

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

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|---|--------------------|---|-----------------------------------|---|--|
| 1. REPORT DATE (DD-MM-YYYY) 26042016 | | 2. REPORT TYPE Master's of Military Studies | | 3. DATES COVERED (From - To) SEP 2015 - APR 2016 | |
| 4. TITLE AND SUBTITLE Fires in the Future Operating Environment: The Case for Distributed Artillery Operations | | | | 5a. CONTRACT NUMBER N/A | |
| | | | | 5b. GRANT NUMBER N/A | |
| | | | | 5c. PROGRAM ELEMENT NUMBER N/A | |
| 6. AUTHOR(S) Sharber Jr., Morris, M, Major, USMC | | | | 5d. PROJECT NUMBER N/A | |
| | | | | 5e. TASK NUMBER N/A | |
| | | | | 5f. WORK UNIT NUMBER N/A | |
| 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) USMC Command and Staff College Marine Corps University 2076 South Street | | | | 8. PERFORMING ORGANIZATION REPORT NUMBER N/A | |
| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) | | | | 10. SPONSOR/MONITOR'S ACRONYM(S) Donald F. Bittner, Ph.D. | |
| | | | | 11. SPONSOR/MONITOR'S REPORT NUMBER(S) N/A | |
| 12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release, distribution unlimited. | | | | | |
| 13. SUPPLEMENTARY NOTES | | | | | |
| 14. ABSTRACT Expeditionary Force 21 is the Marine Corps's capstone concept intended to position the service to respond to the uncertainty and complexity of the future-operating environment. This paper attempts to understand the future operating environment described by Expeditionary Force 21 and identify the requirements for Marine artillery to support an ambitious concept with recent reductions of fire support capacity. Artillery faces the challenge of supporting distributed and enhanced company operations in the littorals during a time when artillery structure and end strength is at an institutional low. | | | | | |
| 15. SUBJECT TERMS Enhanced artillery operations; Distributed artillery; EF-21; Expeditionary Force 21; Distributed Operations; Enhanced Company Operations; Marine artillery; Enhanced Company Operations | | | | | |
| 16. SECURITY CLASSIFICATION OF: | | | 17. LIMITATION OF ABSTRACT | 18. NUMBER OF PAGES | 19a. NAME OF RESPONSIBLE PERSON |
| a. REPORT | b. ABSTRACT | c. THIS PAGE | | | USMC Command and Staff College |
| Unclass | Unclass | Unclass | UU | 40 | 19b. TELEPHONE NUMBER (Include area code) (703) 784-3330 |

United States Marine Corps
Command and Staff College
Marine Corps University
2076 South Street
Marine Corps Combat Development Command
Quantico, Virginia 22134-5068

MASTER OF MILITARY STUDIES

TITLE:

*FIRES IN THE FUTURE OPERATING ENVIRONMENT: THE CASE FOR ENHANCED
ARTILLERY OPERATIONS*


SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF MILITARY STUDIES

AUTHOR:

MAJOR M. MCDANIEL SHARBER JR.

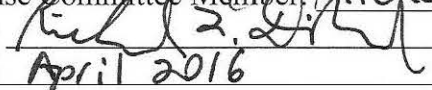
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Mentor and Oral Defense Committee Member: Donald F. Bitner, Ph.D., Professor Emeritus,
Marine Corps University

Approved: 

Date: 26 April 2016

Oral Defense Committee Member: 

Approved: 

Date: 26 April 2016

Executive Summary

Title: Fires in the Future Operating Environment: The Case for Enhanced Artillery Operations

Author: Major Morris McDaniel Sharber Jr, United States Marine Corps

Thesis: Marine Corps artillery requires modernization across the scope of its doctrine, organization, training, materiel, leadership, education, personnel and facilities (DOTMLPF) to institutionalize the requisite capacity to support distributed operations within the future operating environment described within *Expeditionary Force 21*.

Discussion: With the cessation of major combat hostilities in Iraq and Afghanistan, the Marine Corps faces a rapidly evolving security environment and a significant shift from recent operational commitments. These changes come at a time of fiscal austerity, thereby limiting the means available to address these future security challenges. *Expeditionary Force 21* is the Marine Corps's capstone concept intended to position the service to respond to the uncertainty and complexity of the future operating environment. This paper attempts to understand the future operating environment described by *Expeditionary Force 21* and identify the requirements for Marine artillery to support an ambitious concept with recent reductions of fire support capacity.

The challenges expressed in *Expeditionary Force 21* represent a shift in the employment model of the Marine Corps, requiring the increased deployment of forward postured, geographically distributed, maneuver formations in non-contiguous battle space and by extension require parallel changes to Marine artillery. Supporting these enhanced maneuver operations will require similarly flexible and responsive fire support units to enhance the lethality of the Marine rifle company.

Marine artillery faces the challenge of supporting distributed and enhanced company operations in the littorals during a time when artillery structure and end strength is at an institutional low. *Expeditionary Force 21* challenges the notions of centralized employment and deployment of fires, reinforced by the growing capabilities of available munitions that offer increased range and precision. This paper further explores the changes necessary to successfully support *Expeditionary Force 21* through the lens of doctrine, organization, training, materiel, leadership and education, personnel, and facilities. Increasing Marine artillery's capability and capacity to answer *Expeditionary Force 21's* challenges require what this paper calls enhanced artillery operations.

Conclusion: Marine artillery is well positioned to meet the demands of the future operating environment envisioned in *Expeditionary Force 21*, but it must resist the trend towards blind adherence to traditionalism. As the triad of fires redefined the capabilities of Marine artillery, *Expeditionary Force 21* redefines the requirements for fire support. Embracing the widest application of the framework provided by current artillery doctrine, organization, training, and manning while focusing on *Expeditionary Force 21's* requirements reveals a need to modernize the system. Marine artillery must invest in modifications to training, organizing, manning, and equipping to facilitate decentralizing command and control capabilities, the diffusion of sustainment, and enhancing the support capabilities from the battalion to the battery in order to enable enhanced artillery operations responsive to the future operating environment.

DISCLAIMER

THE OPINIONS AND CONCLUSIONS EXPRESSED HEREIN ARE THOSE OF THE INDIVIDUAL STUDENT AUTHOR AND DO NOT NECESSARILY REPRESENT THE VIEWS OF EITHER THE MARINE CORPS COMMAND AND STAFF COLLEGE OR ANY OTHER GOVERNMENTAL AGENCY. REFERENCES TO THIS STUDY SHOULD INCLUDE THE FOREGOING STATEMENT.

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Preface

My interest in Marine artillery's evolution springs from a desire to research a contemporary and fundamental question for the future of ground fire support: how will Marine Artillery adapt itself to address the future operating environment and keep pace with the evolving infantry? Is artillery trained, manned, and equipped to support an evolving ground combat element, and what changes if any are needed across the spectrum of doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF)? This topic is important as the Marine Corps looks to evolve and remain America's expeditionary force in readiness. If Marine artillery is to move fire support employment into the ensuing decade, it must do so with the customer in mind.

Leaders in Marine Corps artillery have long held the artillery battalion as sacrosanct and the smallest unit that should be assigned a tactical mission. This position is doctrinal, and not merely anachronistic artillery dogma. However, this doctrine has been challenged extensively in the last fifteen years by artillery batteries conducting successful operations at home station and abroad. As the Marine Corps moves away from operations in Iraq and Afghanistan into the future operating environment, it is important to determine if going "back to the basics" will meet the future requirements across the spectrum of conflict or if something more radical is required.

This paper analyzes the impact of the future operating environment on Marine Corps artillery and the Marine Corps's answer to challenges expressed in *Expeditionary Force 21*. The myriad of future threats and the demands of *Expeditionary Force 21* require shifts in the Marine Corps's current operating concepts. In addition, *Expeditionary Force 21* requires Marine Air Ground Task Forces (MAGTF) to deploy and operate in a distributed manner with small,

flexible, task-organized forces prepared to dominate across the range of military operations (ROMO). Since distributed and enhanced operations are core competencies of the Marine Corps's evolving operational concept to address future operational challenges, an evaluation of how ground fires will support that force seems timely and necessary.

In studying the impact of the contemporary operating environment on Marine artillery and the Marine Corps's answer to those challenges as expressed in *Expeditionary Force 21*(EF-21), I hope to begin a dialogue on the necessity of distributed and enhanced battery operations for artillery to address future operational challenges. I do not intend to cover a comprehensive future artillery roadmap and will leave that to future research.

I would like to acknowledge the professional Marine artillerymen who have mentored me along the way: Colonel Joseph Russo, Colonel Chris Tavuchis, LtCol Michael Grice (retired), LtCol David Everly, my loving and supportive wife, Kristen M. Sharber for her time and patience with this process, and last, but not least, my MMS Mentor, Dr. Donald F. Bittner.

