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- 10 A Message from the Commandant Gen David H. Berger
- 11 Quo Vadis Indo-Asia-Pacific Presence? LtGen Christopher Mahoney
- 20 The Case for Allies and Partners

 BGen Sean Salene
- 38 Opportunities and Challenges
 COL Yusuke Kawachi
- 48 A Letter from CG MCSC BGen A.J. Pasagian

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49 Cover Article

3 Editorial

116 Observation Post

120 Index to Advertisers

120 Writers' Guidelines

4 Letters

117 Books

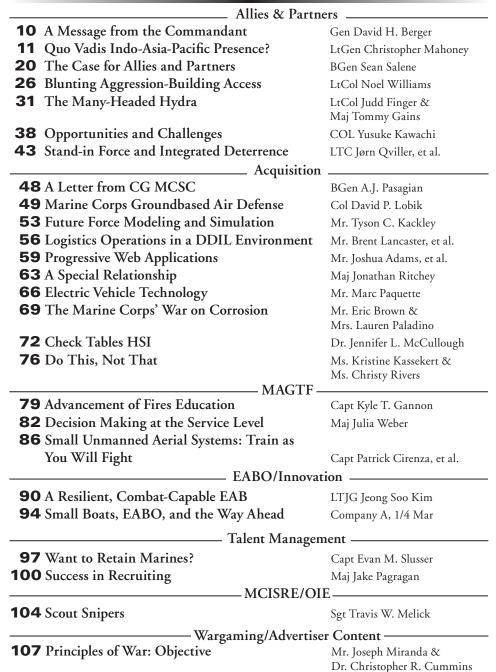
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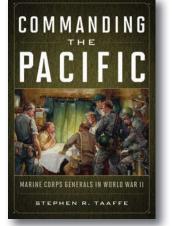
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DEPARTMENTS



IDEAS AND ISSUES





117 Book Review

110 Drones and Maneuver Warfare Marinu.

Maneuverist Papers

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MAY 2022

Editorial: Unique Perspectives and the Future Force

This month's edition is unique in the history of the Corps' professional journal. In addition to focusing on Acquisition and the Air-Ground Team as we have done in recent years for the May *Gazette*, this year we also present for the first time a section of Ideas & Issues dedicated to "Allies and Partners." As our cover highlights, we offer thoughts on operating with the forces of ally and partner nations beginning on page 10 with a message from the Commandant and followed by the observations of LtGen Christopher Mahoney and BGen Sean Salene—leaders with recent experiences in "coalition warfare." We also present the views of authors from several of our closest allies from across the globe: Australia, Japan, and Norway.

Starting on page 48 with "A Letter from the Commander of Marine Corps Systems Command (MCSC)" written by BGen A.J. Pasagian, a series of nine articles from across the Acquisition Community describe the Corps' approach to developing the capabilities required to generate lethal and sustainable stand-in forces. From groundbased air defense, to logistics, electrically powered vehicles, and the collaborative relationships between the Marine Corps and USSOCOM's acquisitions professionals, these articles detail the focus of warfighting investments in the materiel solutions required for the Corps to operate from traditional installations and platforms as well as expeditionary advanced bases along the competition-conflict continuum.

Articles focusing on the tactical combined arms capabilities that make up the Air-Ground team include "Advancement of Fires Education" by Capt Kyle T. Gannon on page 79 and "Small Unmanned Aerial Systems: Train as You Will Fight" by Capt Patrick Cirenza, et al. on page 86. In addition to these focus areas, we also present articles on a range of "trending topics" including EABO/ Innovation, Talent Management, and the MCISRE/OIE.

Finally, I am compelled to comment on two recent phenomena relevant to the professional discourse in the Gazette and the wider Marine Corps community. As the Editor of the Corps' professional journal, I am fortunate to observe and study all subjects related to the Corps and the profession of arms, and as a veteran practitioner, I hold an abiding personal and professional interest in the field. First, as we publish the May edition, Russia's invasion of Ukraine enters its second month. What we continue to observe in realtime are object lessons in the unchanging nature of war, the ever-changing character of war, and the efficacy of international organizations and both conventional and nuclear deterrence. I encourage all students of our profession to learn the differences and to think critically when media pundits and "armchair strategists" attempt to foist their conclusions on you. Second, is the ongoing public excoriation of the Commandant's implementation of Force Design 2030 by veteran and retired senior leaders. The lesson here is twofold. First, change is required to ensure the Marine Corps can generate forces that contribute relevant capabilities to a maritime campaign against a peer competitor. Second, managing change of this level—even in a disciplined military hierarchy like the Corps—requires early, constant, and consistent communication and transparency with all of the "stakeholders" or "constituencies" of the organization. What remains missing from this public argument are alternative solutions to the need for change. Both phenomena require self-education, careful reflection, open discourse, and the sharing of ideas. Fact-based debate makes our thinking clearer and our arguments stronger. The Gazette and the Association provide the forum and the resources for this study and discourse.

Col Christopher Woodbridge

MCA President and CEO, LtGen Charles G. Chiarotti, USMC(Ret); VP Foundation Operations, Col Tim Mundy, USMC(Ret); VP Strategic Communications, Retail Operations & Editor, Leatherneck magazine, Col Mary H. Reinwald, USMC(Ret); VP Professional Development, Publisher & Editor Marine Corps Gazette, Col Christopher Woodbridge, USMC(Ret); VP Corporate Sponsorships, Events & Advertising, Ms. LeeAnn Mitchell.

"Updating Defeat Mechanisms" and "Exploring Context"

Two recent articles in the Gazette warrant special mention. We applaud "Updating Defeat Mechanisms" (Feb22), in which Dr. Frank Hoffman applies his typically critical eye to a very important concept and in the processes advances the thinking on that subject. We also welcome the return of Marinus Era Novum in "Exploring Context" (Mar22), which looks at the development of maneuver warfare theory in light of other reform trends, in particular the Revolution in Military Affairs of the 1980s and the Rumsfeld-Cheney transformation efforts of the early 2000s. Era Novum argues that what distinguished the outcome of the Gulf War in 1991 from the Invasion of Iraq in 2003 was not the quality of the reforms that preceded each conflict but rather clear strategic thinking in the former case and lack of it in the latter. The essential lesson is that neither tactical-operational virtue nor exquisite technology can save you from strategic incompetence. It is important to keep that in mind while arguing the merits of maneuver warfare.

Marinus

EABO is Maneuver Warfare

The Maneuverist Papers continue to promote a healthy and vigorous discourse about Marine Corps doctrine, using *MCDP 1, Warfighting,* as the central point of departure. Written by the pseudonymous author "Marinus," this series of articles has proven to be a valuable mechanism for discussing the current and future state of the Marine Corps.

Marinus' latest contribution directly confronts Expeditionary Advanced Base Operations (EABO), contending that force design efforts that support EABO are over-preparing the Marine Corps for a single fight while hobbling the Marine Corps' ability to conduct other missions. More fundamentally, Marinus argues that EABO is contradictory to maneuver warfare and is rooted in a faulty strategic framework, even suggesting that EABO contradicts the nature of war itself.

The value of this latest paper is that Marinus gives voice to concerns that have been raised by many other critics of EABO, That said, Marinus' evaluation of EABO is off the mark. Marinus' conclusions are not supported by a framing of EABO within the strategic context or the operational approaches that EABO endeavors to support. Additionally, Marinus' claims are hyper-focused on maneuver warfare within the limited—albeit important—frame of tactical movement for tactical advantage. The criticisms of Marinus do not flow from maneuver warfare as a warfighting philosophy, the essential elements of which include: the prioritization of mental or moral defeat mechanisms over physical defeat mechanisms; the exploitation of the element of time; a fundamental orientation on the enemy predicated on understanding him; and the employment of asymmetry.

More to the point: *EABO is maneuverist to the core*. The goal of this piece is to contextualize EABO within maneuver warfare. To do this, the authors will address the concerns raised by Marinus and more clearly articulate the connections between EABO and maneuver warfare. Ideally, this will drive the conversation forward and position those with a hand in refining, wargaming, and executing EABO to do so in the spirit of the Marine Corps' warfighting philosophy.

Island Chains and Maneuver

Marinus begins by identifying apparent shortfalls in the Island Chain Strategy, which is the strategic concept against which EABO is applied. Marinus describes this strategy as inherently attritionist, in contrast with a maneuverist approach. Later, Marinus ties this claim to a description of EABs as inanimate nodes used in a clash of technologies that contradicts the nature of war described in *MCDP 1*.

The reading of EABs as inanimate nodes seems to conflate the term "base" with "installation." A base is merely a locality from which operations are projected and supported, no matter how small or temporal. The recent article by LtCol John Berry (Ret), "What's in a Name?"

tackles this common misconception and highlights instead the operational agility of the EAB.

Regarding attrition, should the threshold of conflict be crossed, the role of EABO in missile-salvo combat certainly has a strong attritionist element. However, a deliberate application of attrition is not foreign to maneuver warfare. Yes, maneuver warfare prioritizes moral and mental defeat mechanisms over physical defeat mechanisms. However, *MCDP 1* insists that violence or its threat remain critical to defeating the enemy system: "Firepower and attrition are essential elements of warfare by maneuver."

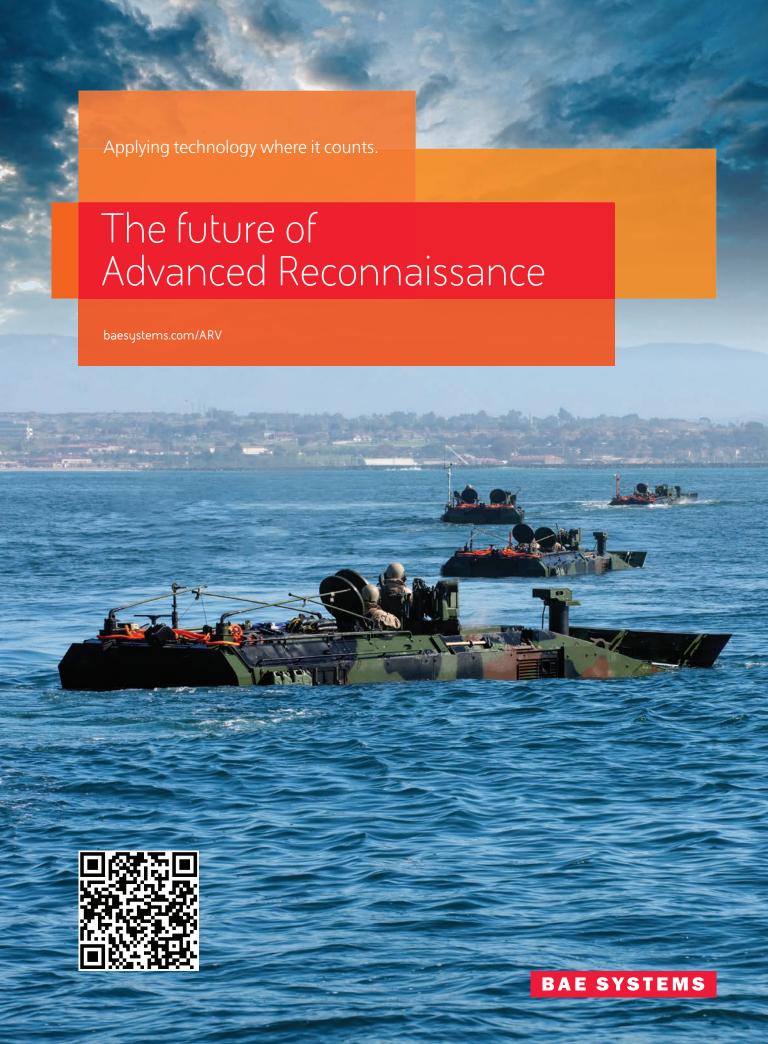
Does a rifle company commander's call for artillery fire on an enemy position mean he has abandoned maneuver warfare? Of course not. And should munitions be fired from EABs, the launching system will likely be static at the moment of firing. The same is true for a howitzer. Is the employment of cannon artillery a refutation of maneuver warfare? Certainly not. The notion of "shoot, move, communicate" is as applicable to EABO as it is to artillery, though EABO and stand-in forces (SIF) conducting such operations might also emphasize "detect, move, communicate."

More than that, the role of EABO is a deliberate effort to attack the enemy's plan and undermine the utility of his anti-access/area denial and counterintervention strategy. The threat inherent in EABO, and its role in facilitating the entry of more decisive naval and joint forces, is a combination of direct and indirect approaches that avoid the enemy's surface and exploit the gap in his battle network. Additionally, the role of SIF conducting constant reconnaissance and counter-reconnaissance builds the commander's understanding of the enemy's disposition, capability, and intent. These are direct applications of the fundamental orientation on the enemy called for in MCDP 1: "We should try to 'get inside' the enemy's thought processes and see the enemy as he sees himself so that we can set him up for defeat."

In doing this, EABO aims to invalidate the enemy's plan below the

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threshold of conflict, leading to a mental or moral defeat if the enemy is deterred from fighting in the first place. All of these attributes align lock-step with maneuver warfare doctrine.

EABO Provides Deterrence

This point is only reinforced by Marinus' reference to the Cold War in an attempt to describe EABO as Maginot Line-like in function. Marinus observes that the Army committed multiple corps to Europe because of the expectation that the major conflict with the Soviet Union was expected to occur in central Europe. But since no such conflict occurred there, Marinus suggests that this was a waste of force structure as other conflicts occurred in the periphery, simply bypassing these forces.

This logic completely ignores the deterrent effect of those multiple U.S. Army corps had on the Soviet Union. The very presence of these and other NATO conventional forces was a key element in deterring the conflict that everyone wished to avoid. Similarly, the presence of EABO in the littorals of an adversary will have a deterrent effect and reduce the risk of conflict. Reconnaissance and counter-reconnaissance executed by SIF inside an adversary's weapons engagement zone are inherently disruptive to enemy planning, rob them of the initiative of surprise, and contribute to deterrence by detection. Once more, it bears emphasizing that EABO attacks the enemy's very plan-a highwater mark for applied maneuver warfare.

The Problem of Access Is Perennial

Marinus goes on to note that making the arrangements with individual states to permit access of forces performing EABO would be difficult and that, "In the event of conflict, the United States could never be sure that host countries would be willing to risk the immense dangers of confronting China." This logic is hollow, as this risk exists with all allies and partners in all wars. The constant existence of this risk does not mean alliances and partnerships should not be pursued. The design of military

concepts like EABO and force structure like SIF offers the Department of State something of military value that can be offered to allies and partners, and something that allies and partners will find acceptable and worthwhile.

The risk assessed by Marinus is overblown as well. Marinus claims that "any U.S. deployment [to Taiwan] would trigger a ferocious Chinese response since the Chinese Communist Party considers Taiwan to be Chinese national territory." And yet, the revelation that Marines had been deployed to Taiwan for over a year resulted in no such response. U.S.-Taiwan bilateral security preparation is only growing and the United States continues to send more troops to Taiwan. Part of China's strategic approach is an application of Lenin's adage, "You probe with bayonets: if you find mush, you push. If you find steel, you withdraw." The commitment of SIF is the presence of steel, and while physical in nature, they support a mental defeat mechanism that cuts directly at the enemy's plan.

EABO Is Theater Agnostic

Marinus then engages the argument that compares EABO to War Plan Orange and the development of amphibious capabilities in the interwar period: "The critical difference, however, is that those amphibious capabilities found utility in nearly every theater of the Second World War and in numerous instances since, while EABO appears to be applicable to one very specific feature of maritime terrain in the western Pacific."

This interpretation is not borne out by the TM-EABO, which is theater agnostic. Additionally, it fails to account for the plethora of writing and wargames on EABO that take place in theaters outside the South China Sea. One such example is Exercise NEW HORIZON, in which the School of Advanced Warfighting applied EABO to a scenario occurring in the vicinity of the Bab al-Mandab Strait. The Commandant of the Marine Corps recently discussed the potential for EABO to support anti-submarine warfare in the northern Atlantic. Indeed, the China scenario gets the most attention

as it connects directly with the priorities set forth in the 2019 *National Defense Strategy*. But just as interwar amphibious operations were designed with Japan in mind but were applicable across the globe, so too are EABO applicable across the globe. EABO is theater and scenario agnostic, and to interpret it otherwise is an artificially narrow reading of the concept.

The Corps Retains Traditional Forces

Another thread running through Marinus' article is the contention that the Marine Corps is changing in its entirety and that the development of Marine Littoral Regiments will tie the entire Service to a narrow mission in a specific theater.

It bears repeating that EABO is applicable outside the South China Sea. More than that, while the creation of MLRs will be a transformational change for 3d MarDiv, the vast majority of the Marine Corps will maintain the composition and capabilities possessed prior to *Force Design 2030*. These forces will remain capable of performing the missions required of the Nation's force-in-readiness.

