations.