Introduction

We have atrophied our Marine ground fires inventory to a dangerous point. We're outgunned and out-ranged by just about everyone. So I am fixing the artillery-bringing robustness back to Marine artillery.¹

-General James L. Jones, USMC, "Fixing the Marine Artillery"

With those carefully articulated words, General James L. Jones, 32nd Commandant of the United States Marine Corps captured the effect of a fiscally constrained and uncertain future operating environment on Marine artillery and his intent to fix it. The current "triad of ground fires" is the result of Gen Jones' well researched plan to bring the robustness back to Marine artillery.² The "triad" provided the Marine Air Ground Task Force (MAGTF) commander with short, medium, and long range fire support systems as illustrated in the 120mm expeditionary fire support system (EFSS), the M777 lightweight 155mm howitzer with digital fire control system (DFCS), and the high-mobility artillery rocket system (HIMARS), respectively. These complementary systems provide fire support versatility to the problem of an uncertain operating environment enabling the commander to influence a myriad of target sets throughout his assigned battlespace.

Although the former commandant's words were spoken fifteen years ago, they could have easily been quoted from a speech today. The cessation of major combat operations in Iraq and Afghanistan brings the Marine Corps to a similar crossroads of a fiscally constrained and uncertain future operating environment. The Marine Corps must choose the path it will take with Marine artillery to address the next security challenge. Unlike fifteen years ago, contemporary combat operations have proven artillery's efficacy and versatility within the context of mobile, large scale, combat operations, like those conducted by 11th Marines during *Operation Iraqi*

Freedom, and in persistent and population-centric counterinsurgency operations in both *Operation Iraqi Freedom II* and *Operation Enduring Freedom*. The questions that lie ahead are less material and more conceptual. The Marine Corps must anticipate the future operating environment, in order to posture itself to meet its demands. Moreover, a question that begs asking is, how will Marine Artillery adapt to address the future operating environment and keep pace with the evolving MAGTF? Answering that question is a fundamental requirement as the Marine Corps moves forward into the unknown. Marine artillery will require updates to doctrine, training, manning, and equipping itself in order to keep pace with the demands of the future operating environment and operating concepts detailed in *Expeditionary Force 21*.

Future Operating Environment

Will the “complexity and rapid change characterized by the current strategic environment driven by globalization, the diffusion of technology, and demographic shifts” as described in the 2015 National Military Strategy (NMS) persist?³ Instead, will some other set of characteristics best characterize the future operating environment? Framing the future operational environment is an immense challenge, but a workable hypothesis is a prerequisite to future planning. Understanding the operating environment allows Marine Corps planners to estimate the types of missions likely to result from the operational reality and develop a concept to cope with those missions. These predictions on the future are always important but become crucial in an era of fiscal austerity and a drawdown of defense spending.⁴

Major Paul S. Oh, USA, an assistant professor at WestPoint, captured the inherent difficulty of framing the future operating environment in his 2009 essay, “Future Strategic Environment in an Era of Persistent Conflict.” While describing the immense challenge, Oh outlines the trends that will characterize the future operational environment: globalization, rise of

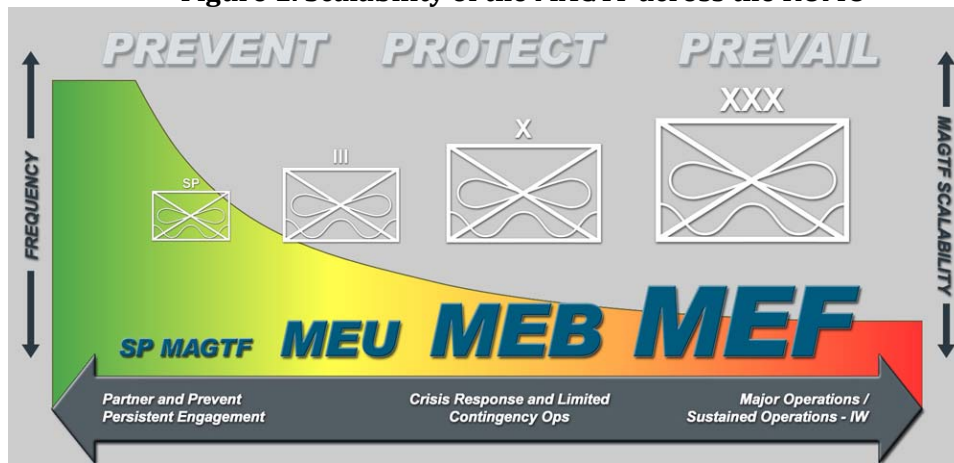
emerging powers, challenges to governance, non-state actors, competition for resources, and advances in technology.⁵ In response to this future strategic environment, MAJ. Oh predicts that, “the United States will most likely be involved in three types of missions: expeditionary warfare to manage violence and peace, defense of the command of the commons, and homeland defense.”⁶ The character of the future strategic environment and likely missions, as described by Oh, are similarly echoed in US strategic documents ranging from the 2015 National Security Strategy (NSS) to the National Military Strategy (NMS). The Marine Corps envisions that the future operating environment will be characterized by instability, complexity, and change. Moreover, globalization will continue to make the proliferation of ideas, goods, and increasingly lethal weapons accessible on the world stage.

The cross-domain superiority that the United States has enjoyed since the end of the Cold War will continue to be challenged as both state and non-state rivals acquire increasingly cost effective, yet lethal, means to challenge US power projection that threatens the status quo. This development is particularly relevant to the Marine Corps’s, Title 10, US Code role to “seize and defend advanced naval bases or lodgments.”⁷ Weapons systems such as anti-ship cruise missiles (ASCMs), mobile surface to air missiles (SAMs), and sea mines exemplify the types of anti-access, area denial (A2/AD) threats that the Marine Corps will face as the nation’s expeditionary force in readiness. The most likely battle-ground for an emerging crisis or threats is increasingly the urban littorals, defined loosely as the congested and diverse area where the sea and land merge. The Marine Corps bases this hypothesis on the fact that “eighty percent of the world’s population currently resides within 100 miles of the coastline-and the proportion is increasing.”⁸ As such, there is demographic and geographic evidence to support littoral action as a fixture of the future operating environment.