EABO Involves Combined Arms

The next argument from Marinus is the claim that EABO completely discounts combined arms maneuver, as it is allegedly a "firepower-based concept premised on defeating the enemy's advance at a long distance. Under such a concept, tactical maneuver becomes irrelevant." In this same vein, Marinus later argues that the capability of maneuvering against the enemy and engaging in close combat will be lost and that, "Movement generally will consist of local repositioning to avoid detection or counterbattery fire."

As previously noted, maneuver does not preclude firepower, and the use of firepower at the moment of firing does not negate maneuver or the ability to conduct tactical movement. This claim also discounts the combinations of robust combined-arms available to support EABO that reside in the entirety of a naval expeditionary force, as well as the ability to move from ship-to-shore, shore-to-ship, and shore-to-shore. Com-

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bined arms are abundant in EABO, and tactical movement over the water is still tactical movement. Here, Marinus appears to conflate maneuver *warfare* with maneuver as a *function* and takes what might be considered a land army-centric interpretation of maneuver vice a naval or expeditionary interpretation.

EABO, Competition, and Maneuver Warfare

Finally, Marinus' concerns focus predominantly on EABO in conflict. While EABO absolutely has a role when the shooting starts and must be optimized as such, the preponderance of EABO will be conducted in the cooperation and competition phases of the competition continuum to support the nation's strategy of deterrence. More than that, providing a force that can provide deterrent value against the enemy's gray zone activities—applying a theory of success that shatters the enemy's plan-exemplifies maneuver warfare. The connections between competition and maneuver warfare are discussed at length in MCDP 1-4, Competing, which in turn is nested within MCDP 1.

Conclusion

Maneuver warfare seeks to shatter the enemy's cohesion via focused, unexpected actions that create a situation with which the adversary cannot cope. In application, it demands asymmetry, an orientation on the enemy, the exploitation of time, and mental or moral defeat mechanisms. EABO includes all of these elements and is fundamentally a means to attack the enemy's plan. While it is applicable in conflict, it generates deterrent value in cooperation and competition, ideally defeating the enemy without fighting him.

The fears about EABO raised by Marinus are not uncommon, but they are based on an incorrect application of maneuver warfare and a misunderstanding of EABO. We implore readers to closely read the following documents to develop their understanding of the issues discussed above: MCDP 1, Warfighting; MCDP 1-4, Competing; A Concept

for Stand-in Forces; and The Tentative Manual for EABO. These essential documents will facilitate the ability of leaders, planners, and executioners of EABO to apply it with clarity. Rather than requiring the Marine Corps to abandon maneuver warfare, EABO will allow the Marine Corps to manifest maneuver warfare constantly through campaigning in peace, competition, and, if necessary, in conflict.

CTR Gary C. Lehmann & Maj Brian Kerg

Defeat Mechanisms

Dr. Hoffman's article discussing defeat mechanisms provides deep insight into the debate across the joint force regarding how to think about tactical victory. In this regard, it is truly helpful. Thinking deliberately about the purpose within the adversary's context, the "in order to," for every military operation or campaign is an absolute requirement. What are we trying to do to the enemy and what are the expected results of our actions? This must be the primary and often the most difficult question answered by planners. How do we plan to collapse the will of our adversary and force their surrender?

The doctrinal differences between the Services in thinking and approach are healthy. Through these debates, the joint community improves and sharpens thinking about how to fight. Each Service's perspective on how to bring about enemy battlefield defeat is viewed through the lens of their warfighting responsibilities and focus. To borrow a concept from Col John Boyd, each Service has different mental maps. When faced with an actual problem, the joint commander draws parts and ideas from each Service's mental map to build a "Boyd snowmobile," meeting the unique needs of the challenge at hand.

In the recent conflicts of Vietnam, Afghanistan, and Iraq, the challenge has not been achieving tactical success; instead, the challenge has been operational art. Operational art is the employment of military means to attain strategic goals.

Marine Corps Gazette

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Author drafts due: NLT 13 May 2022

September Edition

Themes: MCISRE and OIE
Author drafts due: NLT 17 June 2022

October Edition

Author drafts due: NLT 18 July 2022

Dr. Hoffman notes, "military victory is at best a necessary pre-condition for obtaining assigned political aims." I would argue differently; once armed conflict ensues, military victory is an absolute necessity for attaining political aims. GEN MacArthur asserted, there is no substitute for victory, and this was no simple, trite assertion. It is an immutable fact.

Arguably, in all three conflicts, the true problem has been opaque or even non-existent strategic goals. Unconditional surrender, the definitive strategic goal of the American Civil War and for World War II, was never the goal in the three most recent wars. How is it possible to link tactical actions, with nested or reinforcing defeat mechanisms, to achieve strategic results, if you do not know what strategic goal you are striving to achieve? The problem is not understanding tactical defeat mechanisms; the real challenge consistent across recent wars has been the failure of not insisting on the identification of clearly defined political and military objectives.

Alex Vohr

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10 February 2022

A MESSAGE FROM THE COMMANDANT OF THE MARINE CORPS

From 2008 to 2009, I had the privilege of serving as Chief of Staff for the KFOR Headquarters in Pristina, Kosovo. My commander was an Italian lieutenant general, and our staff included representatives from 29 countries. It was a graduate-level education in international relations and an experience, which reinforced what I had learned firsthand in both routine and combat operations across the globe: our allies and partners are a source of tremendous strategic advantage.

It is difficult to overstate the importance of America's allies and partners on the trajectory of our Nation and the world. From our War of Independence to ongoing operations against ISIL/ISIS in Iraq and Syria, our allies and partners have stood with us shoulder-to-shoulder. We have faced down tyrants and terrorists, made the seas free and open for the trade of nations, and provided life-saving humanitarian assistance to millions recovering from natural disasters. We have fought and bled together to defend our people, combat oppression overseas, and buttress democracy. We faced every challenge together.

Today, we confront challenges both new and familiar. Autocrats once again bully neighbors and threaten war, the risk of nuclear proliferation grows, terrorism persists, and climate change portends new conflicts and humanitarian crises. The volume and magnitude of challenges we face demand that we both reaffirm our commitment to each other—as allies and partners—and recommit to the ideals that bind us together. As the late Secretary of State—and Marine—George Shultz noted, our ties with fellow democracies endure, "precisely because they rest on a moral base, not only a base of strategic interest."

This issue of the *Marine Corps Gazette* features articles on our alliances and partnerships. There are few topics of greater strategic import. While Marines and our international military counterparts should be rightfully proud of all we have accomplished together, we cannot afford to be satisfied. As we stand together in defense of the free and open international order, we must move faster in building interoperability and compatibility—both in the "hardware" of shared systems, and the "software" of common operational concepts and procedures. We must increase the complexity and realism of our training and exercises and find new and innovative ways to operationalize our exchange and liaison networks. Finally, for Marines, I charge you to approach our international relationships with a healthy measure of humility. As Secretary of Defense Mattis noted, "Not all good ideas come from the country with the most aircraft carriers."

Semper Fidelis,

David H. Berger General, U.S. Marine Corps Commandant of the Marine Corps

Quo Vadis Indo-Asia-Pacific Presence?

Defining forward presence

by LtGen Christopher Mahoney

hat Is the Nature of the Problem We Are Trying to Solve?

Much has been written and spoken lately concerning the posture of U.S. forces as it relates to strategy. As well, the cyclic ritual of strategizing at the national level has focused on the efficacy and survivability of forward presence in the face of our adversaries' increasingly capable weapons systems. Unfortunately, many otherwise brilliant folks have fallen for the one-dimensional and operationally blind fallacy that declares, if you are in the red you are dead. Part of this debate centers on the value and cost of naval presence in areas of strategic value. Sadly, the trend seems to be a significant if not complete discount of an investment strategy that recognizes the criticality and economy of operationally targeted forward presence as a key component of comprehensive and integrated deterrence. While some reach back into the sometimes-superficial Mahanian bag of references, others confuse the many times' discordant relationship between stated strategy and strategic resource choices.² This article will give a brief perspective on what is meant by forward presence as well as brief operational and strategic sketches that point to the efficacy of military presence. Finally, and in brief, will be a commentary on the economic implications of the choice of presence in the Marine context.

Presence: What?

When we refer to presence we are talking about many different approaches and programs. Regarding the presence of forces, we are generally referring to three types.

>LtGen Mahoney is currently serving as Deputy Commandant for Programs and Resources, Headquarters Marine Corps.

The first is "in situ" or permanent forces. These formations are typically assigned to the theater and live in a host nation, either on base or out in town, with their families for years at a time. They are part of the community and participate in all manner of local activities. The second type of force presence is rotational. These formations or individuals are typically on the Unit Deployment Program or long Temporary Additional Duty orders for 180 days in an unaccompanied status. At present, these

When we surrender to the "impenetrable WEZ" way of thinking, we surrender our thinking.

forces make up about 66 percent of Marine Corps forward deployed strength. Finally, Marines will deploy typically in smaller groups or as individuals on an episodic basis in support of discreet exercises or activities. The duration of these deployments is usually measured in days or weeks. Forces transiting the INDOPACOM Area of Responsibility (AOR) and engaging in operations, actions, and investments (OAI's), such as a MEU deployment, would fall into this last category.

The OAIs in which these various forces engage run a wide spectrum. Marine Corps forces engage in high-intensity OPLAN preparation and rehearsal exercises. They carry out all manner of military capability and capacity building shoulder-to-shoulder with friends, partners, and allies across the AOR. These activities range from individual subject-matter expert exchanges to large, state of the warfighting art, command post, and maneuver exercises. We also lead numerous humanitarian and civic action engagements—for example, providing medical and dental care for underserviced communities, or improving dilapidated infrastructure in partner countries.

Our senior leaders spend a large amount of their time in targeted key leader engagements around the region. The relationships developed by "being there" have significant benefits to ensure our access to training and staging resources. This is to say nothing of building an executive network of trust with leaders alongside whom we might fight. This cannot be done from 6000 miles away or once a year. That is not how trust is built.

Marine Corps forward presence forces also engage in solving real-world problems. From mudslides to earthquakes to typhoons to nuclear meltdowns and tsunamis, forward-deployed Marine forces in the Indo-Asia-Pacific have acted as the theater quick reaction force, providing critical humanitarian aid in places like Nepal, Japan, Indonesia, and the Philippines. These humanitarian assistance and disaster response operations have not only provided a tangible demonstration of America's goodwill but have also re-

sulted in improved political access and influence with our allies and partners.

Finally, there is another sort of presence that is not often captured on the marquee or on a slide in the Commandant's Ops Intel update. By virtue of being part of a host nation community, there are myriad individual community actions and engagements that family members and civic groups undertake on a day-to-day basis. When my family was stationed in Japan, my wife was constantly engaged in the local community, my children attended Japanese schools and had Japanese friends, and we regularly attended local sporting events and festivals alongside our Japanese hosts. In my opinion, this sort of presence is undervalued.

The common ingredient to all these tiers and presence levels of effort is the human dimension. At its very basic foundation forward presence is effective because it ensures and enables human-to-human contact, engagement, and understanding. When individuals communicate, sharing ideas and criticisms, the space for misunderstanding is reduced. By persistently engaging with friends (and also challengers), we increase our familiarity with their patterns of thought, while decreasing the level of strategic and operational uncertainty that is inevitable in a dynamic international system driven by actions, reactions, and counteractions. Political systems as they interact with military systems are better understood. Operational and strategic options and decision space are increased.

Presence: Why? A Strategic Sketch

The Indo-Asia-Pacific region has enjoyed an extended period of relative stability, peace, and security. Since the end of World War II and the emergence of an international rules-based system, the region has seen remarkable and in some cases unparalleled economic growth. To say that this expansion would have been of such magnitude much less possible without significant U.S. Military presence is not seriously debatable. The literature is replete and consistent in the conclusion that the presence and interaction of U.S. Military forces forward deployed and engaged in the region have

been the bedrock of regional stability for the last 70 years.³

When viewed through the lens of strategic statecraft, forward presence takes on an additional role of military diplomacy. Regional stability and geopolitical environment that is predictably beneficial to U.S. interests and its allies depend in no small part on America's forward presence. The absence of Amer-

Mr. Lee is instructing us that *stability abhors a military vacuum*. He is instructing us that a critical component of a stable and omni-beneficial system in the Indo-Pacific region is U.S. presence. We have seen in clear and stark terms what the vacuum left by American retrenchment can mean in other parts of the world. The rise and onslaught of ISIS and the death spiral in the failing state

The bedrock of the military notion of deterrence is to discourage or prevent antithetical behavior through the perception or fear, cost, punishment, or failure.

ican power would leave a vacuum where unchecked competition, "could lead to widespread instability and conflict, endangering former friends and emboldening former adversaries."4 In a 2020 article in Foreign Affairs Thomas Wright of Brookings writes that reducing U.S. presence invites a panoply of strategic problems. He argues that retrenchment (or the lack of presence) is an incubator for deleterious strategic outcomes ranging from the establishment of volatile and exclusive spheres of influence on the proliferation of nuclear weapons.⁵ Taken in a still wider strategic field of regard, U.S. forward presence can be viewed with causal linkage to the rise and success of an inclusive, more liberalized world system. There is a sizeable gallery of critics who decry America's frequent military interventions over the last twenty years. Many of these same critics, though, will stop short of calling for the retrenchment of U.S. presence as a guarantor or foundation of security. A succinct and telling assessment of the Indo-Asia-Pacific comes from Lee Kuan Yew, the former leader of Singapore, often called the "Political Grandmaster" of the region:

[There is] a widely held consensus that the U.S. presence in the region should be sustained. A military presence does not need to be useful. Its presence makes a difference and makes for peace and stability in the region. This stability serves the interests of all, including those of China. ⁶

of Iraq on the heels of American withdrawal in 2011 is illustrative. As history would have it, U.S. forces returned to fill the vacuum.

The military-strategic record of the United States has been and is centered on deterrence as a first-order objective. While different interpretations of deterrence have given rise to varied theories, the bedrock of the military notion of deterrence is to discourage or prevent antithetical behavior through the perception or fear, cost, punishment, or failure.7 When married with an integrated approach to deterrence across other elements of national power, forward military presence offers an effective perception tool in from highly contested contingencies to lesser defined gray zone operations.

Presence: Why? An Operational Sketch

Presence for presence's sake is a losing strategy. It must be applied against strategic objectives and focused operational outcomes. Operationally speaking forward presence is at once about engagement and responsiveness. Out of these two characteristics comes trust, confidence, influence, and options. Through a multiplicity of OAIs, forward deployed Marine Corps forces learn to operate alongside allies and partners in the region to exploit common strengths and train to weaknesses. Contact time with foreign militaries, while engaged in military problem solv-

ing, cannot help but build a higher level of trust at all echelons. Interoperating builds an increased level of knowledge of tactics, techniques, and procedures and equipment that delivers a mutual sense of confidence. The value of this in solidifying stability and creating warfighting capability is obvious. Forces that know each other, know the personality of each other's force, and the capability and employment of their systems will be more effective in combat and operations as well as OAIs short of war. This effect cannot be achieved virtually.

Additionally, at the operational level, Marine Corps forces have taken on direct capability development efforts that will have strategic effects. Forward Marine forces are engaged with Japan, Australia, Korea, and the Philippines to formalize and institutionalize those allies' expeditionary and amphibious capabilities. This undertaking is significant, and its objectives can only be realized by maximizing continued military relationships using forward stationed forces and targeted forward presence OAIs. The overall impact of this effort? Our allies will possess credible, flexible, and interoperable expeditionary forces, enhancing their own national defense capabilities, and at the same time, improving their ability to operate with us and each other. The strategic extrapolation of allied combat power development as it relates to national policy and a regional strategy is clear: In the face of multilateral unified powers and a credible military response, a would-be challenger faces a completely different set of geostrategic issues than a simpler one-on-one dispute.

Another clear deliverable for forward deployed Marine Corps forces is increased readiness. Forward units undergo a near-continuous battery of exercises and engagements. While respectful of our partner nations' training and development, Marine Corps OAIs are also purposefully sensitive to achieving proficiency in their own mission essential tasks. Across all the warfighting functions, deployed units are afforded training repetitions under unique environmental conditions and real-world scenarios that cannot be du-

plicated in the rear. Simply stated, on balance, forward units gain and maintain a level of operational experience that is not possible from a surge layer alone.