The Evolving Marine Corps

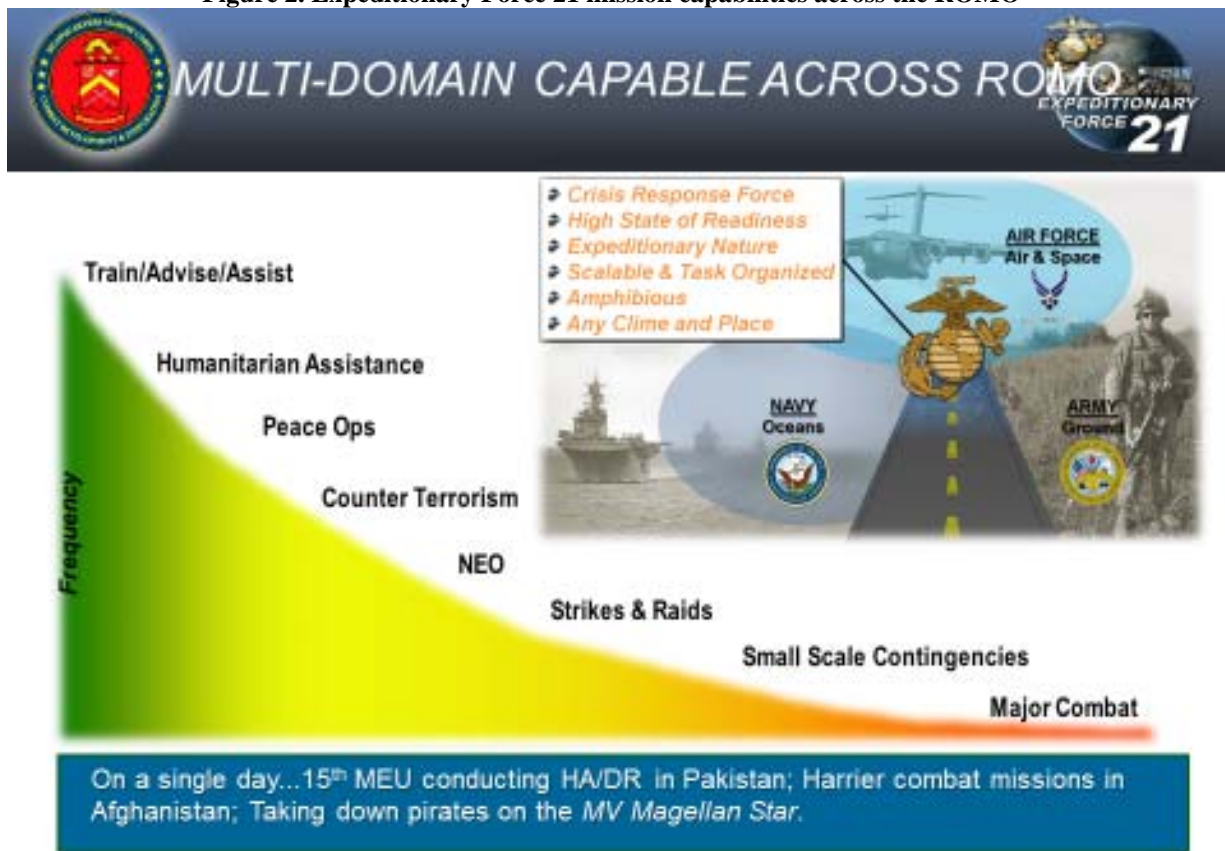
Changes in the future operating environment do not only challenge the status quo of Marine Corps operations for the last fifteen years, but they challenge the Marine Corps to evolve from its current operating models, tactics, and techniques to optimize itself to face future threats. The current operating environment has created an increasing demand for tailored forces to conduct theater security cooperation and ensure access prior to the start of a contingency or crisis well in excess of the established MEU cycle.⁹ Future demands are only going to increase in the face of an increasingly globalized world of ambiguous threats. Defeating these uncertain threats requires placing emphasis on intelligence, logistics, and fires as key enablers of operations designed to provide operational flexibility and shock.¹⁰ The NMS outlines a requirement for the Marine Corps to maintain the capability to operate throughout the continuum of conflict, enabling the joint force to deter, deny, defeat state actors or disrupt, degrade, defeat violent extremist organizations. *Expeditionary Force 21* postures the Marine Corps to do just that by optimizing the inherent flexibility of task organized Marine Air Ground Task Forces (MAGTFs), with dispersed forward deployed formations capable of action across the range of military operations (ROMO). Displayed below are examples of the scalability inherent within the MAGTF and of the types of missions arrayed across the ROMO. These figures illustrate that evolution does not equal a total change. The Marine Corps has been doing missions such as these throughout its history. The evolution comes by way of the creative manner the Marine Corps has chosen to address these contingencies.

Figure 1. Scalability of the MAGTF across the ROMO¹¹



Source: website, USMC Concepts and Programs
<https://marinecorpsconceptsandprograms.com/organizations/marine-air-ground-task-force/types-magtf>

Figure 2. Expeditionary Force 21 mission capabilities across the ROMO¹²



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Source: Expeditionary Force 21 Brief, April 2015, Marine Corps Combat Development Command

Expeditionary Force 21

For the Marine Corps to remain effective as the nation's forward-engaged and ready for crisis force, we must align how we operate with the conditions imposed by the evolving security environment.¹³

-MCCDC, *Expeditionary Force 21*

Expeditionary Force 21 is the Marine Corps's newest capstone concept, designed to address the hybrid threats of the future operating environment. It builds upon the previous concepts of ship to objective maneuver (STOM), Operational Maneuver from the Sea (OMFTS), and Seabasing.¹⁴ This concept will shape the Marine Corps's capabilities and concepts over the next ten years, posturing the Marine Corps to provide the Geographic Combatant Commanders a potent and adaptable middleweight force capable of response to demands across the ROMO.¹⁵ In order to understand *Expeditionary Force 21*, and appreciate its challenges for Marine artillery, it is essential to recognize the future operational environment as the principle catalyst for its creation. *Expeditionary Force 21* represents the Marine Corps's answer to an increasingly complex environment across the ROMO. For that reason, the Marine Corps required force optimization to enhance the scalability of the MAGTF. Similarly, in order to appreciate *Expeditionary Force 21*'s impact on Marine artillery, it is necessary to identify how this capstone concept intends to change the Marine Corps's current operational employment. *Expeditionary Force 21* provides guidance for concepts and capabilities for the next ten years, is nested within the national military strategy, and is centered on four lines of effort built to address uncertainty and aimed at optimizing support to the GCCs.¹⁶ In examining its major operational changes, those four lines of effort (LOEs) transcend any particular element of the MAGTF but that are present thought the concept.

Expeditionary Force 21's first LOE, refining the organization, maximizes the Marine Corps's ability to rapidly respond to geographic combatant commanders' needs by providing them with a regionally competent, scalable MAGTF capable of sustaining itself in austere environments. The second LOE increases the Marine Corps forward posture, placing one-third of the operating force available for tasking with operational reach across the globe.¹⁷ The third LOE comes in the form of increased naval integration with the operational staffs of the naval force.¹⁸ The final LOE seeks to maximize littoral maneuver with dispersed forces utilizing high-speed, long-range connectors.¹⁹ While all four lines of effort are integral to implementation of *Expeditionary Force 21*, refining the organization and adjusting its forward posture are the two LOEs that offer the largest shift in current employment of the force. Consequently, those lines of effort will have the most substantial impact on Marine Corps artillery.

Expeditionary Force 21's first line of effort, refining the organization, optimizes the Marine Corps for crisis response through refining the organization to meet future geographic combatant commander's (GCC) requirements. By leveraging the Marine Air Ground Task Force's (MAGTF) proven flexibility (see Figure 1 and 2), *Expeditionary Force 21* directs regional alignment and habitual relationships between Marine Expeditionary Forces (MEFs) and geographic combatant commands. The three MEFs were formerly the principal Marine Corps warfighting organizations, capable across the ROMO for up to sixty days. Under *Expeditionary Force 21*, the Marine Corps will evolve from three to two operational standing Marine Expeditionary Force (MEF) command elements with each MEF primary function being a headquarters and force-provider.²⁰ *Expeditionary Force 21* regards the MEB as the new principal warfighting force and main effort in force development.²¹ In this new role, the MEB Command Element (CE) is a scalable command and control node capable of deploying and employing

organically or compositing from Marine forces in the region. MEB CE will include establishing a JTF capable Headquarters.

The Marine Expeditionary Unit (MEU) is the standard crisis response, expeditionary, organization complementary to the MEB in forward presence throughout key regions and near global areas of interest. *Expeditionary Force 21* acknowledges that the utility and strength of the MEU is in its ability to respond to crises as an integrated MAGTF, while simultaneously pointing out that there may be advantage in split operations and greater interoperability on a variety of naval platforms.²² The number of activities and operations directed to the Special Purpose MAGTFs (SPMAGTFs) will increase exponentially due to their flexible units characterized by their small size and task-organization for the mission and rapid deployment timeline. *Expeditionary Force 21* describes the SPMAGTF operating as the primary theater security cooperation force, which can be either land based or embarked upon ship within a specific GCC's AOR. Overall, refining the organization of the Marine Corps, as outlined in *Expeditionary Force 21*, maximizes operational flexibility and provides modular forces capable of acting independently in the littorals or compositing within their assigned region to meet a crisis. It also challenges the current command and control architecture.

In addition to reorganizing the force, *Expeditionary Force 21* articulates a plan to employ more potent MAGTFs and adjusts the Marine Corps forward posture by placing one-third of its operating forces forward deployed and distributed within their regionally aligned areas of responsibility.²³ This posture represents a crucial shift in the Corp's contemporary concept of employment. The goal of such an aggressive forward posture is to provide the GCC with some distinct advantages and increased capacity for security cooperation around the globe, deterrence due to dramatically decreased crisis response time, and increased tactical flexibility. Supporting

this posture requires a manpower structure capable of maintaining a deployment-to-dwell ratio of 1:2 for the active component and a 1:4 for the reserve forces.²⁴

This structure will provide forces necessary to support each of the geographic combatant commands with a combination of MAGTFs tailored for operations within their respective areas. Specifically, the commanders of US European and US Africa Command will be supported by an organic sea-based MAGTF reinforced by the 2d MEB CE, capable of producing three ready MAGTFs.²⁵ CENTCOM will be supported by a rotational MEU and a SPMAGTF created for crisis response. PACOM remains supported by the organic forward deployed presence of 3d MEB CE. The remaining combatant commands have similar response support allocated to provide force for action across the ROMO. This new posture is its utility during crisis response. If a crisis occurs, the forces assigned will be capable of attacking the problem set from multiple vantage points and arrive on the scene with a working knowledge of that AOR. These forces also provide a robust command and control architecture to enable in introduction of larger task forces, maritime prepositioning (MPF) ships, or partner nations.²⁶ The flexibility inherent in this shift to capable and potent forces postured forward still relies on the ability of the Navy to project additional power to the point of crisis, and enable the compositing of logistical and combat power. This very fact is why *Expeditionary Force 21* places a premium on naval integration.

Expeditionary Force 21 Fire Support Requirement

Expeditionary Force 21 requires that artillery will continue to provide timely, close, accurate, and continuous fire support; shape the battlespace; and deliver offensive counter-fire to ensure the ground forces' freedom of action, as stated in Marine Corps Warfighting Publication (MCWP 3-16.1), *Artillery Operations*.²⁷ In addition, the concept requires five specified considerations that are applicable to Marine artillery (see Figure 3).

Figure 3. EF-21 Artillery Considerations

Expeditionary Force 21 Specified Requirements

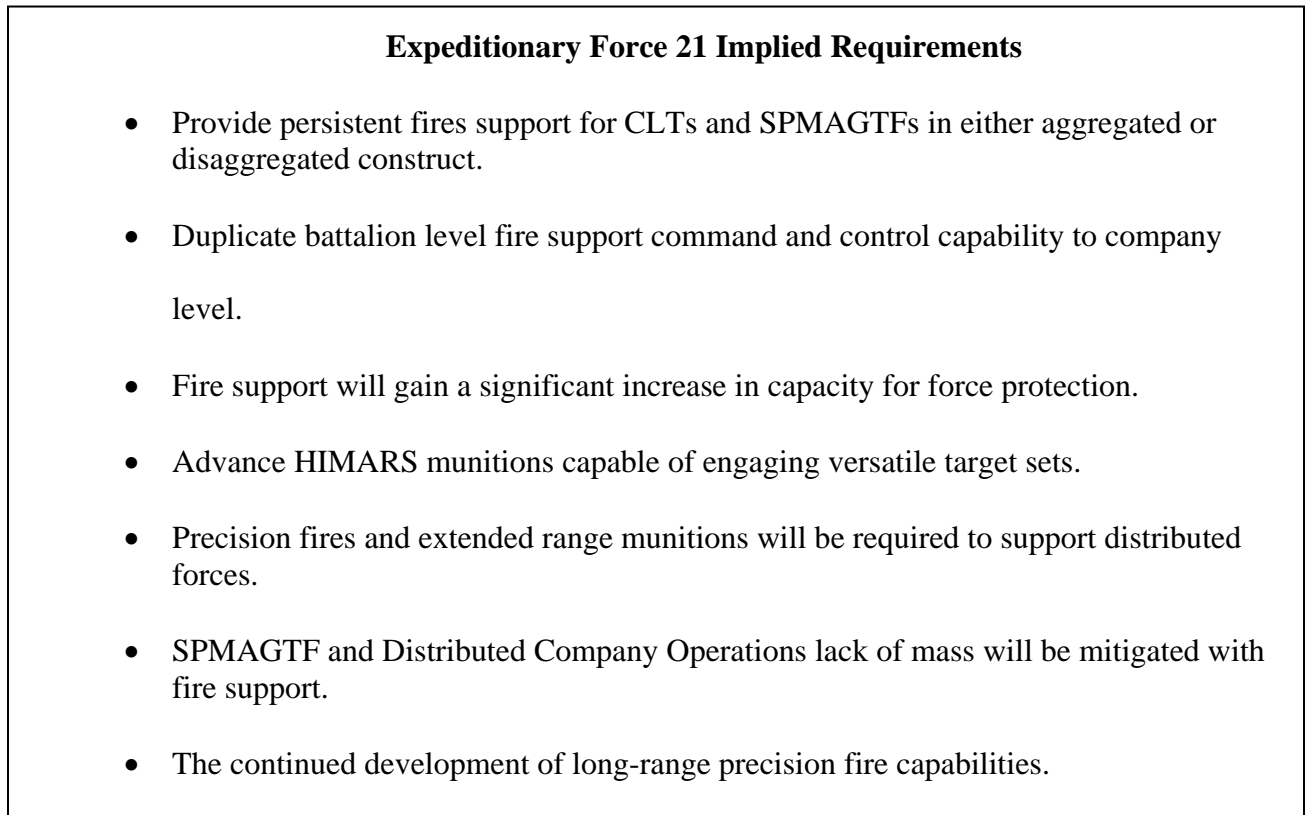
- The capability to employ HIMARS from distributed locations and naval platforms or surface connectors to support distributed maneuver.
- The continued development of long-range precision fire capabilities for the EFSS, the M777, and HIMARS from austere and expeditionary bases.
- Increased capability of sensors to provide a target location of useable accuracy.
- Increased capability from UAS to acquire targets, control fires, and deliver munitions.
- Enhanced ability to leverage joint fires in a timely manner from a distributed or concentrated force.

Source: *Expeditionary Force 21*, MCCDC.

These requirements capture key tasks outlining the necessary advancements of fire support capabilities to provide all-weather fire support to distributed formations. While these are the only tasks specified for artillery within *Expeditionary Force 21*, there are additional implied requirements that must be noted (see Figure 4), as they present significant challenges to the current paradigm. The most obvious implied task involves supporting SPMAGTFs or dispersed and disaggregated forces across the battlespace. Accomplishing this task will require fire support command and control structure capable of pushing battalion level authorities and permissions down to smaller units. It will require the similar ability for artillery battalions to be capable of breaking into small, semi-autonomous batteries and platoons. These formations will be required to provide tactical and technical fire direction, joint fire support, and terminal control. In addition to communications requirements, this semi-autonomous battery/platoon will need to be relatively

self-sustaining, which implies significant expansion in current logistics and maintenance capabilities.

Figure 4. EF-21 Implied Artillery Requirements



Source: *Expeditionary Force 21*, MCCDC.

Enhanced Company Operations (ECO) & SPMAGTF

Conventional wisdom tells us that the battalion is the smallest tactical formation capable of sustained independent operations; current operations tell us it's the company.²⁸

-General James T. Conway, USMC, "A Concept for Enhanced Company Operations"

Resourcing *Expeditionary Force 21* requires Marine artillery to respond to a shifting demand in evolving tactics, techniques, and procedures (TTPs) along with the rest of the ground

combat element (GCE). When analyzing the threats of the future operating environment, the requirements of the GCC, and the reality of manpower restraints, the Marine Corps's requirement for numerous adaptable forces becomes apparent. Two new tasks for Marine artillery result from this: enhanced company operations in the form of company landing teams (CLT) and SPMAGTFs. Responding to the needs of mobile and dispersed organizations requires an appreciation for these two concepts.

In 2008, Commandant of the Marine Corps, General James T. Conway sought to challenge conventional wisdom and initiate intellectual dialogue on a topic that had only received cursory attention at that time. He addressed this new concept in a *Marine Corps Gazette* article, titled "A Concept for Enhanced Company Operations (ECO)." In this piece, General Conway "describes an approach to the operational art that maximizes the tactical flexibility offered by true decentralized mission accomplishment, consistent with commander's intent, and facilitated by improved command and control, intelligence, logistics, and fires capabilities."²⁹ Enhanced Company Operations were born out of the reality of overseas contingency operations (OCO) and the requirement to optimize force structure by extending companies beyond the limits of mutual support with the purpose of distributing combat power over larger spaces. The resulting increase in distance from mutual supporting companies and the battalion headquarters meant increased autonomy and requirements for the company commander. General Conway asserted that "collective task and battlefield functions long the province of battalion commanders and their staffs have devolved to the company commander."³⁰ However, ECO promises more than a mere exigent response to past or current requirements. It offers the possibility of realizing the operational potential of decentralization.

This shift in operating concept has been experimented with since 2008, both ad-hoc and deliberately, real world and in training. *Expeditionary Force 21* aims to capitalize on the potential within enhanced company operations by “improving [the Marine Corps] ability to operate effectively in task-organized, distributed formations to counter growing threats from proliferating technologies that improve an enemy’s capabilities.”³¹ *Expeditionary Force 21* provides the blending of these concepts and repurposes the Special Purpose MAGTF (SPMAGTF) as a vehicle for both theater security and crisis response. Special Purpose MAGTF crisis response (SPMAGTF-CR) specifically provides a rotational, forward deployed, and land-based MAGTF task organized to conduct crisis response, contingency operations, and theater security cooperation. This force was conceived in the wake of the September 11, 2012 attacks in Benghazi, Libya, and a resulting analysis that highlighted the Marine Corps’s need for additional available forces for crisis response in excess of its rotational MEU deployments. SPMAGTFs are already employed within several geographic combatant commands with SPMAGTF-CR-AF as one of the best established.