The "tyranny of distance" is often the hue and cry of military planners and statesmen alike. In military terms, a given formation that is in a position to influence events brings faster decision cycles—militarily and otherwise. Presence is the defeat of distance. It provides options in the time domain

The 21st-century economic map has no national frontiers. This is not a bold statement.

and an inherently quicker response. "Being there" puts Marine Corps forces shoulder-to-shoulder with our allies and partners. Whether the operative metric is steaming days or flight time, forward presence solves many problems for the operational planner and significantly mitigates others. Marine Corps forces closer to the point of friction, when coupled with naval mobility and maneuver, contribute to our strategic deterrence and confer a distinct operational advantage.

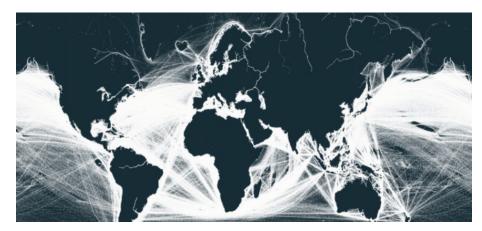
In the Commandant's 2020 force design report, the operational value of forward presence is called out as a fundamental constituent of our operational architecture. The report requires:

Focus on capabilities and force postures that maximize conventional deterrence such as capabilities that provide the option for us to strike effectively first from a force posture (location and disposition) that balances forward presence and integration with allies and partners and allows for the flexibility to dictate the time and place of action.

2022 and the Irrelevant Notion of Borders

The 21st-century economic map has no national frontiers. This is not a bold statement. Whether there is more intellectual comfort in the moniker of globalization, internationalism, market complexity, or the like, the free exchange of commodities and commerce that drives a truly global system does not and cannot have distinct borderlines on a map.⁸

Rather, global economic health requires relatively unfettered multi-domain circuitry. This circulation flows through the land's pace of politically bordered countries, incorporated regions, common sea space, airspace, and the pervasiveness of cyberspace. As a prime set of data, consider the United States economic linkages with respect to eleven Indo-Asia-Pacific countries: Australia, Brunei, China, Indonesia, Japan, Malaysia, New Zealand, Philippines, Singapore, South Korea, and Vietnam. The United States executed over \$1.3 trillion in trade with these countries in 2021.9



Traces of global sea trade routes. The world's prosperity pump operates outside national frontiers, not within them. For an interactive view of world shipping see: Shipmap.org. (Photo: Shipmap.org.)



Sea trade is essential to the volume of global trade worldwide. (Photo: National Ocean Service National Oceanic and Atmospheric Administration U.S. Department of Commerce.)

Geographically, this encompasses the Pacific Rim from Northeast to Southeast Asia, the Antipodes, as well as a good portion of the South China Sea rim.

Consider as an additional data point the flow of commodities in and through the South China Sea, which has an estimated annual value of approximately \$3.4 trillion (discounting the value of air transported goods above it).¹⁰ In a very real sense, the maritime trade routes traversing the South China Sea Routes form the jugular of regional, if crude imports, 60 percent of Japan's, 60 percent of Taiwan's, and 66 percent of South Korea's. It is fair to say that for these countries that a traditional frontier delimitation, when it comes to trade in energy, is irrelevant.

The myth that a global economic system can be protected from behind distant frontiers has been invalidated at least as far back as Genghis Khan, who created the first modern "world" economy. The point of all this in military terms is quite simple: If it is valu-

The myth that a global economic system can be protected from behind distant frontiers has been invalidated at least as far back as Genghis Khan ...

not global, trade. One-third of all the world's maritime traffic by volume, and over 50 percent of the world's merchant fleet, steams through these routes. The amount of East Asia-bound oil that traverses the South China Sea is six times the amount that flows through the Suez and seventeen times more than flows across the Isthmus of Panama. This accounts for 80 percent of China's

able, it must be defended. Clearly, these international conduits, in all domains, that make up the connective tissue of the modern economy require security and protection. It would follow then that a persistent military sentry is required to provide, in Mr. Lee's lexicon, "peace and stability" as well as, in my lexicon, the direct military options in defense of a high-value asset that knows

no borders. Therefore, presence is required. In the Marine Corps capstone concept document *Expeditionary Force 21*, the requirement for the presence of Marine Corps forces in this regard is clear:

Expeditionary Force 21 envisions a posture in which one-third of the Marine Corps' operating forces will be persistently positioned forward, with a greater variety of unit types distributed appropriately across areas of command responsibility. This gives each GCC the three-fold advantages of forward presence: the recurring dividends available from "soft power"; deterrence derived from credible and capable response; and the freedom of action created by expanded operational reach and tactical flexibility.

This foundation provides the "what" of the Marine Corps approach to forward presence as well as some of the "why." In *Force Design 2030* and its continuing refinements we see a reinforcement of this foundation with an architecture that clarifies the "why" in terms of a pacing challenge but just as importantly elucidates the "how."

What Price Empire?

While the sovereign terrestrial borders of the United States may not qualify for empire status, its economic borders, or lack thereof, certainly do. As exemplified above, the stakes for the U.S. across the globe, and certainly in the INDOPACOM AOR, in economic and alliance terms are colossal. The investment, in military terms, to maintain our position in the global economic system and the preservation of stability and access to this empire must be sufficient. There may be those who, while searching for economies and savings, will target the Marine Corps forward presence in favor of a more CONUS-based "surge" posture." While continually examining programs for more efficient positions is good business, we need to temper the search for dollar savings with the operational and strategic appreciations aforementioned.

Additionally, we will need to closely examine any side-by-side comparison of forward deployed force posture with alternatives to specifically cal-

culate the value differential. Many assume that forward stationed forces are more expensive in dollar cost than CONUS-based forces, but this is not always the case. We need to be careful and deliberate in this analysis. Take MCAS Iwakuni for example. It is the only master jet base with deep water port facilities the Marine Corps controls overseas. It supports 100 percent of the U.S. Forward Deployed Naval Force (FDNF) TACAIR (Marine Corps and Navy) to include the F-35. It already supports all Marine Corps aerial refueling assets in the western Pacific. Its port is LHA capable and will easily host forward-deployed Expeditionary Fast Transports. The base is a strategic power projection platform. Its upgrades înclude a brand new 8000x200 foot runway, refueling pits, advanced aviation simulators, state-of-the-art organizational and intermediate maintenance facilities as well as brand new housing, schools, recreational facilities, and all

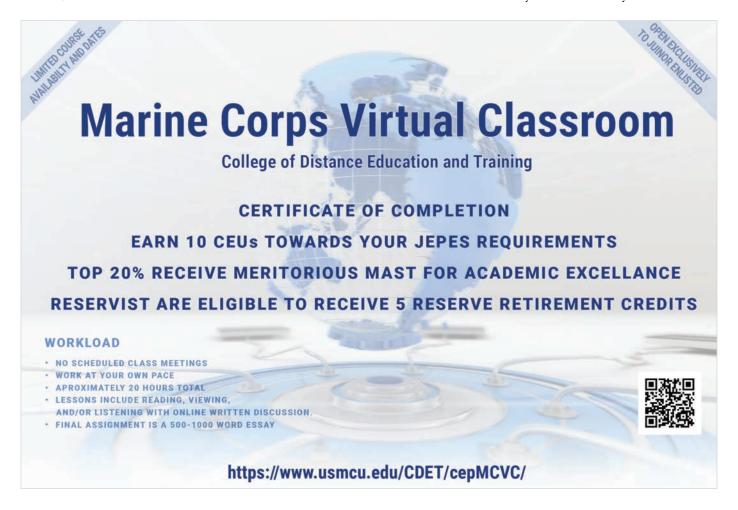
manner of quality-of-life support. When all improvements and construction are complete, the total investment is estimated to be approximately \$7.1 billion U.S. dollars. Of that figure, the U.S. Government will have invested about \$353 million. Not a bad deal.

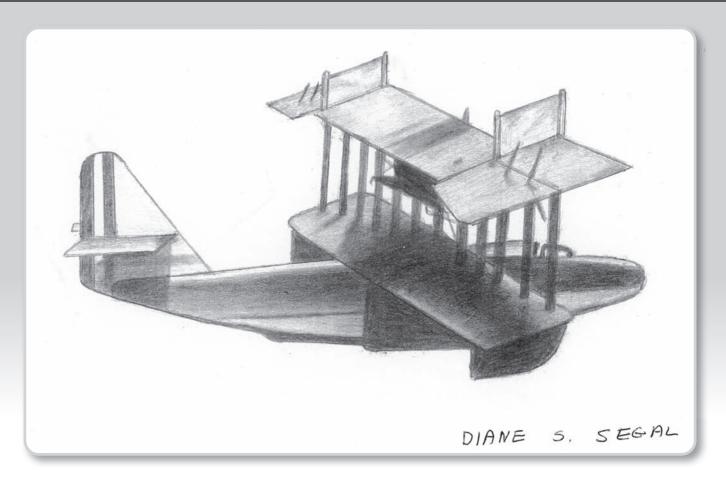
In fact, for Marine Corps forces deployed to Japan or Korea, our allies contribute 83–93 percent of the total costs for Base Operating Support and Facilities, Sustainment, Restoration, and Modernizations. The big idea here is that with operational and strategic advantages taken into account plus the very significant offsets that are provided by host governments, the total cost of forward-deployed forces on "the edge of the empire," at least in the INDOPA-COM AOR, is much more modest.

For naval presence forces like MEUs and targeted overseas AOI events sourced from CONUS to the FDNF, the dollar costs are higher. For an INDOPACOM exercise at a nomi-

nal battalion level, the cost can range anywhere from \$20,000 to \$8 million. This figure is made up primarily of the bills incurred for the transportation of people and things and host nation life support services. MEU-specific training typically incurs a bill of between \$700,000 to \$1 million. Projecting the MEU ashore can cost anywhere from \$17,000 on the low end to over \$1 million on the higher end, depending upon the scope and scale of the mission. 11

With force design initiatives in mind, it only makes operational sense to operate in the littoral environment that is already in contest. Operating from organic L-Class shipping the MEU brings with it sovereign U.S. policy that is maneuverable in the sea space commons and able to project across the littorals. In 2016, Kathleen Hicks led a study, along with Michael Green and Marc Cancian, that investigated a more optimal force posture in the Pacific. The study is aimed at the year 2025.





H-16 FLYING BOAT FROM THE PHILADELPHIA NAVY YARD

Written and Illustrated by DIANE S. SEGAL

Dedicated in loving memory to my mother,

DOROTHY M. SEGAL,

for her service to the Navy Department, Bureau of Aeronautics, Naval Air Experimental Engineering Command, in Philadelphia, Pennsylvania, as a civilian during World War II. Her work involved assisting in the preparation of confidential reports on radar, loran and sonar.

The Navy Department had a problem of aircraft supply when the U.S. entered World War I This was resolved in 1917 when the Naval Aircraft Factory, built at the Philadephia Navy Yard, was done

The original plan was for training planes but what was needed was aircraft for anti-submarine patrol
So the Factory, beginning production of the Curtiss
H-16 flying boat, had a new role

Anti-submarine patrol in World War I by U.S. Navy aircraft was the most important contribution
By preventing German U-boat attacks,
they provided the solution

The Curtiss Company's experienced workers did not need detailed drawings for every part

But inexperienced NAF employees did require complete information for their start

ADVERTISER'S CONTENT

Just 228 days after ground-breaking and 151 days from receipt of drawings came the initial flight
March 27, 1918 was the big day for the first NAF-built
H-16 and all went just right

Production increased and there was a need for more space An expansion of the Naval Aircraft Factory was authorized to provide the place

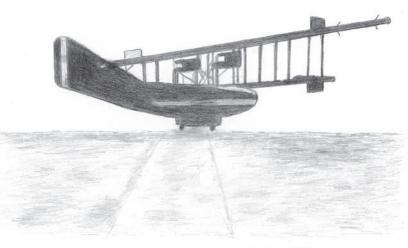
For a hangar, waterfront improvements and a storehouse to manufacture and assemble aircraft there was a need

The cost was necessary for the Naval Aircraft Factory to succeed

At NAF about 3,700 persons were directly engaged there Also, for the manufacture of parts around 7,000 took care

To aeronautical technology during the First World War, America's Liberty engine was an important contribution To power many aircraft types there was a distribution

The H-16 power plant consisted of 400 hp Liberty 12A liquid-cooled engines—there were two A pilot, observer, mechanic and wireless operator were the four who made up the crew



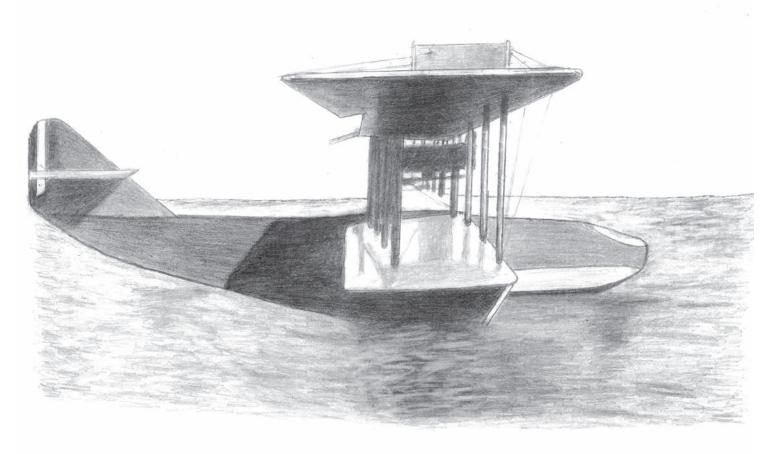
DIANE S. SEGAL

Four Lewis machine guns and four 100 lb or two 230 lb bombs were the armament

With a length of over 46 feet and a span of over 92 feet, the H-16 carried out the mission where it was sent

The H-16 flying boats served at foreign naval air stations At Killingholme, England, at Brest and St. Trojan, France and at Queenstown, Ireland, were their destinations

The Navy procured 274 H-16s and some served until 1928 The H-16 flying boat and its anti-submarine patrols were absolutely great.



The study recommended a significant augmentation of the Sasebo-based MEU/ARG presence. It does not stop there. Despite an assessed high dollar cost, Hicks et al., recommend that "the entire 10th Amphibious Ready Group

Notes

1. No amount of increased range, speed, artificial intelligence, or machine learning (to name a few) will ever turn a kinematic envelope into an inviolable and impenetrable bubble. While

The Marine Corps has a plan for a redesign that will confront the changing character of conflict, particularly but not solely in the Indo-Pacific theater.

should be moved from San Diego to Japan," and that, "In the long term the Navy and Marines would ideally add an 11th Amphibious Ready Group to the Pacific." Back of the napkin math puts the minimum number of L-Class ships recommended by Hicks et al., at 37. 13 11 ARGs, according to the study, were worth the price of empire.

Conclusion

Going forward the Marine Corps has a plan for a redesign that will confront the changing character of conflict, particularly but not solely in the Indo-Pacific theater. The cornerstone of this redesign is a military presence that provides a competitive advantage in time and capability. Of course, there are countervailing propositions versus presence and retrenchment. However, arguments to the latter (meritorious or not) do not square with the strategic record and logic of U.S. strategic tradition. The question of affordability of presence must be filtered through at least the opportunity cost of the investment alongside the criticality of the interest to be defended. In the case of the Indo-Pacific, the value cannot seriously be debated in economic terms. As far as opportunity cost goes, Dr. Hick's study says it best: "Forward stationed U.S. forces are one of the most important ways to signal U.S. political commitment to the region. The political and military value of forward presence from both permanently stationed and temporarily deployed forces is enormous."14

risk calculations and absolute lethality versus adversary systems will change, there will always be methods and counters to penetrate, exploit, and destroy. History is replete with this lesson. When we surrender to the "impenetrable WEZ" way of thinking, we surrender our thinking.

- 2. Dr. James R. Holmes and Commander Kevin J. Delamer, "Mahan Rules," *Proceedings*, (May 2017), available at www.usni.org. This article is very useful in reminding us of the stultifying effect of using superficial strategic bumper stickers in place of better strategic study, thought, and understanding.
- 3. While the usual Vietnam objection to the stability claim stands out, it is widely accepted that U.S. force presence in Japan, Korea, the Philippines, and Thailand framed and controlled the wider notion of regional stability.
- 4. Zalmay M. Khalilizad and Ian O. Lesser, Sources of Conflict in the 21st Century: Regional Futures and U.S. Strategy, (Santa Monica, CA: RAND, 1998).
- 5. Thomas Wright, "The Folly of Retrenchment: Why America Can't Withdraw From the World," *Foreign Affairs*, (March/April 2020), available at www.foreignaffairs.com.
- 6. Graham Allison and Robert Blackwill, "Interview: Lee Kuan Yew on the Future of U.S.-China Relations," *The Atlantic*, (March 2013), available at www.theatlantic.com.
- 7. Michael J. Mazarr, *Understanding Deterrence*, (Santa Monica, CA: RAND, 2018).
- 8. This is not a commentary on nation-state sovereignty. Nor is it a suggestion that the nation-state is dead or moreover that what we understand as national sovereignty is some arcane expression of power. Not nearly. The principles and progeny born of the Westphalia crew face no real danger in 2022. Quite the

opposite. As Michael Green writes in his book on U.S. strategy in Asia, By More than Providence, "It may be fashionable in some corners to argue that nation-states no longer dominate the international relations of Asia-that we now live in an era of epistemic communities, nonpolarity, multilateralism, and shared transnational challenges that diminish the centrality of national power. However, it is a fallacy to believe that multilateralism or transnational challenges will transform the geopolitics of Asia in the foreseeable future." The suggestion might be that in order to maintain the traditional pillars of national power, and the power to delimitate national frontiers, economic borders must be boundless and kept that way by the power of the nation-state.