These agile and geographically distributed SPMAGTF-CR elements will continue to have an increasing role as the Marine Corps’s contribution to the geographic combatant commander’s theater requirements. Although the SPMAGTF is purposefully built to fulfill a GCC’s theater security requirements, its dispersed forces provide ready units available to aggregate to respond to unpredicted crises or contingencies.³² These concepts are becoming a reality with SPMAGTFs committed to crisis response in NORTHCOM, SOUTHCOM, CENTCOM, EUCOM, and AFRICOM. These formations represent *Expeditionary Force 21*’s forward deployed and engaged operational construct, and a review of the table of organization reveals an alarming dearth of persistent ground fire support within these formations. Currently, there is a dangerous

over-reliance within the SPMAGTF and ECO construct on the air combat element to provide close air support, electronic warfare, assault support, and aerial reconnaissance with limited assets operating at the limits of their operational range.

What follows is an analysis of the ways that Marine artillery can position itself to fill that gap with complementary capable ground fire support forces. More extensive study across the DOTMLPF will be required to flesh out a comprehensive plan of action. This thesis aims to generate dialogue in the artillery community within each of these respective domains.

Doctrine

Since the Marine Corps adopted ground based fire support as the foundation of its combined arms doctrine, artillery has been inextricably linked to ground maneuver forces, specifically the infantry. Since Desert Storm, the relationship between artillery and infantry was arguably at its purest during the opening stages of *Operation Iraqi Freedom* (OIF). However, since 11th Marine Regiment facilitated I Marine Expeditionary Force's (MEF) rapid seizure of Baghdad in May 2003, later iterations of OIF and *Operation Enduring Freedom* (OEF) greatly disrupted this paradigm as the focus on lethality and kinetic strike were superseded by population-centric counterinsurgency (COIN). Counterinsurgency strategy required restraint, which meant limiting collateral damage and civilian casualties. As this trend continued, artillery units lost much of their relevance within the division. In a 2008 *Marine Corps Gazette* article titled "Resuscitating the King," Lieutenant Colonel Michael Grice captured this reality in his assertion that "the artillerists of the 10th, 11th, and 12th Marines found that they were no longer employing their units as Marine Corps doctrine postulated, but instead were the wells of souls ...for any and all nonstandard missions that were required."³³ In the same article, this renowned artilleryman with an intellectual reputation in and outside of artillery highlights the consequences

of limited artillery employment. Artillery units that were trained, manned, and equipped for the mission of destroying, neutralizing, or suppressing enemy formations by cannon and rocket fire instead found themselves conducting a combination of civil military operations, providing convoy security, and executing provisional infantry or police mission sets. The cost of performing a decade of these “in-lieu-of” missions has robbed a generation of artillerymen of their core competencies and an intimate knowledge of fires integration and deconfliction. Similarly, a generation of infantry officers has developed with a limited understanding and appreciation for the application of integrated combined arms fires.

As a result of the aforementioned lack of operational experience in core artillery competencies, there has been a common trend towards centralization within Marine artillery. This trend is not simply a vestige of overseas contingency operations, but organizationally is a return to basic artillery doctrine predicated on fulfilling requirements on the major combat end of the spectrum of military operations. Understanding how to adapt artillery doctrine built for linear combined arms operations at the kinetic end of the ROMO will require a more nuanced assessment of employment and deployment considerations of artillery doctrine. While modifications to current doctrine are necessary, the existing framework provides a capable structure to enhance the scalability of the Marine artillery battalion.

Doctrinally, Marine artillery is organic to each infantry division, organized under the artillery regimental headquarters, and employed with maneuver elements an echelon larger than itself. Specifically, artillery battalions provide fires to infantry regiments, and on MEUs an artillery battery attaches to an infantry battalion. Artillery battery operations are significant because the attached battery operates independent of its parent battalion and becomes a part of the infantry battalion. *Expeditionary Force 21* requires a look at continuing along this logical

progression towards employing task organized artillery batteries and platoons in direct support to enhanced infantry company landing teams. Presently, current doctrine challenges this necessary structure change. The justification for this position has historically been one of capacity, capability, and experience. These limitations are valid and must be addressed with increased education, exposure to complicated battery, and decentralized operations sooner in the artillerymen's career.

According to Marine Corps Warfighting Publication 3-16.1 “[t]he artillery battalion is the basic tactical fighting unit. It has enough firing units to effectively mass its fire and engage several targets simultaneously.”³⁴ Yet this foundational employment construct sits in contrast to the last fourteen years, which have seen artillery systems and organizations routinely employed as anything but consolidated battalions. Artillery employments during COIN operations were characterized as positional, static, and dependent upon firebases. While the artillery purist will see those facts as doctrinal failures and not successes, the true accomplishment lies in the adaptability demonstrated through non-standard employment of Marine artillery's capabilities. The aforementioned decentralized and firebase employment construct maximized the utilization of modern weapons and lethal, precision munitions. In addition, this doctrinal stretch provided responsive fire support to the maximum number of maneuver elements over historically large battlespaces. Many in the Marine artillery community see those successful operations in OIF & OEF as an aberration and not indicative of the future operating environment. Those artillery traditionalists insist upon a “return to the basics” of shooting, moving, and communicating. They believe that contrary to the NSS or NMS, conventional interstate conflict is not a remnant of the past and remains likely in the future.³⁵ To that end, the target sets that will present themselves will require mass. Most notably, the fear exists that focusing on smaller unit tactics and

employment will rob artillery of its ability to mass fires. The result is Marine artillery focuses on combined arms support to conventional forces assuming a permissive environment, with an inherent assumption that proficiency in those tasks translates to the requirements to support distributed forces pursuing more limited objectives. Marine artillery traditionalists' trepidation with abandoning battalion level operations and training, in lieu of decentralized battery operations is justified, even if scenarios that require massed artillery formations are unlikely in operations which small distributed forces would be employed.

Enhanced artillery operations do not presume the dissolution of battalion-level training; instead they place a premium on perfecting and duplicating most of the battalion-level capabilities to the battery. At a minimum, battery and platoon commanders must be trained to understand the requirements of artillery tactical missions, and those missions should be promulgated from the artillery battalion down to the battery/platoon level (see Figure 5).

Figure 5. Assign these to Enhanced Marine Artillery Batteries/Platoons³⁶

| Arty Unit with Tactical Mission of... | Answers Calls for Fire in Priority From... | Has As Its Zone of Fire... | Furnishes Forward Observers... | Establishes Liaison With... | Establishes Comm With... | Is Positioned By... | Has Its Fires Planned By... |
|--|---|-----------------------------------|---|---|---------------------------------|---|------------------------------------|
| DIRECT SUPPORT (DS) | 1. Supported unit. 2. Own observers. 3. Higher artillery headquarters. | Zone of supported unit. | To each company-sized maneuver element of supported unit. | Supported unit (down to battalion level). | Supported unit. | Unit commander as deemed necessary or ordered by higher artillery headquarters. | Develops own fire plan. |
| REINFORCING (R) | 1. Reinforced unit. 2. Own observers. 3. Higher artillery headquarters. | Zone of fire of reinforced unit. | No requirement. | Reinforced unit. | Reinforced unit. | Reinforced unit or ordered by higher artillery headquarters. | Reinforced unit. |
| GENERAL SUPPORT (GS) | Higher artillery headquarters. | Zone of supported unit. | No inherent responsibility. | No inherent responsibility. | No inherent responsibility. | Higher artillery headquarters. | Higher artillery headquarters. |

| | | | | | | | |
|--|---|--|-----------------|------------------|------------------|--|--------------------------------|
| GENERAL SUPPORT-REINFORCING (GSR) | 1. Higher artillery headquarters. 2. Reinforced unit. 3. Own observers. | Zone of supported unit to include zone of fire of reinforced unit. | No requirement. | Reinforced unit. | Reinforced unit. | Higher artillery headquarters or reinforced unit subject to prior approval by higher artillery headquarters. | Higher artillery headquarters. |
| Marine Artillery Tactical Missions (Inherent Responsibilities). | | | | | | | |

Source: MCWP 3-16.1, *Artillery Operations*

Modest doctrinal changes are required in order to set the conditions for a more modular and relevant artillery force capable of supporting distributed company operations. Retired Marine Colonel Mark Cancian supports this sentiment in his essay on the crisis and opportunity facing Marine artillery. He states that “[g]etting back to the basics is not enough. It is comforting to think that rebuilding traditional skills and missions will restore the field artillery to its former status.”³⁷ Unfortunately, those skills alone will not prepare artillerymen to begin solving the complicated problems of distributed logistics, force protection, and precision in the future operating environment. That does not disparage a need to place a primacy on traditional artillery skills, focused on MEF-level combat operations. In addition to those mission essential tasks (METs), decentralization to platoon operations requiring tactical and technical fire direction is essential to the required accuracy and autonomy of the world described in *Expeditionary Force 21*. Doctrine must be fully explored to address the assignment of tactical missions down to the battery level, with the ability to disaggregate further to semi-autonomous platoons, as METT-T requires. This doctrinal change of employment may even have implication on Marine artillery organization.