- 9. Information regarding trade is available at www.census.gov.
- 10. Even a casual student of the geopolitics of the South China Sea will find a wide variance in trade and commodity transit estimates ranging from the mid-three trillions to the mid-five trillions. I have elected to use an estimate cited in Staff, "China Primer: South China Sea Disputes," (Washington, DC: Congressional Research Service, February 2021).
- 11. Overall costs for ground units composited to form a MEU is approximately \$8.5M (green dollars) and for aviation units associated with the MEU is approximately \$30M (blue dollars). These are readiness costs that would be assessed whether the units were deploying as a MEU or not.
- 12. Michael J. Green, Kathleen Hicks, Mark F. Cancian, "Asia-Pacific Rebalance 2025 Capabilities, Presence, and Partnerships," *CSIS*, (January 2016), available at www.csis.org.
- 13. The number is based on 4x L-Class in an FDNF ARG fleet plus 3x L-Class in a CONUS ARG. No calculation is attempted versus ship operational availability (Ao) rates. The twenty-year average of L-Class Ao is 63 percent. The Ao for the last five years is 45 percent. Applying these numbers to a readiness generation, deployment, and recovery cycle would most likely drive the required number of ships higher.
- 14. "Asia-Pacific Rebalance 2025 Capabilities, Presence, and Partnerships."





The Case for Allies and Partners

Building and sustaining relationships

by BGen Sean Salene

ark Twain is reputed to have said, "History does not repeat itself, but it rhymes." Since our War of Independence, we have relied on other nations to help us achieve our security objectives. French troops, ships, and financial support were critical to our victory at Yorktown in 1781 (approximately 600 French gave their lives, either on land or at sea, to win that pivotal battle). In later wars of the 20th and early 21st century, the armed forces of the United States relied upon its many allies and partners to defeat tyranny, contain communism, fight terrorism, respond to crises, and enable collective security around the globe. As we move forward in the 21st century, the United States will continue to need its allies and partners to deter aggression and defend our shared interests in the context of at least two authoritarian rivals. Existing and emerging strategic guidance points to the value of allies and partners which could be decisive in deterring the next war. To be more effective in implementing that guidance, Marines should deliberately consider how to approach building and sustaining our relationships before the next crisis or conflict occurs. One approach begins with a review of a common theme in strategic guidance, follows with personal preparation to better implement the guidance, and considers the resources available to help us better work with our Nation's network of allies and partners to deliver interoperability necessary for the common defense.

Common Theme

In March 2021, the President signed the *Interim National Security Strategic*

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A marker "Commemorating the French Soldiers and Sailors who gave their lives for American Freedom," Yorktown Battlefield, National Park Service, taken on a tour with the author's family in October 2021. (Photo provided by author.)

Guidance. ¹ That guidance identifies national security priorities, to include the protection of the security of the American people, notes an enduring interest in expanding economic prosperity and opportunity, and highlights our commitment to "realizing and defending the democratic values at the heart of the American way of life." ² Importantly, the President's guidance notes that we cannot do this alone: "For that reason, we will reinvigorate and modernize our alliances and partnerships around the world." ³

While neither the 2022 National Defense Strategy nor National Military Strategy has been released at the time of this article's writing, recent public comments by senior defense officials suggest that the value of allies and partners will be central to both. "Succeeding through Teamwork" is one of the three strategic priorities of Secretary of Defense Lloyd I. Austin III. He casts our allies and partners as a force multiplier, linking our success in facing complex challenges across the globe to how closely we work with them to secure our common interests and promote shared values. Importantly, Secretary Austin also notes our limitations, and how our allies and partners can help:

We cannot meet our responsibilities alone, nor should we try. Rather, we will consult with our allies and partners and, when appropriate, we will act together ... making us stronger as a team than the sum of our individual parts.⁴

Secretary Austin has also called the concept of integrated deterrence a new way to approach deterrence. Undersecretary of Defense for Policy, Dr. Colin Kahl, has discussed integration in terms of being integrated across domains, theaters of competition, and the spectrum of conflict. He also noted the concept of integrated deterrence included being "integrated across our allies and partners, which are the real asymmetric advantage that the United States has over any other competitor or potential adversary." Chairman of the Joint Chiefs of Staff, Gen Mark A. Mil-

Service Maritime Strategy also notes, "alliances and partnerships remain our key strategic advantage," and calls upon the Services to "strengthen and expand our network of relationships to ensure our success in competition, crisis, and conflict."

Here, the value of Naval Expeditionary Forces in general, and the stand-in force in particular, is acute. Our forward

extension of the Fleet—will be first on the scene, first to help, first to contain a brewing crisis, and first to fight if required to do so.⁹

There are opposing views on the value of allies and partners. Some take the view that many do not have highend capabilities or that interoperability is hard to achieve. It is difficult to objectively measure the return on investment in security cooperation, and we may risk entanglement or dependence on others that could limit our freedom of action. However, the Secretary of Defense has already given his view that we cannot fulfill our responsibilities on our own. We do not have the capacity to be everywhere all the time. Our allies and partners have capabilities and authorities we do not. They provide access, basing, and overflight permissions that we will need to deter, and if necessary, to fight. In many ways, we are playing an away game. If we think about it differently, we can turn our key strategic advantage of allies and partners into a decisive one—to defeat an aggressor's

Maj Timothy A. Ornelas noted in his excellent October 2021 *Gazette* article that the People's Republic of China's active defense strategy con-

It is difficult to objectively measure the return on investment in security cooperation, and we may risk entanglement or dependence on others ...

ley, noted in Congressional testimony that our allies and partners are the keys to maintaining the international rules-based order and peace and prosperity for the United States and the globe. In facing security challenges, the Chairman added the important point that working with allies and partners can help them help themselves by building capabilities, interoperability, and relationships:

Doing so allows us, our allies, and partners to counter the coercion of our strategic competitors, the malign activity of regional threats, and meet the varied security challenges state and non-state actors, terrorism, climate change, and pandemics or any other threat that may emerge. We are stronger when we operate closely with our allies and partners.⁶

For the Naval Services, the Secretary of the Navy specifically calls upon us to strengthen alliances and partnerships in response to strategic competitors who pursue confrontation and coercion:

Our Department will strengthen military-to-military relationships with existing allies, leverage specialized allied experience in regional operations, and expand and deepen our partnerships with like-minded democracies around the world.⁷

Following our Secretary's guidance will enable the Navy and the Marine Corps to operationally integrate allies and partners into our concepts to support deterrence. In the same vein, the Trideployed and stationed are already on scene to do the strengthening and the expanding of our network of allies and partners—day in and day out—inside our adversary's weapons-engagementzone in campaigning, crisis, and conflict. They do not need a strategic lift to get to the point of need alongside allies and partners to deter malign behavior because they are already there. As the Commandant has said,

in crisis prevention and crisis response, the Fleet Marine Force—acting as an



A Marine F-35B Lightening II with Marine Fighter Attack Squadron (VMFA) 211, Carrier Strike Group 21 "The Wake Island Avengers" aboard Her Majesty's Ship Queen Elizabeth demonstrates the global reach and interoperability of the U.S. and U.K. armed forces and the deterrence and defense capabilities of the NATO Alliance. (Photo by 1stLt Zachary Bodner.)

tains the concepts of effective control and localized war. He argued the presence of U.S. military capabilities in the Indo-Pacific "would require Chinese military planners to account for the potential for multiple dilemmas in a conflict."10 Following this thought, and in line with our guidance on allies and partners, we should play to our key strategic advantage by working with our broad network of allies and partners, adapting the Chinese concept of networks and connections known as Guan Xi.11 Doing so "directly challenges the PLA's ability to control the scope, duration, and means of a conflict by introducing a complex adaptive system of cooperation underpinned by a competitive advantage that the CCP cannot replicate."12

Defeating an adversary's plans and strategy is a strength of stand-in forces. Stand-in forces provide the joint force the capability "to disrupt an adversary's plans at every point on the competition continuum,"13 the stand-in forces' theory of success. As stated in the *Concept for* Stand-in Forces, "In day-to-day activity, SIF deter potential adversaries by establishing the forward edge of a partnered maritime defense-in-depth that denies the adversary freedom of action." To operationalize the concept, "the impact of working with allies and partners cannot be overstated; it is key to undermining the adversary's plans and is a primary reason stand-in forces' presence must be persistent."¹⁴ For deterrence to work, two actors must believe the defense is credible: the aggressor and the ally or partner being defended.¹⁵

Personal Preparation to Implement

To begin, Marines should first think. We can apply our tried and true leadership principle to "know yourself and seek self-improvement" as we consider an effective approach to working with a specific nation or group of nations. We are an elite, storied organization, but this does not mean we are gifted with all the answers. If we accept that premise, we can approach our relationships with a sense of humility that authoritarians lack. In the context of working with allies and partners, an approach open to learning from others can model our

values. Where our resources are limited, we may find synergy, as was recently seen in the Royal Navy's historic, global deployment of *Queen Elizabeth*, with American Marines and Sailors aboard. Seeking to understand the needs of our allies and partners, and where and how we can build our relationship, can lead to achieving shared objectives.

Next is reading and listening. Selfstudy will help gain an initial understanding of an ally or partner's perspective and create a hypothesis of where the shared space of cooperation exists. Actively listening to our allies and partners will help us test our initial hypotheses and build our knowledge. One Commandant of the Marine Corps Fellow noted recently that "candid, clear, and respectful communication is especially important when discussing divergent views and disagreements between each other's interests."17 This will help us engage in dialogue, a search for truth, as we consider the position of others and the goals they profess. Language can sometimes be a barrier but putting oneself in the shoes of the other is a technique that helps overcome that barrier. Our Commandant captured this sentiment in a recent interview when

allies and partners. For me, participation in Exercise COBRA GOLD in 2019 provided a powerful illustration.

Illustrative Example

The 38th iteration of the annual theater security cooperation event known as COBRA GOLD took place in February 2019 in the Kingdom of Thailand. As one of the largest theater security cooperation exercises in the Indo-Pacific, and an integral part of the U.S. commitment to strengthen our engagement in the region, COBRA GOLD 2019 provided the opportunity for approximately 29 nations to improve capabilities to

plan and conduct combined and joint operations; build relationships among participating nations across the region; and improve interoperability over a range of activities, including enhancing maritime security, preventing and mitigating emerging disease threats, and responding to large-scale natural disasters.²⁰

How Marines approached supporting the staff exercise was important. While the U.S. staff trainers were pre-disposed to running a standard planning process for a typical scenario with a fictitious

... working shoulder-to-shoulder on a shared objective can deepen understanding and build interoperability. Understanding ... is the highest class of knowledge.

he talked about working with allies and partners, suggesting an approach that begins by asking, "what are you trying to do, and how can we help you get there faster?" 18

Finally, working shoulder-to-shoulder on a shared objective can deepen understanding and build interoperability. Understanding, as our doctrine states, is the highest class of knowledge. It "allows us to anticipate events—to recognize in advance the consequences of new or impending developments or the effects of our actions," which in turn can unlock opportunity. Multi-national exercises provide excellent opportunities to better our understanding of our

country that progressed from steady state to crisis to conflict, our Thai three-star leader had a different idea. He professed his intent to apply a philosophy he learned from Thai kickboxing. He preferred to start slow and keep options open. He wanted to preserve the ability to go fast and hard but only if needed. His approach would delay any potential kinetic activity to the last moment, to enable a softer hand of diplomacy to work. In his mind, this would better fit the coalition of nations in his area than would a textbook response.

After hearing our Thai leader, it was important to translate his intent into staff action for the play of the problem.



	R150	R400	R600
	Tactical & Support Vehicles	Flagship RWS in Service Worldwide	Combines Medium Caliber Firepower with Third Effectors
Lethality	Lightest RWS to mount .50 ca Can also mount LMG-M, M134D & MK19	Lightest RWS to mount 30x113mm cannon with subcaliber coax and optional third effectors including Javelins	Dual weapon configuration with 30x113mm cannon and subcaliber coax, and configurable with missile pods (Javelin, Stinger, Coyote, etc.)
Weight Above Roof (with Weapons & Ammunition)	<350 lbs	<1,000lbs	<1,600lbs
Stability Under Fire	<1 mrad		
Detect/ Recognize/Identify - Day Camera	>12km / >5.6km / >4.7km		
Detect/ Recognize/Identify - Thermal Imager	>13.7km / >5.1km / >4km		



Photo taken of COBRA GOLD 2019 STAFFEX members, Kingdom of Thailand, February 2019. Note the Thai STAFFEX Commander is second from right, in the first row. (Photo provided by author.)

As the commander for the staff exercise, it was our duty to listen to him. Second, it was important to every other Thai that we strove to meet the intent of our shared commander in the exercise. Third, it was important for the other participating nations to observe how Americans treated their hosts.

Adaptation caused us to slow down the planning process. We could have sped up, but that would likely have resulted in a dynamic familiar to many participants in multinational planning: the best English speakers step forward to work with American planners, while those who speak English less well stay on the outside. This would have created two groups of people learning at different speeds with different outcomes, with one group learning far less than the other. A better way was for the Marines to adapt the planning process to the environment and the hosts, slow down, and instill pauses into the staff rhythm to cross-level and enable questions and answers so that all learned. While slower, listening, installing feedback loops, and ensuring that all participants were part of the planning better met the objectives of the exercise—to build relationships and interoperability. It also served to educate the Marines, Soldiers, Sailors, and Airmen on the U.S. side of an alternate, and Thai, way to solve the staff problem.

At the conclusion of the exercise, one Thai participant noted that the Marines' approach was different than working with the Chinese. The Chinese were pedantic, it was relayed, and often dictated the course of their exercises with less give-and-take. In the broader scheme of things, being our best selves as Americans—listening, treating others with respect, compromising on methods, and achieving shared objectives—contrasted well with an authoritarian approach.

Resources

There is no dearth of unclassified resources available to Marines who work with allies and partners, from encyclopedic data produced by the State Department and CIA to deep analysis produced by academic and think tank communities in the United States and overseas. Our Service's professional journal is also a rich resource. From 2ndLt Kayla Olsen's article on emotional intelligence²¹ to BGen Bill Bowers, Col Thomas Wood, and Dr. Jim Holmes on the U.S.-Japan alliance making for a "stronger home team"²² to deter aggression, our journal is full of insights we can leverage to prepare for our own engagements.

Additionally, the Marine Corps has a broad and diverse body of foreign

expertise in the International Affairs Program. This program,

identifies, develops, and manages a professionalized cadre of subjectmatter experts in regionally-focused political-military affairs who will possess advanced education in regional security studies, regional experience, and advanced linguistic skills. The program prepares Marines to serve as leaders, principle staff, planners, and advisers on capabilities for assignments on tactical, operational, and strategiclevel staffs, joint and combined assignments, and for duty with interagency organizations in order to improve MAGTF plans, operations, security cooperation, and intelligence efforts.²³

Currently, hundreds of foreign area officers, regional affairs officers, and foreign area staff NCOs (FAS) serve in embassies and organizations across the world, focused on gaining and maintaining relationships with our allies and partners.

There are approximately 872 Marines in the Corps today who have been trained and educated to provide perspectives, and lessons learned, to assist in strengthening partner relationships. This number also includes our Personnel Exchange Program graduates who are embedded at all levels of partner forces. These foreign area officers, regional affairs officers, foreign area staff NCOs, and Personnel Exchange Program are in the fleet or supporting establishments ready to assist units and individuals preparing for an upcoming exercise or engagement. There is also knowledge and experience in our current and former Marine Security Guards. Finally, there are fleet experiences from those who are stationed overseas with our allies and partners, have previous experience from their civilian lives, or deploy with them. For example, Marines and Sailors of VMFA-211 will undoubtedly return to their home station with new perspectives to share from their experience being aboard the Royal Navy's *Queen Elizabeth* as an integrated element of the Carrier Strike Group in 2021. Gaining and sharing their lessons, as with all who have foreign experience, is valuable. Finally, leaders at all levels will likely find that their Marines will

learn and grow in the process of working with allies and partners, providing them potentially life-long benefits.

Conclusion

Winston Churchill is quoted as saying, "the only thing worse than having allies is not having them." ²⁴ Perhaps he was being humorous, but long experience in our recent wars has shown we cannot surge trust when a crisis occurs. While effective military-to-military relationships do not automatically translate into political decisions to align with the United States in crisis, the absence of effective relationships makes a conflict more likely to occur and our ability to succeed in it less.

It is incumbent upon us to successfully approach our allies and partners to make a strategic advantage decisive in the concept of integrated deterrence. Therefore, we should think, read, listen, and act with a sense of humility as we work with allies and partners to enable the theory of success in A Concept for Stand-in Forces. Marines have long known the value of the Strategic Corporal. All of us can model our values as we approach our relationships with allies and partners—our "greatest strategic asset."25 With respect, discipline, and our values to guide us, we can employ the talents of our most precious resource, our people, to their best effect to deter aggression and set conditions to win if deterrence fails.

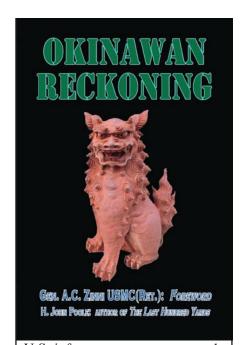
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U.S. infantrymen are now grossly under-prepared for WWIII. To find out why, one must revisit WWII. They will need what was tactically discovered on Okinawa. Foreword by Gen. A.C. Zinni. Purchase for \$13.95, with no shipping charge, at https://posteritypress.org.

Blunting Aggression-Building Access

The essential contribution of allies and partners and the Marine Corps' role in assuring peacetime access

by LtCol Noel Williams

he failure to engage and deter Japan's expansionism in the 1930s resulted in the United States having to fight a World War in the Pacific in the 1940s. The 1941 attack on Pearl Harbor galvanized the U. S. populace to respond with overwhelming force to roll back Japanese aggression and to craft an enduring international rules-based order across Asia and the Pacific.

This reaction to the Japanese attack was enabled by an economic asymmetry that gave the United States a deep and incontrovertible material advantage. Barring a change in U.S. resolve or mass operational incompetence, the Japanese could not succeed once U.S. industrial might was harnessed for military production.1 The United States had the capacity to build a military possessing overwhelming military capabilities that could isolate Japanese territory and occupied holdings to destroy the Japanese military in detail.² Japan possessed only two of these three ingredients for success, resolve and military operational competence; however, it lacked the third, the industrial capacity for material overmatch.

Today, the geography is the same, but the economic and industrial capacities of China and the United States are much closer to parity than those between Japan and the United States in the 1940s. In fact, in purely military-industrial capacity, China has important structural advantages over the United States, especially in its shipyard capacity, steel production, and faster acquisition timelines for major weapons systems. Thus, in the current U.S.-China compe-

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tition, the United States has structural disadvantages that were primary sources of its strength last century. Disadvantages in manning and equipping the military place a premium on national resolve, the competence of executive leadership, and military competence. This more symmetrical correlation of forces vis a vis America and China also requires strategic competence and finesse for success. In short, a conflict between China and the United States would at best be a close-run affair, requiring Washington to be strategically and operationally excellent to succeed because the buffer provided by economic and material overmatch during World War II no longer exists.

It is unlikely that a Chinese attack on Taiwan would have the same bracing effect on U.S. resolve as did the surprise attack on Pearl Harbor. This asymmetry of interest is a critical element as the outcomes of our more recent wars attest. Having removed material overmatch and unwavering resolve from the equation, we are left with strategic and operational competence as the principal levers of military advantage. Given the potential catastrophic consequences of armed conflict between two nuclear-armed adversaries, tightly coupled in a globalized economy, this structural

correlation of forces makes a strategy dedicated to defeating the People's Liberation Army (PLA) exceedingly risky.

Asymmetry of interest, coupled with an ever-increasing symmetry in military capabilities, strongly commends a focus on deterrence. The costs and length of a clash of arms could be ruinous. A conflict between the United States and China would likely look more like World War I than World War II, with trenches replaced by islands, intervening seas as no-man's land, and missiles rather than machineguns and artillery as the primary form of lethality. The prospects of such a slugfest between nuclear-armed adversaries should be adequate motivation to invest serious time and resources in preventing such an eventuality.

In the case of World War II, the United States did not respond with offensive military action to Japanese expansion until after Pearl Harbor. Such a reactive strategy is unlikely to succeed against a closely matched adversary that can potentially halt our attempted rollback and overmatch our military production capacity. Thus, the acme of success is to prevent the expansion from happening in the first place.

The United States and its allies and partners are admittedly late to game in the South China Sea since China has expanded significantly throughout this region over the past two decades, so the key will be to ensure China does not continue expansion beyond the first island chain. This can only be accomplished with allies and partners because the wisest Chinese strategy would be to continue its current below-the-thresh-



The best way to demonstrate U.S. commitment is through many small, visible presence and engagement activities like bilateral training and exercises. (Photo by Cpl John Lamb.)

old-of-war expansion. This is why a U.S. military strategy focused on sinking the Chinese Navy is inadequate: it does not prevent China from expanding its coercion and regional control.

An integrated approach to deterrence is essential to ensure China cannot continue to "boil the frog" and gain strategic advantage through non-combat aggression. Should tensions escalate toward military action, robust and flexible deterrence options are critical to allow time for both parties to understand that conflict is counterproductive, with political, economic, and humanitarian consequences that obviate any anticipated advantage gained through military action?

Importantly, there is another key difference between now and World War II, and that is the power, influence, and capacity of our allies and partners. They have the capacity to rebalance the strategic framework to one looking much more like the favorable position we possessed in the 1940s. The systemic advantages arising from this diplomatic, economic, and military recalibration are worthy of our time and investment.³

Unfortunately, there is evidence that the DOD's priorities are not focused on this sort of cooperative deterrence. The DOD 2021 Strategic Posture Review provides a strong indicator to China and

our Pacific allies and partners that we are not serious about the strategic competition called for in the 2018 National Defense Strategy. It largely maintains the status quo when our Pacific posture is clearly deficient to counter Chinese aggression. In simplest terms, the current posture is the one that China used to optimize its current strategy. In The Long Game, Rush Doshi persuasively outlines China's decades-long phased strategy to blunt U.S. strengths and then build capabilities to directly challenge U.S. influence in Asia.

Doshi explains that in implementing what Xi terms Peripheral Diplomacy,

military instruments were a tool for achieving greater regional influence, including through intensified security ties with neighbors, influence on resolving territorial disputes, and the provision of public security goods. Regarding ties with neighbors, Xi's call for a 'Community of Common Destiny' often stress[ed] the importance of China expanding security cooperation with Asian neighbors.⁴

The United States needs to develop its own "community of common destiny," and the Marine Corps would have an important role to play in such a strategy to build access to allies and partners. The Marine Corps has two-thirds of its operating forces in the Pacific. III MEF, headquartered in Okinawa, has traditionally engaged in annual exercises and various engagement activities throughout the region, so it is easy to expand into additional activities in support of a new strategy of engagement.

The best way to demonstrate U.S. commitment to strategic competition is through an accumulation of many small but tangible actions that begin to move us from conceptual rhetoric to physical action. Modest increases in funding to III MEF, perhaps resourced from the Pacific Defense Initiative, could build upon its current foundational activities and yield substantial benefits.

In A Guide to Extreme Competition with China, RAND explains how the PLA has been executing a similar strategy for many years. RAND states,

Since 2004 the PLA has also been ordered to focus on mastering 'new historic missions' or 'diversified tasks.' These include activities such as garnering prestige domestically and shaping China's image abroad by participating in multilateral exercises and military diplomacy, engaging in counterpiracy efforts and providing commercial shipping escorts, conducting noncombatant evacuation operations, supporting counterterrorism operations, providing military medical assistance to foreigners, contributing to humanitarian assistance and disaster relief missions, engaging in polar exploration and rescue, pursuing space exploration, and ensuring global peace and stability. Such activities serve to justify distant operations that can earn the PLA accolades at home and abroad while enabling it to test its power projection capabilities and concepts.⁵

Chinese engagement activities demonstrate that actions speak louder than latent warfighting readiness in the current competition.

INDOPACOM, in coordination with the Department of State, could refine its theater engagement plans to focus on gaining access for building mutual deterrence capabilities and capacities. The results of such efforts are essential to Marine Corps force design planning and implementation as it is critical to understand what levels of ac-

cess are possible and how force design can be tailored and prioritized to maximize the most promising outcomes. For example, some capabilities like sensors, communications, and logistics might have a lower bar for access than missiles, large formations, or fixed bases. This sort of real-world feedback into force design planning is overdue. Access is far from a given, and the United States needs a coordinated whole-of-government campaign to build pre-conflict access in order to be postured to support U.S. national interests, especially in the Indo-Pacific theater.

Building Access

A number of options can be envisioned for building and sustaining U.S. access to this dynamic region.

- 1. Expand training and exercises. III MEF currently conducts many exercises of varying size and scope, such as COBRA GOLD with Thailand, BALIKATAN with the Philippines, YAMA SUKURA with Japan, and the Darwin Rotation with Australia. Either adjusting these traditional exercises for greater focus on the deterrence mission set or adding additional training opportunities to achieve these ends would offer important opportunities for interaction among U.S. forces, allies, and partners. It is also important to expand the number of countries involved in these exercises.
- 2. Develop dual-use, resilient infrastructure. For this discussion, dual-use infrastructure consists of facilities or physical assets that support peacetime activity in the host nation but can provide militarily relevant capabilities when required. An example would be a road built to standards that would allow it to be used as a runway or a storage facility that supports local uses, such as supplies for natural disasters, but could also house logistics for expeditionary operations. Given limited warning times for a conflict and long-range precision fires, a traditional surge and stockpiling of logistics support is not feasible, thus placing a premium on distributed prepositioning. Even the act of discussing and planning such infrastructure is a positive step to increase engagement and provide tangible evidence of commitment.

Dr. Stacie Pettyjohn from the Center for a New American Security reinforces the importance of distributed infrastructure and passive defenses, considerations that are fundamental to emerging Marine Corps operating concepts. She states:

Passive defenses minimize the damage of an attack by improving the ability of the target to withstand a strike, recover, and continue critical military operations ... Decades of RAND research has demonstrated that passive defenses greatly improve the survivability of U.S. aircraft and are useful against a range of threats from swarms of drones to ballistic and cruise missiles and hypersonic weapons. Ideally, one wants a diverse portfolio of active and passive defensive measures, which reduces the probability that an attack succeeds. Yet the U.S. military is overfocused on active defenses, such as surface-to-air missiles, electronic warfare, and defensive combat air patrols, which seek to intercept and neutralize a threat before it reaches its target. Passive defenses offer an affordable and effective way to counter a range of threats to U.S. bases and forces, but they lack strong advocates in the services, Congress, and industry and thus tend to be overlooked in favor of active defenses.6

Access is far from a given, and the United States needs a ... whole-of-government campaign ...

3. Reconceive prepositioning. The Maritime Prepositioning Force was developed as an answer to logistical support shortfalls caused by a declining amphibious ship inventory. The original three Maritime Prepositioning Squadrons have been reduced to two, and this number will be reduced to one squadron in the near future. As in the 1970s, when resource constraints led to Maritime Prepositioning Force as

a creative alternative to larger numbers of traditional amphibious ships, today we need to develop new ways to ensure necessary military materiel is available where and when needed. A long-range precision strike suggests a greater distribution of assets across more numerous platforms and facilities—afloat and ashore. Allied and partner ports, harbors, and facilities ashore offer options worthy of exploration.

- 4. Provide improved situational awareness. Reconnaissance/counter reconnaissance is equally useful to us, our allies, and partners. Intelligence, surveillance, and reconnaissance (ISR) are important in peacetime and war. Encouraging allies and partners to establish permanent operational command centers, enhanced by U.S.-provided ISR and manned with U.S. liaison officers, enables exposure of Chinese malign activities while simultaneously building interoperability that would be invaluable during conflict. Sensor-equipped expeditionary advanced bases could provide a low footprint, high-impact contribution to maritime domain awareness.
- 5. Demonstrate the utility of new technologies and techniques: unmanned, passive defenses, MILDEC, C4 interoperability, combined integrated command and control. Amphibious ships are ideal mother-ships for employing unmanned air, surface, and subsurface systems as well as facilitating allied and partner integration with these systems by providing a persistent, self-sufficient platform able to interact with their militaries and law enforcement agencies.

Retired Japan Ground Self-Defense Force General Isobe explains,

When a Stand-In Force, a Marine Corps unit designed to generate technically disruptive, tactical stand-in engagements that confront aggressor naval forces with an array of low-signature and affordable platforms and payloads, operates along the First Island Chain, it would undoubtedly be joined by SDF units deployed to the Southwestern Islands.⁷

The synergies described by Isobe allow perfect venues for cooperatively developing new capabilities.

6. Diverse and mutual learning exchange. Importantly, the initiatives



MQ-9B STOL will be the first unmanned aircraft in its class to offer big-deck amphib takeoff and landing.









IDEAS & ISSUES (ALLIES & PARTNERS)

recommended here are reciprocal. We have as much to learn from allies and partners as they have to learn from us. This two-way peer relationship is an important element in developing trust and confidence for all participants.

7. Catalyze combined capabilities. Developing deeper, long-term relationships on a permanent basis, rather than the current periodic, short-term, exercise-focused engagement, will lead to improved interoperability and create opportunities for combined operations and standing combined force elements. For example, U.S. Coast Guard elements working with a host nation for maritime enforcement operations could be combined with Marine Corps ISR assets to provide improved maritime domain awareness for a range of activities from search and rescue, to fisheries enforcement, to countering threating PRC maritime militias or other naval force aggressive actions.

As Gen Isobe articulates,

To conduct well-coordinated and timely bilateral operations, both forces [JGSDF and USMC] need to elaborate on joint planning. Questions that arise include: to what degree do both commanders delegate authority to the coordination center, or how is the Intelligence, Surveillance, and Reconnaissance (ISR) of information or data between the two forces shared? These efforts are critically important for mission accomplishment, as our adversary would conduct joint operations under a single commander. ... When conducting the USMC's expeditionary advanced bases Operations and JSDF's territorial defense operations, targeting is surely one of the most challenging issues for both forces.⁸

Isobe further recommends,

To strengthen the military-to-military relationship, both forces should align their respective roles, missions, and capabilities, and establish an operationally ready, responsive bilateral command-and-control architecture.⁹

This example regarding Marine Corps and JGSDF cooperation is equally applicable across other allies and partners in terms of the need to work closely together now to achieve the interoperability necessary for effective combined operations.

8. Establish additional liaison billets in allied and partner militaries. Logistics, installations, intelligence, counterintelligence, infantry, and fires officers and Marines would be especially relevant for improving our situational awareness and that of the host nation. Permanent assignment of liaison officers would vastly improve upon the periodic engagement achieved through exercises and would allow units not based in the first island chain to gain situational awareness and insights for tailoring their training.

9. Build interpersonal relationships through cross-assignment of personnel. Similar in benefit to liaison billets, cross-assignment of personnel to fill existing billets is a beneficial way to build relations and interoperability. For example, the Marine Corps has done this sort of cross-assignment for many years with the Royal Marines and Royal Air Force but expanding this practice to allies and partners in the Pacific region would benefit all parties. This approach is important to develop a deeper understanding of doctrine, tactics, techniques, procedures, technology, and culture—topics that cannot be fully appreciated with periodic interactions.

10. Facilitate diplomatic dialog. Developing access and infrastructure as described above provides a useful construct for the Department of State to engage allies and partners and develop area expertise and professional relationships with their counterparts. A negotiation for obtaining a small storage facility could be the foundation for cultivating issues of much greater importance.

In the 20th century, the Marine Corps' role was to gain access and roll back enemy expansion. In the 21st century, the Marine Corps' first priority within an integrated deterrence strategy is to gain and maintain access to ally and partner territory in order to build deterrent capacity and positional advantage. In this phase, the metric for success is not the throw weight of offensive capabilities the Marine Corps provides, but rather the diplomatic and policy opportunities our stand-in forces enable. Diplomatically, gaining access versus not having access is of far greater significance than the specifics of how that access manifests. Whether access entails one missile or 100 missiles, the most important issue is the demonstrated alignment of interest.

Should deterrence fail, the Marine Corps will resume its 20th-century mission to roll back an expansionist power and defeat its military forces. Thus, in assessing the Marine Corps' contribution to the joint force, one must consider not only its organic warfighting capabilities but also the positional advantages it affords the joint force and the allied and partner capabilities it enables. First to deter, first to fight. Building access in peace, gaining access in war.