Organization

Organization shapes everything that a unit does and is prepared to do. It defines the command structure and formalizes the methods by which the unit operates. Reviewing how Marine artillery has been traditionally organized and “allocated through a process called organization for

combat” is essential to understand the maneuver space required to enhance overall scalability.³⁸ Organization for combat establishes the command relationships and assigns the tactical missions required to meet the needs of the force and its subordinate units. Currently, the artillery organization for combat is focused on furnishing close and continuous fire support by neutralizing, destroying, or suppressing targets that threaten the success of the supported unit.³⁹ These requirements are predominantly focused at the high end of the ROMO. Proponents of the current organization adhere to the flawed assumption that training for major conventional war will encompass the same tasks as those required at the low end or that those tasks are easier to train to. The current construct represents a valuable remnant of times when the Marine Corps was centered on addressing threats from a near peer competitor in a major land offensive. As a result, “the firing battery [was] not normally assigned a tactical mission unless operating independent of the battalion.”⁴⁰ Adhering to this organization will likely ignore those unique organizational requirements that Marine artillery must work through in order to support *Expeditionary Force 21*.

Within the active component the ability to provide infantry regiments with direct support (DS) artillery battalions is known as artillery-infantry parity, and for the first time in several years that parity is no more. As of the current 182.1k authorized strength report (ASR), the Marine Corps is manned at twenty-four infantry battalions and twenty-one cannon batteries leaving a delta of three artillery batteries at surface level.⁴¹ Moreover, the results of the 2010 Marine Corps Force Structure Review Group and the 2011 Budget Control Act have reduced cannon artillery from ten to eight active duty battalions.⁴² Reductions in manpower within the Marine Corps from 202,100 in FY 2012 to current end strength of 182,100 in FY 2015 necessitated the assumption of increased risk with ground fires. *Expeditionary Force 21*

complicates this matter in its potential to employ multiple independent maneuver companies, further challenging parity within the ascribed fire support paradigm.

Changing that paradigm provides a potential organizational solution that would enhance artillery integration. For example, deploying organic fire support teams with CLTs and SPMAGTF-CR would increase the overall operational capability within the maneuver units and create a stronger case for increased organic fire support assets. Another organizational shift that may make Marine artillery better suited to fight within the *Expeditionary Force 21* construct would be adding an additional active duty HIMARS battalion to 10th Marine Regiment. This suggestion is made in acknowledgment of the fact that uncompensated structure gains are unlikely given current fiscal austerity. However, this addition would provide maximum return on investment in long range general support fires to the MAGTF commander, and enhanced ability to weight the main effort without stripping ground fires from another element. HIMARS provides an expeditious, long-range, precision fires, capability that is organically transportable via organic Marine Corps airlift in the KC-130J.⁴³ This capability can be leveraged to augment a SPMAGTF or CLT responding to a crisis in the littorals or deliver a kinetic strike for special operations forces conducting mission on High Value Targets or other deliberate strikes. HIMARS' expeditionary capability for intra-theater or inter theater transfer and exceptional 70-300 km reach with the M31, Guided Multiple Launch Rocket System (GMLRS) and the MGM-168, Army Tactical Missile System (ATACMS), makes it an ideal weapon system and munitions match for the target sets facing distributed forces in the littorals. The system provides direct support lethality, speed, precision, and low collateral damage tailored to forcible-entry operations in the littorals.⁴⁴

Organizational changes by their nature involve systems and their associated capabilities, but more importantly they should reflect a construct that maximizes the employment of those systems.

The current organizational construct for artillery is based in the industrial age. Informational age communications technology permits the massing of fires and effects without physically massing the systems per se. In addition, technology allows for the proliferation of increased command, control, and situational awareness. If the Marine artillery is ever to truly embrace maneuver warfare tenets and the demand of *Expeditionary Force 21* it can begin by deploying as batteries and employing as platoons.

Training

The Marine Corps Warfighting Laboratory (MCWL) conducted an example of the type of training that must be expanded and institutionalized in order to increase Marine artillery's enhanced operations capability to support *Expeditionary Force 21*. An assessment of its efforts will demonstrate the likely ways in which enhanced artillery operations could be conducted. Subsequently, an analysis of MCWL's findings offers usable data for exploration into specific additions to NAVMC 3500.7B the artillery training and readiness manual.

During the winter of 2010 in Hawaii, the MCWL conducted a limited objective experiment (LOE) designed to evaluate the efficacy of organic fire support coordination in an infantry company conducting enhanced company operations.⁴⁵ This experiment evaluated four fire support objectives related to company landing teams augmented with key enablers aimed at assessing their combat operations centers (COCC) and their integration with an artillery platoon fire direction center (FDC) and fire support team (FiST) as the company fire support cell (CFSC).⁴⁶ The first objective of LOE-4 was to identify fires capability gaps. The second objective was an evaluation of command and control TTPs with respect to fires. The third objective was to evaluate the contribution and cost of enhanced attached/organic surface indirect fire support and enhanced infantry weapons capable of providing fire support.⁴⁷ After testing

these objectives, the MCWL deduced a number of findings that may give insight into a way forward towards enhancing artillery operations further.

Principal to these findings is the requirement for further research on fires TTPs to support CLT operations, specifically in the area of company fire support coordination and logistical support.⁴⁸ The requirements of *Expeditionary Force 21* for Marine artillery mirror those of LOE -4 and will require the CLT fire support team leader to assume the duties associated with the battalion fire support coordinator (FSC). LOE-4 also gives examples of the integration of the artillery FDC personnel collocated with the FSC dedicated exclusively to calculating and clearing fire mission in a streamlined manner.⁴⁹

In addition, MCWL's limited objective experiment clarified that the company level operations centers are capable of incorporating additional forces necessary to accomplish the operational requirements outlined within *Expeditionary Force 21* through enhanced artillery operations. Doing so will require training that most closely replicates the challenging scenarios within which artillery systems can expect to be employed. Amphibious training exercises, such as Bold Alligator, Ssang Yong, and RIMPAC provide prime opportunities to test modifications to Marine artillery's operating concepts and test capabilities and capacities necessary to develop Marine artillery. Steel Night or Fuji Combined Arms Exercise are an additional opportunity to employ expeditionary and enhanced artillery concepts, yet there are limitations that need to be addressed. Camp Lejeune's training areas are inadequate to mimic the true distributed nature of operations within the confines of the base. Utilization of Fort Bragg in conjunction with Camp Lejeune would offer a non-kinetic framework, although a solution that would allow for full mission rehearsals would be optimal.

Modernization in training must push the limits of decentralized command and control of fires through the FSCC, FiST, FDC, and JTAC integration. This training will have to mimic evolving organizational requirements best characterized as decentralized, scalable, and distributed. A method of enhancing Marine artillery decentralization through training is to assign the task of managing both tactical and technical fire direction formally to the rocket and cannon battery formations as the experimental base unit for deployment. Subsequently, current battery level collective tasks should be captured in the platoon level tasks list to facilitate scalability down to the platoon level. Duplicating training and readiness standards from the battalion level is the first step towards resourcing to the same standards. These shifts in responsibility and scope must be enabled by codifying mission essential tasks in the training and readiness manual (T&R) that reflect *Expeditionary Force 21*'s requirements.

Currently Marine artillery battery collective tasks do not appropriately address the requirements outlined in *Expeditionary Force 21*. Both HIMARS and cannon battery collective events are missing key collective events that would enable the performance of enhanced artillery operations. Adding battalion collective events of conducting fire support, providing artillery support, and exercising command and control get closer to the specified and implied requirements necessitated by the Marine Corps's Capstone concept. Capturing the reality of *Expeditionary Force 21* within the T&R pushes Marine artillery a significant step closer to institutionalized enhanced operations and ensures that the community is capable of supporting the direction the force is going toward.

Materiel

The M777 A2 and EFSS topic of materiel immediately brings several questions to mind, not the least of which being the survivability of current weapons systems available to Marine

artillery in the future operating environment. In light of the technologies available to potential adversaries such as radar, unmanned aerial vehicles, or sympathetic civilians with smartphones, the survivability of towed artillery comes into question. Fiscal constraints being what they are systems are not likely to change in the near term. The question then becomes how to foster additional capacity to support distributed and disaggregated forces with scalable Marine artillery units without major acquisition programs.