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The Many-Headed Hydra

An Australian Army-U.S. Marine Corps bilateral landbased naval strike network

by LtCol Judd Finger & Maj Tommy Gains

"Stand-in forces (SIF) reassure the Nation and our allies and partners. SIF deter the application of military power on the part of adversaries by establishing forces designed to persist forward alongside allies and partners within a contested area, providing the fleet, joint force, interagency, and allies and partners more options for countering an adversary's strategy ... In the event of armed conflict, SIF remain forward in the contested area alongside allies and partners to support naval and joint campaigning."

—A Concept for Stand-In Forces

"More capable and active regional military forces, and expanding anti-access and area denial capabilities, require Defence to enhance its deterrence posture. Army's reputation as an effective and deployable force contributes to deterring actions against Australia's interests. Army will play an important role in developing capabilities, such as long-range missiles and special forces, that can engage or threaten adversaries at long-range. These increase the potency and survivability of the Joint Force. This in turn increases options for deterrence."

—Army In Motion: Army's Contribution to the Defence Strategy–Edition Two

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The United States Marine Corps and the Australian Army have a committed and enduring relationship. Recently, both Services have implemented major force design reforms in the face of an uncertain security environment. The Marine Corps under Force Design 2030 has shifted its focus to countering malign influences in the Indo-Pacific, particularly the "pacing threat" of China.³ Comparatively, the Australian Army is undergoing its largest modernization since the Second World War, investing heavily in littoral maneuver, long-range fires, and naval strike capabilities. 4 Consequently, there exists great potential for both Services to explore collaborative modernization efforts.

A strategic opportunity exists for the Marine Corps and Australian Army to explore the development of a bilateral landbased naval strike network; built upon interoperable Ground-Based Anti-Ship Missile (GBASM) systems, sensor-shooter network, littoral maneuver capabilities, and common logistical chains. A naval strike network provides potent options for the joint force and coalition maritime operations. As part of Australia and the United States' regional security efforts, such a network can bolster deterrent options and collective capability to shape, deter, and respond through competition and conflict.

An Argument for a Bilateral Naval Strike Network

The increased lethality, affordability, and prevalence of GBASM capabilities have considerably enhanced the ability for landbased effectors to









"The United States will defend our interests, deter military aggression against our own country and our allies and partners—including across the Taiwan Strait—and promote regional security by developing new capabilities, concepts of operation, military activities, defense industrial initiatives, and a more resilient force posture."5

—Indo-Pacific

Strategy of the

United States

contribute to maritime operations, becoming integral components within anti-access/area denial networks. These capabilities are an operational necessity within the Indo-Pacific and are viable initiatives for the Australian Army and U.S Marine Corps to explore. Importantly, the exploration and potential development of a bilateral naval strike network align with the strategic direction outlined in both Australia's Defence Security Update 2020 and the recently released Indo-Pacific Strategy of the United States.

Such a network also affords an opportunity to attract and integrate other countries' security initiatives, building wider collective deterrence and response options. Countries such as the Philippines, South Korea, and Japan are pursuing, or have existing GBASM programs, and would be invaluable contributors to a naval strike network. This network could become a core component of both Australia's and the U.S. theatre campaigning and collective deterrence and response initiatives.

Comparable Naval Strike Assets

Supported by the Australia, United Kingdom, United States (AUKUS) Agreement, the Australian Defence Force (ADF) and the United States are undertaking a range of shared missile programs including the RGM-109 Tomahawk cruise missile for the Royal Australian Navy and the AGM-158B Joint Air-to-Surface Standoff Missile and AGM-158C Long-Range Anti-Ship Missile for the Royal Australian Air Force. Both countries continue collaborative hypersonic missile development, with Australia pursuing a \$1 billion sovereign guided weapons and explosive ordnance enterprise, seeking to manufacture and maintain these systems within the country.⁷ The ADF has also allocated \$500 million to acquire a naval strike capability, in line with Marine Corps GBASM investments.⁸

A shared pursuit of naval strike capabilities provides an opportunity for collaborative force development. A potential option includes the Precision Strike Missile (PrSM) Increment Two-Land Based Anti-Ship Missile Seeker variant. The Australian Army has signed a Memoriam of Understanding that includes a \$70 million contribution to the U.S. PrSM program, opening the door for "potential domestic component manufacture, maintenance, repair, weapon surveillance and research."9 The Marine Corps also continues testing and future introduction of the Kongsberg Defence and Aerospace Naval Strike Missile, with further options including PrSM.¹⁰ It would benefit both Services to explore common missile types to support shared experimentation, collaborative data collection, and common logistical chains. Looking further to the future, the Marine Corps is also exploring longer-range options such as the Tactical Land-Attack Missile R/ UGM-109 Tomahawk.¹¹ While the Australian Army has given no indication it is seeking a Tomahawk option, shared experimentation and development informs decision making and enables both countries to respond to the evolving technological change.

Sensor Shooter Network (Kill Web)

The ADF's and United States' exist-

ing force development collaboration, close intelligence/information sharing arrangements, and collective exercise programs provide an established architecture to explore and develop a sensor-shooter network. The Marine Corps' A Concept for Stand-In Forces acknowledges a coalition approach to an integrated "kill web," an all-informed, resilient network that allows "for the rapid identification and selection of assets for tasking and re-tasking within and across military boundaries from disaggregated or distributed forces."12 Central to the success of such a network is developing interoperable command, control, communications, computers, cyber, and intelligence (C5I), leveraging intelligence sharing, and continuing interoperability efforts through collective

The recent AUKUS agreement and release of the Indo-Pacific Strategy of the United States outlined a desire for a deeper pursuit of shared technologies. Both countries have already proven successful collaboration on major capabilities such as the Lockheed Martin F-35, Boeing EA-18G Growler, and Aegis Combat System. Combined with existing intelligence-sharing arrangements such as the Five-Eyes agreement, both nations have established systems to collaborate on interoperable C5I capabilities. Importantly, both Services are already pursuing C5I and networking interoperability through the Marine Rotational Force-Darwin and large-scale exercises such as RIM OF THE PACIFIC (Hawaii) and TALISMAN SABRE (Australia). The ADF, U.S. Marine Corps, and U.S. DOD are also taking significant steps through Project Convergence; a U.S. Army-led project that seeks to explore and test requirements for a joint and multi-national sensor-shooter network.¹³ These collective exercises and projects provide the backbone and stimulus in developing a shared sensorshooter network, enhancing coalition force resilience and operational concepts in the Indo-Pacific.

Littoral Maneuver Capabilities

Littoral maneuver capabilities are essential to operating in archipelagic regions and deploying GBASM systems, with the Australian Army and the U.S. Marine Corps pursuing a range of littoral maneuver vessels (LMV). Australia is investing up to \$2.1 billion on an LMV suite that will support inter and intra-theatre movement, including light, medium, and heavy vessels and a riverine patrol craft. 14 Australia's envisioned LMV-Heavy is a smaller, but comparable capability to the Marine Corps Light Amphibious Warship. Australia's development of a riverine patrol craft and LMV-Medium for intratheatre movement also mirror the efforts of the U.S. Marine Corps for tactical maneuver, survivability, and persistence within the weapon engagement zone. It is feasible that Australian and U.S. Marine Corps forces could deploy into the region across the competition spectrum through a combination of each other's littoral craft. The need for early interaction between both Service's littoral maneuver programs is essential to achieve interoperability.

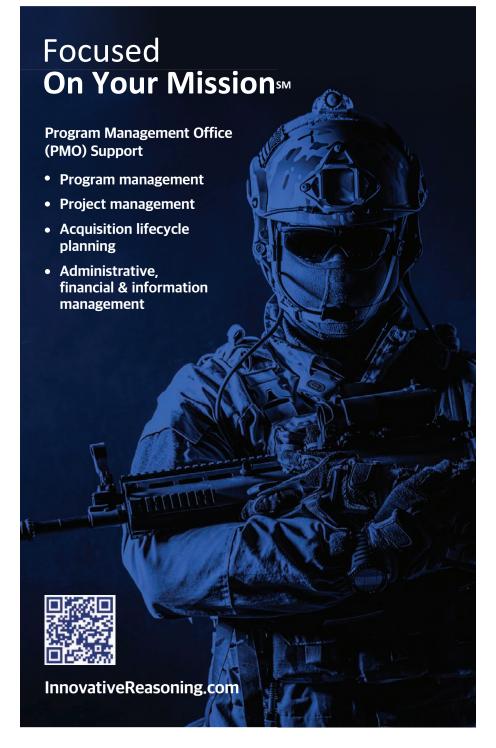
Forward basing options for littoral forces are of equal importance to the littoral capability itself. Northern Australia's proximity to Southeast Asia is optimal for littoral vessel projection into the region. While the Marine Corps seeks to establish Maritime Littoral Regiments across the Indo-Pacific, the ability to force project to and from Northern Australia provides strategic flexibility. 15 The Australian Government has committed to large-scale development of a littoral vessel precinct in Northern Australia to service Army's littoral craft. 16 The Australian Army is positioning Darwin as a key entry point for future littoral force projection into Southeast Asia. Noting enduring U.S. force deployments to Darwin, such as the Marine Rotational Force-Darwin and shared U.S.-Australian infrastructure developments including military fuel reserves, accommodation, and military ranges, the Marine Corps should note the utility of Darwin for its future littoral maneuver access into the region.17

Common Logistical Chain

A naval strike network operating at extended ranges requires an expansive system of logistical nodes to support littoral maneuver, fuel reserves, magazine depth for GBASM capabilities, maintenance requirements, and traditional military classes of resupply. Australian basing in the second island chain is an important consideration for the U.S. ability to sustain projection and operations into Southeast Asia. Equally as important for Australia, is seeking com-

parable capabilities to the Marine Corps to ensure international supply chains from the United States. A common logistic system supporting a naval strike network serves both nations' needs.

The Marine Corps should note Australia's plans to establish a sovereign precision-guided munition and explosive ordnance enterprise. Critical



"We will foster security ties between our allies and partners in the Indo-Pacific region and beyond, including by finding new opportunities to link our defense industrial bases, integrating our defense supply chains, and co-producing key technologies that will shore up our collective military advantages. As we do, we will bring together our Indo-Pacific and European partners in novel ways, including through the AUKUS partnership." 18

—Indo-Pacific Strategy of the United States

to a naval strike network is a common logistic system supporting compatible GBASM munitions, supplies, parts, and maintenance. Shared GBASM systems and equipment types could assure the Marine Corps a ready supply from an Australian base for training and in times of conflict. Additionally, the Marine Corps and U.S. Navy should investigate port access, maintenance facilities, and logistical nodes for its future littoral fleet in Northern Australia. The United States is already undertaking a number of shared infrastructure developments with Australia including military fuel reserves and airbase capabilities. Forward logistical nodes in foreign countries within the second and first island chains are critical enablers for U.S. force projection and integrating Australian-U.S. logistical requirements. The growth of the Australian sovereign industry to produce and conduct maintenance on guided munitions and

A bilateral naval strike network has significant potential to enhance coalition operations within the Indo-Pacific through the time of competition and conflict.

littoral capabilities is a capacity-building requirement for both nations and their response through competition and conflict.

Conclusion

A bilateral naval strike network has significant potential to enhance coalition operations within the Indo-Pacific through the time of competition and conflict. A proven network can attract a multi-nation effort, enhancing collective deterrence and resolve. For Australia and the United States, a naval strike network is a very real, affordable, and potent line of effort to support theatrelevel campaigning. As both Services look to the future and maturing naval strike capabilities, a multi-nation naval strike capability will become a key enabler to the joint force and coalition deterrence and response in times of competition and potential conflict.

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Opportunities and Challenges

Partnership in the littorals: A Japanese perspective by COL Yusuke Kawachi

apan should be considered a pacing ally for the United States while China emerges as its pacing challenge. This description is a result of not only the two countries' shared values and interests but also Japan's unique geopolitical position in a moment of renewed U.S. engagement in the Indo-Pacific. The Japanese Archipelago constitutes the bulk of the First Island Chain, which lies east of the Eurasian landmass. From a Japanese perspective, Force Design 2030 and its related operational concepts for the Marine Corps are seemingly all oriented toward the operational environment of the Western Pacific. It would be difficult to discuss operations in the littorals without the inclusion of Japan as an island nation. As the Japan Self-Defense Forces (JSDF) have been adapting to the current security environment, the Marine Corps' initiatives offer new opportunities for collaboration with the JSDF, especially its land component, the Japan Ground Self-Defense Force (JGSDF). Such opportunities will inevitably entail a number of challenges the JSDF/JGSDF and the U.S. joint force/Marine Corps will have to tackle together.

Nature of the Operational Problems

Japan is facing pressure from three strategic directions: the Sea of Okhotsk, the Korean Peninsula, and the East China Sea. However, the pressure from the latter is of most concern. The nature of the problem is complex, spanning the gray zone and conventional levels. China's rapid military build-up has been significant in the areas of its nuclear arsenal, missile force, and maritime/air

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A JGSDF soldier and a Marine coordinate on site before an air assault jump during the Exercise ARC21 held in Japan in May 2021. (Photo: JGSDF.)

capabilities.² As claimed in A Concept for Stand-in Forces, the proliferation of the mature precision-strike regime (MPSR) is one of the key characteristics of the current operational environment.³ Gen Berger's warning about coercive activities below the threshold of violence, employed under the umbrella of the MPSR, should be taken literally.⁴ It has been widely pointed out that China pursues a so-called cabbage strategy in gray zone operations, surrounding the maritime areas over which it claims sovereignty with suc-

cessive and concentric layers of maritime militias, coast guard cutters, and naval vessels.⁵ The outermost layer of the People's Liberation Army reportedly includes elements of its ashore Rocket Force.⁶ Their medium-range ballistic missiles (MRBMs) such as the DF-21 can reach the entirety of the Japanese archipelago.⁷ One may therefore speculate that the People's Liberation Army's growing confidence in its ability to deter the United States and its allies from responding on the conventional military level has become an incentive

for Beijing's increasingly assertive and aggressive behavior on the gray-zone level.⁸ Thus, the rungs of the escalation ladder, which were once climbed temporally and sequentially, are now present simultaneously.

Opportunities for Collaboration

To address this reality squarely, the JSDF has been modernizing its architecture, adjusting its force posture, and developing new operational concepts. The efforts on both sides of the Pacific have opened up new opportunities for collaboration between Japan and the United States. Collaboration between the JGSDF and the Marine Corps, in particular, is key for peace and stability in the Indo-Pacific.

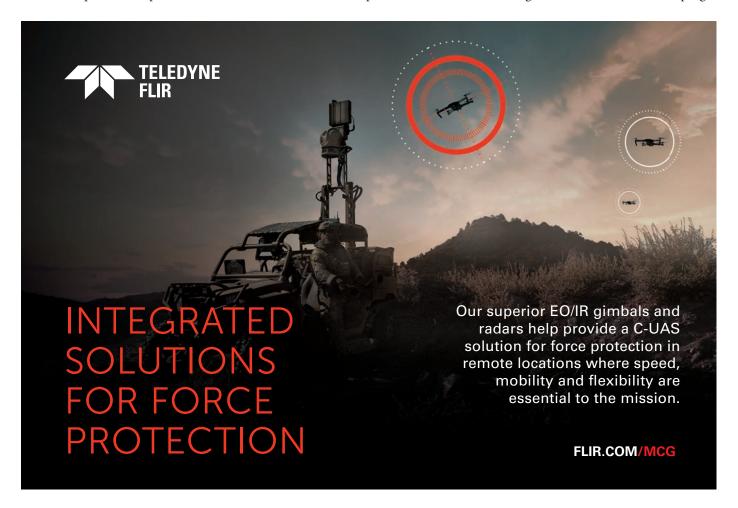
Since 2013, the JGSDF has been making some of its existing divisions and brigades lighter and more mobile, suitable for rapid deployment to potential operational areas. It expanded its own amphibious capabilities into a

standing brigade in 2018. It has also established new garrisons on the Nansei (Southwest) Islands, basing ISR assets, anti-ship and anti-air missiles, and security forces there.9 The new JGSDF emerging from these programs is in many ways similar, albeit coincidentally, to the Marine Corps as envisioned in Force Design 2030. However, the JGSDF is not merely following in the footsteps of the Marine Corps. For example, the Marine Corps is a relative newcomer to groundbased anti-ship missiles with its ROGUE-FIRES program, whereas the JGSDF developed its Type-88 Surfaceto-Ship Missile during the Cold War. It has therefore operated them for several decades and garnered extensive experience. Moreover, the Japan Ministry of Defense is currently working to extend the range of the latest Type-12 Surfaceto-Ship Missile.¹⁰

While both the JGSDF and the Marine Corps are seemingly converging in terms of future capabilities, it should

also be noted that the JGSDF is inherently a stand-in force. Compared to its sister Services, the JGSDF will never withdraw from Japan's national territories, standing always inside the enemy's weapon engagement zone. Its soldiers will live and fight on the land inherited from their ancestors. For all that, the JGSDF enjoys certain homecourt advantages, including its robust and resilient landbased operational infrastructure comprised of, but not limited to, basing facilities, logistics, communication, and command and control. These are luxuries that Marine Corps expeditionary forces cannot readily afford.