As the Marine Corps looks to increase Marine artillery's capacity for scalable operations it will likely not require vast additions to its current table of equipment. The M777A2 and EFSS both provide capable and responsive fire support to the MAGTF commander. The most recent artillery table of equipment was designed with redundancy in mind to provide increased command, control, and fires computational capability down to the battery level. The mobile tactical shelter and Centaurs handheld back-up computer system enable expeditious fire mission processing. The current major end items were fielded to support the employment of two, three-gun, howitzer platoons' operations for limited duration of time.

The single point of significant materiel improvements needed is to acquire the HIMARS systems necessary to make General Jones' recommendation of having one HIMARS battalion per division a reality.⁵⁰ This capable system would add much needed depth to the existing capabilities within each infantry division and provide flexible fire support coverage over a large area.

Leadership & Education

Current artillery education at entry, intermediate, and advanced levels are addressing the realities of the future operating environment. These various schools adequately prepare officers for the mental rigors of enhanced battery operations and command and control of decentralized

artillery operations. However, these young officers require substantial nurturing in their assigned units before being operationally capable. Officers will require time to evolve and mature into the type of leaders required to provide ground-based fires in support of ECO. Platoon commanders graduate from the Fires Center of Excellence in Fort Sill, Oklahoma with the requisite skills to manage platoon operations and conduct basic tactical and technical fire direction. Furthermore, these young artillery officers are familiarized with the employment of each weapon within the triad of fires and given the basics necessary to manage them appropriately. *Expeditionary Force 21* requires an artillery battery capability equal to that of the current artillery battalion. In addition, it requires artillery firing platoons capable of planning for logistics, fire support, and tactical and technical fire direction for multiple weapon systems. Mission essential task must be amended for the artillery battalion and battery to support distributed operations focused on fire support planning, associated logistics planning, and command and control in support of distributed maneuver companies.

In addition, artillery officers require broadened expertise and focused training with regards to fire support planning and coordination. Within the last five years Marine Corps artillery recognized the need to create a more comprehensive fire supporter with increased experience and ability to support infantry battalions and companies. To solve this problem, forward observers (0802) and scout observers (0861) were consolidated within headquarters battery in order to form a professional fire support liaison element capable of focusing on the demands of fire support planning and execution. The efficacy of this method is up for debate; however, the need still exists to ensure Marine artillery provides infantry units with officers that are trained not only in the means of employing artillery fires but also comprehensive fire support planning integrating all ground, sea, and air based platforms into combined arms operations.

Enhanced companies cannot afford one trick ponies but received a capable fire support officer and not merely a forward observer.

Personnel

In 2012, the Marine Corps Force Structure Review Group (FSRG) & Force Optimization Review Group (FORG) assumed the daunting task of envisioning the future and right sizing the Marine Corps in the face of clear fiscal constraints.⁵¹ The result was a reduction from an end strength of 202,000 Marines to 182,000 over five years, and an affirmation of the expeditionary nature of the Marine Corps and codification of its role as America's "Middleweight" Force in Readiness.⁵² As a result of the FSRG, Marine artillery was reduced from thirty cannon batteries to twenty-one and was reduced by two active duty artillery cannon battalions.⁵³ In spite of this reduction in fire support capacity, Expeditionary *Force 21* demands that Marine Artillery increase its ability to support an undetermined number of enhanced maneuver elements. Enabling Marine artillery to support these forces will require a proactive manpower management program to ensure the necessary employment of the artillery battery's authorized strength. Analysis of the 2005 and 2016 tables of organization illustrate instrumental personnel changes that have postured Marine artillery to meet the challenges of enhanced artillery operations; however, these changes will only work if service level manpower practices are able to staff to the table of organization.

Manpower is one of the most challenging aspects of any system to either manage or assess because of its dynamic nature. It changes to reflect operational construct of the service and as it evolves so do units and specialties. All of these factors are then evaluated against fiscal realities which constrain the ideal manpower solution. Personnel are simultaneously the Marine Corps's single most precious commodity and its greatest expense. In order to conform to

requirements and Marine Corps priorities, units are characteristically not manned or staffed to one hundred percent of its table of organization (T/O). However, the ability to scale and disaggregate necessitates that units are staffed as closely as possible to their authorized staffing goal.

Expeditionary Force 21 future concept of disaggregated forces operating in a distributed manner over space and time necessitates high levels of readiness and redundancy. Specifically, Marine artillery units need close to their full complement of manpower structure to have the requisite skillsets necessary to enable safe and accurate fire support, and to maintain any modicum of force protection. For enhanced artillery operations to work, a unit will likely need to be manned at a high percentage of its staffing goal. In addition, essential billets, such as operations chief and section chiefs must never be gapped if possible. If this stance is not supportable, gaps must be minimal and limited to units not in a deployment work up. This will require further integration with HQMC Plans, Policies & Operations with Manpower and Reserve Affairs. The 2016 Artillery table of organization (T/O) is built to facilitate modularity. It consists of two firing platoons of three howitzer sections, motor vehicle operators organic to those platoons, a platoon headquarters consisting of fire control men, local security chief, and platoon leadership. Additionally, the artillery battery headquarters contains the required enablers to command, control, and support those platoons accordingly.⁵⁴ In stark contrast to this construct, which lends itself to decentralization, the artillery battery T/O as recently as 2005 was not as capable. For example, it had no redundancy in fire direction officers or fire direction operations chiefs. Legacy batteries also required more manpower per howitzer-section, a situation resulting in even fewer personnel for local security. Marine artillery has already taken great steps with manpower to enable a basis of necessary scalability and decentralization;

however, in order for that existing framework to be effective it must be staffed in accordance with the ASR.

Facilities

There exists a great disparity in training opportunities and training areas across the Marine artillery enterprise. Each Marine artillery regiment by virtue of its geographic location has its unique opportunities and challenges. Since not much can be done about increasing opportunity to employ artillery in places like Oahu Hawaii or Camp Fuji, Japan, training facilities and ranges for artillery units must maximize training areas that can accommodate multiple artillery firing and position areas. These limited changes to facilities are required to specifically address support of *Expeditionary Force 21*; however, local changes might be required to accommodate additional howitzers per battery and the addition of a HIMARS battalion on the east coast within 10th Marines would likely have some facilities requirements.

Conclusions

Expeditionary Force 21 remains an embryonic concept that will require further testing and experimentation before the totality of its potential and its requirements are realized. The concept is up for revision and further clarification, and ultimately how it will guide the force remains to be seen. While much surrounding the future operating environment remains unclear, that environment will be characterized by globalization, the rise of emerging powers, challenges to governance, non-state actors, competition for resources, and advances in disruptive technology. In response to these challenges the GCCs will require a Marine Corps that is expeditionary, scalable, and capable of responding to those threats. Arguably the Marine Corps will continue to depend on smaller, disaggregated, MAGTFs to enable its most likely missions.

Marine artillery's concept of support must evolve in kind and embrace enhanced artillery operations with flexible, scalable and persistent ground fire support teams.

In order to facilitate the necessary responsiveness and fire support capacity, Marine artillery must institute organizational, training, and manning changes while focusing on leadership and education that enables decentralized fire support. Marine artillery battalions must relinquish their monopoly on tactical fire direction and push command and control, planning, maintenance, and the ability to enable critical sustainment to the battery level. The heart of enhanced artillery battery operations is reinforcing the existing framework for batteries to provide fire support divorced from an artillery battalion headquarters. Of course this change will come with challenges, some likely unforeseen, but there are also opportunities in this new paradigm. The ability for artillery to deploy as batteries and employ as platoons is a unique capability that would provide persistent all weather fires and alleviate the overreliance on close air support.

Enhanced artillery operations must be capable of operating at both ends of the ROMO. At one end of the spectrum, these operations will take on a certain character while disaggregated, but in cases where aggregation becomes necessary Marine artillery will be capable of fighting as battalions and regiments as in days of old. Foreseeably these traditional formations will maintain enhanced capabilities and allow fire supporters to focus more on the massing of the effects of their fires and less on the massing of firing pieces and units. Marine artillery must embrace its capacity for expeditionary and creative solutions or find itself relegated to obscurity.