Therefore, if sufficiently synchronized, the JGSDF and the Marine Corps will be able to serve as force multipliers and enablers to each other. Leveraging its advantages, the JGSDF may shape conditions for the naval team of the U.S. Navy and Marine Corps to operate along the First Island Chain, helping it



to deescalate crises and terminate conflicts early. It may also contribute its own assets to a kill web built around the allied forces. At the same time, the Marine Corps may serve as a gateway for the JGSDF to link to a gigantic kill web comprised of the U.S. joint force. Together, the bilateral stand-in forces would be an efficient deterrent to any adversary throughout the continuum of competition, prevailing better in the reconnaissance and counter-reconnaissance fight. In fact, the JGSDF and the Marine Corps have taken strides toward such a direction, as evidenced by the recent Exercise RESOLUTE DRAGON in December 2021.11 Their combined readiness to fight and win in conflicts, as demonstrated in such exercises, would make them more advantageous in competition in steady-state.

Challenges Ahead

With the opportunities discussed in mind, there is a range of issues to be considered. First, any defense cooperation involving the JGSDF or the Marine Corps cannot be limited to the collaboration between just the two Services. Recently, the Marine Corps F-35Bs landed on JS Izumo of the Maritime Self-Defense Force in support of the F-35B program of the Air Self-Defense Force. The JSDF's relationship with the Marine Corps spans across the Services. Similarly, from the perspective of the ISDF, the Marine Corps is but one component of the U.S. joint force. The partnership at the service level should align with guidance from a joint level or a higher policy level, with the Services speaking with one voice. For example, linking the JGSDF and the Marine Corps forces to form a unified kill web is not a simple matter of digitally linking platforms. There should be prescriptive policy guidance from a higher level regarding what data and information is or is not shareable in such an architecture. When it comes to coordinating capabilities and postures in and around Japan, the U.S. Services need to be represented by the DOD talking to the Japan Ministry of Defense through a proper channel, given the politically sensitive nature of access and basing.12



A JGSDF soldier and a Marine bump fists upon successful completion of combined-arms livefire exercise during the Exercise IRON FIST held in Camp Pendleton in February 2022. (Photo by SFC Osamu Taguma, JGSDF.)

Second, there should be a shared operational concept between the JGSDF and the Marine Corps, nested within the one at the joint level and based on policy guidance from the Ministry of Defense/DOD. While the Marine Corps' operating concepts—concepts for expeditionary advanced base operations and stand-in forces—suggest that they are focused on the contact layer and the blunt layer in the Global Operating Model, it is not immediately clear to the eyes of Japanese planners how they relate to concepts from other U.S. Services, such as the multi-domain operation concept of the U.S. Army.¹³ Japanese planners are keenly monitoring what kind of role these concepts would play in a much larger picture of the Joint Warfighting Concept or the Integrated Deterrence. The JGSDF has partnered with the U.S. Army as well as the Marine Corps. As such, it stands ready to take part in integrating those various concepts into a unified bilateral concept.

Finally, any operational concept shared by the JGSDF and the Marine Corps should have a clear theory of victory. ¹⁴ If the MPSR, which emboldens China in the gray zone, is the defining characteristic of the environment, who will address the problem? Will responding to coercive measures in kind, only with deterrence by detection, be suf-

ficient to deny any *fait accompli*? How can the United States and its allies avoid being deterred at the conventional level? How could they effectively impose costs on adversaries in regard to the MPSR? Who will fill the capability gap in a post-INF (Intermediate Nuclear Missile Treaty) world and how? These questions remain unanswered in the Marine Corps' current operational concepts. Whatever answers there may be, these questions must be bilaterally addressed to synchronize operations on both sides.

Conclusion

Once the challenges mentioned above are squarely addressed, the JGS-DF and the Marine Corps will be able to further accelerate their collaboration at the service level. In such an endeavor, both Services will need to specify what they expect from each other in concrete scenarios, across all the warfighting functions. They will have to develop supporting concepts in each function. They should test divisions of roles and responsibilities repeatedly in realistic training and exercises while continually updating their respective doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy. The problems include the lingering ones of command and control structures as well as organizational cultures.¹⁵ While the tasks ahead are





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ELEVATING performance

IDEAS & ISSUES (ALLIES & PARTNERS)

daunting, there are good reasons not to be pessimistic. The two militaries have cultivated a similar warrior culture, mutual respect, and understanding—all the more because their predecessors fiercely fought each other all over the Pacific. This relationship has been strengthened through the seven decades of alliance. To use a phrase from Gen Mattis, the JGSDF and the Marine Corps should be "no better friend" to each other and "no worse enemy" when unified against our challengers. Such a relationship is a solid basis for any partnership in the littorals.

>Author's Note: The views expressed are those of the author and do not reflect the official policy of the Japan Ground Self-Defense Force, the Japan Ministry of Defense, or the Government of Japan.

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RESOLUTE DRAGON 21 was the largest bilateral field exercise ever held in Japan. It was an opportunity for the JGSDF and the Marine Corps to test synchronization of JGSDF Cross-Domain Operations and the Marine Corps' EABO. (Photo: 3d MarDiv.)

Stand-in Forces and Integrated Deterrence

The Marine Corps and the Norwegian Armed Forces

by LTC Jørn Qviller, LTC Semming Rusten, MAJ Anders Vedul & CPT Kevin Lamptey

he latest Marine Corps concept publication, A Concept for Stand-in Forces (SIF), introduces integrated deterrence.1 The publication frequently cites deterrence as an essential part of strategic competition, the competition continuum, and as an effect the SIF can achieve. Deterrence theory is simple but achieving the effect in reality is complex because of the dependence on how the deterred assesses and perceives the credibility of the deterrent. The aim is to prevent someone from attacking you or an ally.² The credibility of the deterrent is the key.³ The SIF concept is part of deterrence by denial, meaning denying an adversary any hope of achieving what it wants by invading.4 The SIF concept further expands on the previously published Expeditionary Advanced Base Operations concept (EABO). The Tentative Manual for EABO outlines six characteristics of EABO: stand-in forces, mobility, persistence, low signature, integrated naval forces, and cost effectiveness.⁵ The SIF concept is therefore a precondition for EABO that highlights the importance of the reconnaissance and counterreconnaissance (recce/counter recce) fight in the competition continuum. It also emphasizes integration and completing kill webs with the Navy and the rest of the U.S. joint force (JF). It describes the complexity of sustainment in a decentralized concept in a contested environment. Furthermore,

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it emphasizes allies and partners, but it says little about integration and interoperability with them. The Norwegian Armed Forces (NAF) also has a deterrence by denial approach as the SIF concept. As the Marine Corps still is a vital part of Norwegian deterrence towards Russia, how should the NAF and Marine Corps plan and conduct integrated deterrence?⁶ If integrated deterrence is to be credible, the ability to conduct combined operations must



How should the Marine Corps and the NAF plan to conduct integrated deterrence? (Photo: DVIDS.)



Marine Corps-NAF collaboration is an important part of more holistic integrated deterrence in the high north across all domains. (Photo: DVIDS.)

increase, especially within recce/counter recce, kill webs, and sustainment to achieve a higher level of interoperability than today.

This article explores integrated deterrence in the context of the SIF concept and the new Norwegian Army Development Concept.⁷ Even though the Marine Corps focuses its Force Design 2030 and concept development on the Indo-Pacific theater and China as the pacing threat, it is also important to show how this can contribute to deterring Russia. This article is also relevant for countries in the Pacific region that collaborate closely with the Marine Corps. Even though the Marine Corps is not planning to operate with a permanent SIF force in Norway, an adapted concept represents potential in the High North and Norway. The NAF could perform as a permanent allied SIF force aligned with the SIF concept, and the Marine Corps, as a high readiness force, can rapidly plug into the NAF in a crisis. We will focus on conventional deterrence and not nuclear deterrence since the former is most relevant in the Marine Corps and the NAF relations. The SIF concept states:

SIF also practices 'integrated deterrence,' which means they coordinate their activities with the joint force, interagency, and allied and partnered nations to achieve greater results than could be gained by acting alone.⁸

Integrated deterrence is something that the U.S. Secretary of Defense Lloyd J.

Austin III has repeatedly advocated in relation to all domains, interagency, and allies and partners.⁹ Integrated deterrence is therefore much more holistic than a NAF-USMC collaboration.¹⁰ The NAF and the Marine Corps will not deter Russia alone in the High North; together they can make a valu-

This is highly relevant in a gray zone under the threshold of armed conflict. In this situation, the competitor has to weigh the cost and benefits of interfering in a foreign country when the likelihood of being detected is high. ¹² Russia is known for its fait accompli approach to armed conflict, either through a grayzone approach (Ukraine 2014–2021) or as a rapid land grab attack (Georgia 2008). Either way is challenging for a country like Norway. ¹³

In an integrated intelligence, surveillance, reconnaissance, and targeting (ISR-T) process as described in the SIF concept, handling both gray-zone scenarios and a surprise attack will be crucial for credible deterrence. In the first scenario, the ISR-T has to disclose Russian activity on Norwegian territory in peacetime, which in Norway mainly is a police responsibility concerning internal security, supported by the Coast Guard and the Army Border Guard. The Norwegian Intelligence Service handles external security threats to Norway, supported by the National

This article explores integrated deterrence in the context of the SIF concept and the new Norwegian Army Development Concept.

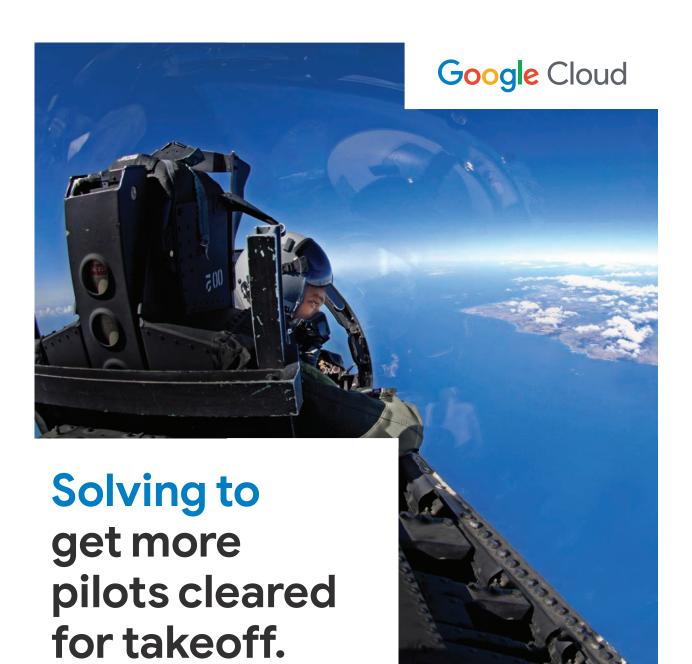
able contribution. Regardless, it is still helpful to look at the NAF and Marine Corps in this context and how that collaboration can support a U.S. and Norwegian integrated deterrence. Both are critical integrators for the Norwegian Total Defense and the U.S. JF. We will therefore look at deterrence from primarily a military perspective.

Recce/counter-recce

The SIF concept states that winning the recce/counter-recce fight in the competition continuum is imperative to give decision makers an advantage in situation awareness relative to the adversary, and at the same time, deny the adversary the ability to collect information on our own forces.¹¹ Winning this battle applies in all domains and supports deterrence, namely deterrence by detection.

Joint Headquarters. To integrate the Marine Corps in peacetime intelligence collection will be challenging from a legal perspective because of Norwegian laws.

The other scenario, of a rapid surprise attack on parts of Norway, demands quickly collected intelligence to target high payoff assets to deny Russia freedom of action in or in the vicinity of Norwegian territory. To do this, the Marine Corps and NAF have to solve both technical and procedural issues. We can do parts of this today but not with the speed and precision needed. The Norwegian Army is implementing its Army Command Control Communication Computing Information System. The Army Command Control Communication Computing Information System needs to be plugged into a



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What are you solving for?

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similar Marine Corps system connected to the future U.S. Joint All Domain Command and Control system. 14 Too many legal and bureaucratic hurdles in place today hinder the smooth sharing of information between the two countries. Technologically, it is doable but not without problems. The SIF concept mentions that a select number of allies and partners should integrate into a common operational picture.¹⁵ We take for granted that Norway is one of those allies. Interoperability is key to success for coalition warfare and credible integrated deterrence. Today, we see a cumbersome U.S. DOD foreign disclosure process and national systems with limited ability to share information promptly between nations, even with close NATO allies. The DOD and the NAF need to address this to speed up the ISR-T process, especially concerning targeting.

Kill Webs

The SIF concept uses the term kill webs to describe the network of sensors, effectors, and decision makers. Kill webs connect to the previously described ISR-T but with an emphasis on the weapon systems. Kill webs have evolved from the term kill chain that Christian Brose's book with the same name made popular. The kill chain also derives from the traditional targeting process. The reasoning behind kill webs is that a web is less vulnerable to adversary attacks than a chain and creates increased flexibility and complexity. The Marine Corps is investing in several weapon systems that will fit into this web: the anti-ship missile system NEMESIS, increased investments in the long-range rocket system HIMARS, armed MQ9 Reaper unmanned aerial systems, and a considerable number of F-35 fighters in addition to unmanned platforms with loitering munition. The Marine Corps will be part of the larger U.S. JF kill web, enabling other Services and the future Joint All Domain Command and Control. The NAF is also investing in new systems that can be part of an integrated kill web; new submarines, P-8 maritime patrol aircraft; F-35A with the integration of the Joint Strike Missile (JSF), all surface

combatants have the advanced Naval Strike Missile; and the Army has newly fielded the K9 howitzer and will invest in long-range missiles in the near future. The new Norwegian Army Development Concept introduces a framework for integration and convergence for the NAF, civil authorities, and allies, ensuring that the sensors, effectors, and decision makers on different levels and in different units constitute more than the sum of their parts. ¹⁶

Again, it is a question of technical and procedural interoperability. Based on lessons learned from the Afghan Mission Network, NATO is developing the Federated Mission Network (FMN). The FMN is "to support affiliates in the conduct of their missions by efficient and effective information management,

Interoperability is key to success for coalition warfare and credible integrated deterrence.

enabling information sharing between NATO, the Nations, and their respective Communities of Interest."¹⁷ The United States is on its side developing the Mission Partner Environment capabilities to "enable the joint force to share information and exchange data with mission partners through all phases of operations."¹⁸ These two initiatives by NATO and the United States consist of Coalition Interoperability Assurance and Validation Support requirements.

To a certain degree, we both are using NATO doctrine for the targeting process. Legal issues to prosecute targets in a foreign nation are usually covered in a Standard of Forces Agreement. Still, we will initially have our national chain of commands that will make this difficult. Especially if the situation is unclear and the Norwegian Government has not delegated war authorities to the NAF. The Marine Corps and the NAF conduct live fire training in Norway to increase joint fires proficiency. Still, there is an urgent need for more

realistic training with the whole of the NAF, including the Norwegian Navy, to be able to integrate, coordinate, and deconflict fires in all domains as a step towards an integrated kill web.