Appendix A - Acronyms

| | |
|---------|---|
| AFRICOM | United States African Command |
| ASCM | Anti-ship Cruise Missiles |
| ASR | Authorized Strength Report |
| ATACMS | Army Tactical Missile System |
| CE | Command Element |
| CENTCOM | United States Central Command |
| CFSC | Company Fire Support Cell |
| COCC | Company Combat Operation Center |
| COIN | Counterinsurgency |
| CLT | Company Landing Team |
| DFCS | Digital Fire Support System |
| DOTMLPF | Doctrine, Organization, Training, Materiel, Leadership & Education, Personnel, Facilities |
| DO | Distributed Operations |
| DS | Direct Support |
| ECO | Enhanced Company Operations |
| EAO | Enhanced Artillery Operations |
| EFSS | Expeditionary Fire Support System |
| FDC | Fire Direction Center |
| FiST | Fire Support Team |
| FSC | Fire Support Coordinator |
| FSRG | Force Structure Review Group |
| FORG | Force Optimization Review Group |
| GS | General Support |
| GCE | Ground Combat Element |
| GMLRS | Guided Multiple Launch Rocket System |

| | |
|------------|---|
| GSR | General Support Reinforcing |
| HIMARS | High Mobility Artillery Rocket System |
| JTF | Joint Task Force |
| LOE | Limited Objective Experiment |
| MAGTF | Marine Air Ground Task Force |
| MEB | Marine Expeditionary Brigade |
| MEF | Marine Expeditionary Force |
| MEU | Marine Expeditionary Unit |
| MCWL | Marine Corps Warfighting Laboratory |
| MET | Mission Essential Task |
| NMS | National Military Strategy |
| NORTHCOM | United States Northern Command |
| NSS | National Security Strategy |
| OCO | Overseas Contingency Operations (Formerly, The Global War on Terrorism) |
| OEF | Operation Enduring Freedom |
| OIF | Operation Iraqi Freedom |
| R | Reinforcing |
| RIMPAC | Rim of the Pacific |
| ROMO | Range of Military Operations |
| SA | South Africa |
| SAM | Surface to air Missile |
| SOUTHCOM | United States Southern Command |
| SPMAGTF | Special Purpose MAGTF |
| SPMAGTF-CR | Special Purpose MAGTF Crisis Response |
| T/E | Table of Equipment |
| TFSD | Total Force Structure Division |
| T/O | Table of Organization |
| T&R | Training and Readiness Manual |
| TTP | Tactics, Techniques, Procedures |

Appendix B – Artillery Weapons Systems

Figure 6. 120mm Expeditionary Fire Support System (EFSS) w/ Internally Transportable Vehicle (ITV)



| | |
|--------------------------|------------------------------|
| Weapons System | M327 EFSS |
| Precision Guided | PERM* |
| Min Range | 1.2 km |
| Max Range | 8.1 km HE 16 km w /PERM* |
| Caliber | 120mm rifled |
| Crew | 2 |
| Rate of Fire | 2 rpm sustained 4 rpm max |
| Operational Range | 580km |

*(PERM) Precision Extended Range Munitions

Appendix B – Marine Artillery Weapons Systems

Figure 7. M777A2 Lightweight 155mm Howitzer



| | |
|--------------------------|--|
| Weapons System | M777A2 |
| Precision Guided | Excalibur / PGK* |
| Min Range | |
| Max Range | 24km / 30km w/ RAP* 40km Excalibur |
| Caliber | 155mm |
| Crew | 8 |
| Rate of Fire | 2 rpm sustained 5 rpm max |
| Operational Range | Not applicable |

* (PGK) Precision Guidance Kit

* (RAP) Rocket Assisted Projectile

Appendix B – Marine Artillery Weapons Systems

Figure 8. M142 High Mobility Artillery Rocket System (HIMARS) Is this a DS fire support system?



| | |
|--------------------------|-------------------------|
| Weapon System | M142 HIMARS |
| Precision Guided | GMLRS Unitary |
| Min Range | 2km |
| Max Range | 84km / 300km ATACMS* |
| Caliber | 227mm |
| Crew | 3 |
| Rate of Fire | N/A |
| Operational Range | 408km |

*(ATACMS) Army Tactical Missile System

Appendix C – Marine Air Ground Task Forces (MAGTF)s

The Marine Corps currently employs four types of MAGTFs

- 1) Marine Expeditionary Force (MEF)
- 2) Marine Expeditionary Brigade (MEB)
- 3) Marine Expeditionary Unit (MEU)
- 4) Special Purpose MAGTF (SPMAGTF)

MARINE EXPEDITIONARY UNIT (MEU)

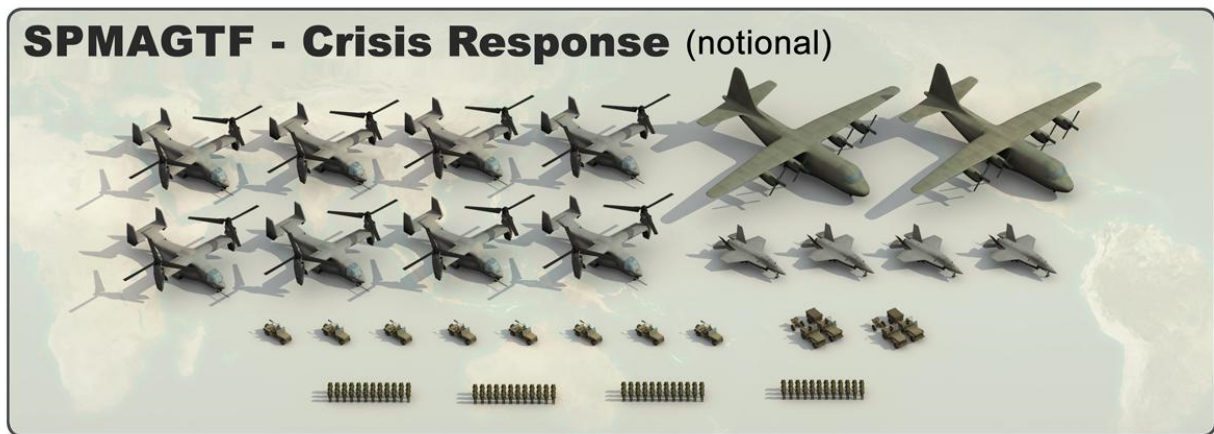
Forward deployed MEUs aboard Amphibious Readiness Groups (ARGs) operate continuously in the GCCDR's areas of responsibility (AOR). These units provide the President and the GCCDRs with a forward deployed and flexible, sea-based MAGTF. These units are capable of conducting amphibious operations to respond to crisis, conduct limited contingency operations, introduce follow on forces, and support designated SOF. In effect, they provide an afloat "on-station" force capable of responding to any situation that may arise. MEU's are characterized by their sea-based forward presence, expeditionary nature, and ability to plan for and respond to: crises, combined arms integration, and interoperability with joint, combined, and SOFs. The MEU's composition is informed by Marine Corps order 3120.9C, Policy for MEUs.⁵⁵

Figure 9. MEU laydown



Source: website, U.S. Marine Corps Concepts and Programs

Figure 10. Special Purpose Marine Air Ground Task Force (crisis response)



Source: website, United States Marine Corps Concept and Programs

SPECIAL PURPOSE MAGTF (SPMAGTF)

A SPMAGTF is task organized to accomplish a specific mission, operation, or regionally focused exercise. SPMAGTFs have capabilities, mobility, and sustainability similar to mission requirements in order to increase interoperability with, and provide training to, less developed military forces. SPMAGTF tasks include building and supporting partner nation security capacity efforts in specific regional areas. The SPMAGTF provides the CCDR with a flexible expeditionary force employment option that further augments the traditional capabilities provided by our Corps. The Marine component service headquarters designate SPMAGTFs in response to the CCDR requirements.⁵⁶

Notes

¹ Patrecia Slayden Hollis, "Fixing the Marine Artillery," *Field Artillery* (September 2000): 3. <http://search.proquest.com/docview/231144930?accountid=14746>.

² Hollis, "Fixing the Marine Artillery," 3.

³ The Joint Chiefs of Staff, *The National Military Strategy of the United States of America* (Washington, DC, 2015), 1.

http://www.jcs.mil/Portals/36/Documents/Publications/2015_National_Military_Strategy.pdf

⁴ Headquarters United States Marine Corps, *Expeditionary Force 21*, Concept, (March 4, 2014) http://www.mccdc.marines.mil/Portals/172/Docs/MCCDC/EF21/EF21_Capstone_Concept.pdf

⁵ Major Paul S. Oh, "Future Strategic Environment in an Era of Persistent Conflict." *Military Review* 89 (4): 68-79. <http://search.proquest.com/docview/225310561?accountid=14746>.

⁶ Oh, "Future Strategic Environment," 69.

⁷ Headquarters United States Marine Corps, *Expeditionary Force 21*, Capstone Concept, (Quantico, VA: Headquarters Marine Corps 2014)

http://www.mccdc.marines.mil/Portals/172/Docs/MCCDC/EF21/EF21_Capstone_Concept.pdf

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⁹ USMC, *Expeditionary Force 21*, 9.

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