Sustainment

Sustainment is described as one of the key challenges in the SIF concept. The distributed concept of EABO with small units scattered over a vast area in a contested environment constitutes many challenges for the Marine Corps and especially for logistics. However, this does not need to be a big challenge in Norway. The Marine Corps has stored equipment and supplies in Norway through the Marine Corps Prepositioning Program-Norway since the early 1990s. For the future, this program needs to be updated with equipment, supplies, and spare parts for the equipment listed earlier in this article, especially the high-demand, low-density equipment, and key enablers. In addition, as Norway is a host nation (HN) responsible for receiving and supporting allied reinforcements, it has established a Joint Logistics Support Group (JLSG) HQ as part of a NATO initiative to coordinate and provide logistic support to allied and especially U.S. forces.¹⁹ Therefore, the Marine Corps already has functional logistical support in Norway providing necessary support for the Marine Corps to reduce the logistical strain from the United States. Furthermore, to facilitate the reception, staging, onward movement, and integration but also support operations, Norway has already in place a Host Nation Support Battalion specially designed to support Marine Corps units. The Joint Logistics Support Group and Host Nation Support Battalion can be expanded if required. The Total Defence Concept (TDC) in Norway represents opportunities to support the sustainment of the SIF concept.²⁰ Norway's HNS concept is closely integrated with the TDC. The TDC is a whole-of-nation concept based on mutual military and civilian cooperation and support in peace, crisis, and war. In peace and crisis, the military will primarily support civil society with different capabilities. In war, civil society, both public services and private companies, will support the military in its war effort. The Marine Corps can plug into this system to reduce the logistical footprint. This is especially relevant in the remote communities where the Marine Corps will establish EABs, which can provide access to infrastructure, local knowledge, contracting, and support. All of this is manageable by planning, updating existing MCPP-N and agreements, and conducting rehearsals and realistic exercises. That will further challenge the exercise pattern between the NAF, the Marine Corps, and the U.S. JF today.²¹

Conclusion

The SIF concept is the latest evolution in developing the previously released EABO concept. The SIF concept emphasizes deterrence in general and specifically integrated deterrence. Integrated deterrence is a coordinated and integrated whole-of-government approach with allies and partners. For deterrence to work, the perception of the adversary is that the deterrent's posture is credible. The SIF concept and the NAF have a similar deterrence by denial approach. Even though the Marine Corps is not planning to operate as a permanent SIF in Norway, we find an adapted SIF concept highly relevant for the High North. The SIF concept emphasizes the recce/counter-recce fight, kill webs, and sustainment integrated with the U.S. JF. The SIF concept highlights the importance of allies and partners but puts limited focus on integration and interoperability. We consider these aspects key to a credible combined concept and thus credible integrated deterrence, especially through U.S. JF integration and interoperability with the HN. In an armed conflict in the High North, the NAF and the Marine Corps will be key integrators for the Norwegian Total Defense Concept, NATO, and the U.S. JF. The challenges to truly integrating and having a high level of interoperability within recce/counter recce, kill chain, and sustainment are not unsolvable. Thorough planning, changes to current national procedures, updating current bilateral agreements, early integration in procurement, and realistic training, exercises, and rehearsals are crucial to improving interoperability. The Norwegian Army Development concept introduces a framework of convergence and integration that we think is highly relevant to get the NAF and the Marine Corps to be better integrated and interoperable.

The Marine Corps has to understand the limitations of what it can do as a SIF in a sovereign state, especially prior to armed conflict. We must dare to fail during realistic joint and combined training and exercises to develop a common ability to thrive and win in the environment of the High North and in a contested space.

Notes

- 1. Headquarters Marine Corps, A Concept for Stand-in Forces, (Washington DC: November 2021). There is uncertainty about what the U.S. Government means by integrated deterrence. The State Department and DOD are currently working on a joint understanding of this term and concept. Multi-domain deterrence is another term that covers more or less the same meaning. Critics, such as Michael Mazzar, see no major difference between what the United States has done in the past and the new integrated deterrence.
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- 3. Paul K. Huth, "Deterrence and International Conflict: Empirical Findings and Theoretical Debates," *Annual Review of Political Science*, (San Mateo, CA: Annual Reviews, 1999).
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- 5. Headquarters Marine Corps, *Tentative Manual for EABO*, (Washington, DC: February 2021).
- 6. Terje Bruøygard and Jørn Qviller, "Marine Corps Force Design 2030 and Implications for Allies and Partners Case Norway," *Journal of Advanced Military Studies*, (Quantico, VA: Marine Corps University, Fall 2020).
- 7. MGEN Lars Lervik, Konsept for Utvikling av Hæren, Morgendagens Hær, (Heggelia: Hærstaben, February 2021).
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- 12. Thomas G. Mahnken et al., *Deterrence by Detection: A Key Role for Unmanned Aircraft Systems in Great Power Competition*, (Washington, DC: CSBA, 2020).
- 13. Jøern Qviller, "The Fait Accompli and A2/AD Dilemma in Northern Europe: A New NATO Operating Concept to Counter Russia," (master's thesis, Marine Corps University, April 2020).
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- 18. J-6 Chairman of the Joint Chiefs of Staff Instruction, *Requirements Management Process for Mission Partner Environment CJCSI 6290.01*, (Washington, DC: September 2019).
- 19. Solberg Regjeringen, *Prop 14s*, (Oslo: Departementenes sikkerhets-og serviceorganisas-jon, 2020).
- 20. Frank Bakke-Jensen, *The Defence of Norway: Capability and Readiness: Long Term Defence Plan 2020*, (Oslo: Norwegian Ministry of Defence, 2020).
- 21. The Norwegian Government, Støtte og Samarbeid; En Beskrivelse av Totalforsvaret I Dag, (Oslo: 2018).





April 2022

Marines and Sailors,

As we redesign and modernize the Marine Corps to meet the vision of *Force Design 2030*, Marine Corps Systems Command plays the critical role of bringing this effort to life through the research, development, acquisition, and fielding of weapons, vehicles, and military equipment. Through a close partnership with our teammates at Combat Development and Integration and the Marine Corps Warfighting Lab, we ensure that the Marine Corps remains equipped to fight and win. Informed by experimentation, wargaming, operational concepts, and ultimately by user requirements, we strive to ensure our gunfighters are prepared for the worst day imaginable on an expeditionary advanced base.

Sustainment in acquisition planning is central to this mission. MARCORSYSCOM plans and executes product force and system sustainment with deliberate purpose and foresight in order to provide lifecycle support that maintains readiness, operational capability, and controls costs. Sustainment is built into everything we do.

To provide the best support possible to Marines, MARCORSYSCOM continues to refine and optimize the process of acquisition and sustainment of systems and equipment, most recently with the establishment of *Marine Corps Order 5000.27*. By clearly defining specific authorities, roles, and responsibilities, the Marine Corps clarifies and streamlines service-level acquisition actions to deliver capability at the speed of relevance. The order allows us to leverage the maneuver space provided by the Adaptive Acquisition Framework to increase tempo in acquisition operations wherever applicable and advantageous.

This year's *Gazette* brings together all areas of acquisition to demonstrate the breadth of the acquisition process and workforce. You will read thought-provoking articles on groundbased air defense, logistics, virtual training environments, vehicle electrification, and more. As you will read, ensuring our Marines maintain an unfair advantage is no simple task, and MARCORSYSCOM is at the heart of that process.

It is a privilege to lead this team of acquisition professionals through this dynamic period in our history. The most important resource we have is our people. The intellectual capacity that goes with the people is our most prized advantage when it comes to the global competition we face today. They continue to impress me with their creative ideas, passion, and their ingenuity is evident in this year's articles.

I encourage you all to read, discuss, and debate the articles in this year's acquisition edition of the *Gazette*. Challenging old ways of thinking and sharing new ideas is how we got to where we are today and will continue to help us build the force of 2030 and beyond.

Semper Fidelis,

A.J. Pasagian

Brigadier General, U.S. Marine Corps Commander, Marine Corps Systems Command

Marine Corps Groundbased Air Defense

Layered air defense to reduce risk to stand-in forces

by Col David P. Lobik (Ret)

istory Since the Korean War, U.S. ground forces have operated with nearly total air supremacy in every conflict. The collapse of the Soviet Union and ongoing counterterrorism and counterinsurgency operations have led U.S. forces to take air supremacy for granted. U.S. ground units' tactics, techniques, and procedures designed to mitigate enemy air operations through passive defensive measures, such as signature management, have atrophied or have been lost altogether as the greatest air threats facing Marines were limited to rockets and mortars. Marine units, without the layered air defenses employed by the Army, are particularly at risk. After

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decades of operating without enemy air threats, the Marine Corps has had little incentive to invest in air defense systems or train to operate under contested or hostile airspace—until now. In addition to ballistic and cruise missiles, low-cost, prolific, and highly effective unmanned aerial systems (UAS) are changing the character of air warfare. The Marine Corps recognizes the need to adapt to this new reality by acquiring air defense systems capable of engaging a range of

aerial threats and modifying long-standing tactics, techniques, and procedures to increase unit survivability from aerial attacks. No longer can joint and Service air superiority be taken for granted, nor can it be assumed that friendly air protection will be adequate. In future fights, the air domain will be contested at best and hostile at worst. Units must have capable anti-aircraft, anti-missile, and counter-unmanned aircraft system (C-UAS) weaponry and the competence to operate them effectively.

To that end, the Marine Corps must prioritize and sustain investments in modern, rugged, and sophisticated air defense and command and control (C2) capabilities required to operate effectively inside the adversary weapons engagement zone and to protect our forces. If installations, including host nation installations, and forward deployed forces are unable to persist inside the weapons engagement zone, they will be irrelevant, or worse, a liability. The joint force is witnessing the emergence of a new era of UAS, cruise missile, and anti-air warfare and must possess the capabilities required to mitigate those threats. Air and missile defense capabilities are vital for a stand-in force to be successful in any area of responsibility.

Until recently, precision fires were not related to small UAS (sUAS). As drone and sUAS technology proliferated, it has become apparent that C-UAS development is critical to "address the rapidly evolving challenge for U.S. forces at home and abroad."



Light MADIS. (Photo by LCpl Jessica Foraker.)

The Commandant of the Marine Corps recognizes the disparity between the threat and Marine Corps capabilities, providing clear direction in his planning guidance:

We must accept the realities created by the proliferation of precision longrange fires, mines, and other smartweapons, and seek innovative ways to overcome those threat capabilities. Our forces currently forward-deployed lack the requisite capabilities to deter our adversaries and persist in a contested space to facilitate sea denial.

The GBAD Program

By the fall of 2018, the growing complexity and increasing number of groundbased air defense (GBAD) requirements proved to be the catalyst for the activation of a separate program office. As a result, the GBAD Program Office stood up under the leadership of a very experienced acquisition professional team and was welcomed by all Marine Corps stakeholders and collaborators from Headquarters Marine Corps and other senior staffs who supported its initiation.

Like the Ground/Air Task-Oriented Radar and Air C2 and Sensor Netting programs, the new GBAD Program Office is subordinate to Program Executive Officer Land Systems. The GBAD Program may be one of the Department's most complex acquisition programs as the majority of GBAD systems were developed and are still under Urgent Needs Statement processes. Moreover, the GBAD Program Office faces broad and complex integration challenges. While other acquisition programs are often described as a family of individual systems, the GBAD Program Office is a Family of Programs, each comprised of multiple efforts. Every GBAD program meets a specific operational requirement, often with unique funding, and requires collaboration, planning, information sharing, and integration of the efforts of joint, Marine Corps, Department of the Navy, DOD, Congressional, and other key stakeholders to meet the requirements of the Marine Corps and the joint force.

The GBAD Program Office is organized into three Product Teams, each



MRIC Launch. (Photo provided by author.)

led by an individual Product Manager (PdM), with responsibility for multiple systems. The three teams/PdMs are Future Weapons Systems (FWS), Fixed-Site C-UAS, and Advanced Man-Portable Air Defense System (A-MANPADS)/Medium Range Intercept Capability (MRIC).

PdM FWS

The GBAD FWS Product Team will modernize Low Altitude Air Defense Battalions (LAAD Bns) by providing increased capability and lethality to meet evolving and future threats. Supporting a Joint Urgent Operational

designated an Acquisition Category IV/T program under PM GBAD and will deliver a significantly upgraded capability leveraged from the Urgent Need system initially deployed in 2017.

MADIS Inc 0 is mounted on a Mine Resistant Ambush Protected All-Terrain Vehicles (M-ATV). It also features a 360-degree radar, radio frequency jammer, electro-optic infrared sensor, and a Common Remotely Operated Weapon Station with an integrated mini-gun direct fire weapon. It demonstrated the first on-the-move detect, track, identify, and defeat capability on a medium tactical vehicle. MADIS Inc 0.1 C-UAS suite is mounted on an M-ATV as well with improved capability of the MADIS Inc 0, such as upgraded sensors and air defense C2 software via the Forward Area Air Defense and Counter Rocket and MortarC2. MADIS 0 and 0.1 are no longer in service and are currently being phased out.

MADIS Inc 1.0 is the Marine Corps' Acquisition Category II program that features a complete C-UAS kill chain capability that is based on the lessons learned from the Inc 0/0.1 systems. With the Joint Light Tactical Vehicle as the platform, the system will provide the Marines with an additional level of force protection and enhanced C-

MADIS Inc 1.0 is the Marine Corps' Acquisition Category II program that features a complete C-UAS kill chain capability ...

Need, two mobile systems, Light-Marine Air Defense Integrated System (L-MADIS), and MADIS Increment (Inc) 0/0.1, it evolved in 2017 to address the emergent UAS threat.

L-MADIS is a C-sUAS electronic attack system mounted on a Polaris MRZR all-terrain vehicle. It features a 360-degree radar, radio frequency jammer, and electro-optic infrared sensor. Media reports have credited the L-MADIS with downing an Iranian drone that flew in the close vicinity to the amphibious assault ship USS *Boxer* in July 2019. L-MADIS was recently

UAS capability. The MADIS Inc 1.0 is comprised of two vehicles, the Mk1 and Mk2, which form a complementary pair and will be the basic building blocks of the LAAD Battalions' GBAD capability.

• MADIS Mk1 includes a turretlaunched Stinger missile, multi-functional electronic warfare capability, direct-fire weapons, Electro-Optical Infra-Red (EO/IR) optic, and a shoulder-fired Stinger missile for dismounted operations.

MADIS Mk2 (C-UAS variant) includes a multi-function electronic-warfare capability, 360-degree radar, direct-fire weapons, EO/IR optic, and a supporting C2 communications suite.

PdM Fixed-Site C-UAS

Protection of Marines at forward operating bases from UAS incursions has been the focus of the GBAD Program Office during the past three years. PM GBAD has deployed and sustained a fixed-site MADIS capability to various parts of the world with success. These deployed capabilities support not just Marines but also joint forces and include the following systems:

- Expeditionary Marine Air Defense Integrated System for dismounted and fixed-site operations.
- Compact Laser Weapon System provides a directed energy C-sUAS capability in defense of forward deployed, fixed-site operations.

Addressing Continental United States (CONUS) and Overseas CO-NUS (OCONUS) facilities, traditional base and station planning, as well as

the execution processes, make Deputy Commandant, Installations and Logistics and Commanding General, Marine Corps Installations Command's to MAGTF commander's vital areas and Marine Corps CONUS and OCONUS Critical Infrastructure.

PM GBAD is prototyping various Installation C-sUAS systems that will meet the requirements to protect critical assets.

infrastructure, funding, sustainment, training, and employment responsibilities quite challenging. To support these goals, PM GBAD is prototyping various Installation C-sUAS systems that will meet the requirements to protect critical assets. These systems of systems are modular and scalable components that will detect, track, identify, and deliver kinetic and non-kinetic C-UAS capabilities to defeat the full spectrum of low-altitude and low-observable threats

PdM A-MANPADS and MRIC

The Marine Corps' currently fielded A-MANPADS is a mobile, Stinger missile-based low altitude surface-to-air weapons system designed to provide close-in, short-range air defense. A-MANPADS consists of a Fire Unit Vehicle, a Section Leader Vehicle, and the Stinger missile as the primary weapon system. The Fire Unit Vehicle is the mobile firing component of the GBAD system, with the capability to transport





SYSTEMATIC



MADIS Inc 1. (Photo provided by author.)

Stinger missiles and possessing a turret-mounted M-240B or M2 machinegun. The Section Leader Vehicle manages the C2 system that links this capability to the Marine Air Command and Control System. These systems will incrementally "sunset" as their Rotary Wing/Fixed Wing defeat capability integrates into MADIS Inc 1.0 and begins fielding to the LAAD Marines.

The MRIC is in the prototype phase. The MRIC system currently integrates existing Marine Corps capabilities, speFollowing its initial demonstration in 2019, senior Marine Corps leadership deemed the event highly successful and the GBAD Program Manager was given the authorization to proceed to the next phase, which was planned to reduce the MRIC footprint, enhance radar capabilities, and provide greater mobility. Recently, MRIC successfully conducted live-fire testing at White Sands Missile Range against multiple relevant cruise missile profiles that stressed the capability of the MRIC system with success-

prime contractor to integrate capabilities, GBAD technology must outpace the threat by aggressively upgrading major component performance over time. Sensor performance, signature management, communications suites, utilities, software, C2, size, weight, power, interoperability, reliability, maintainability, energetics, and more will require continuous, rapid improvement as this capability is fielded to the FMF. Components and subsystems, rather than the major system, will be the primary contributors to advancing capability against threats, evolving to stay ahead of adversary technology and abreast of interoperability requirements of the joint force. Components will be the critical enablers and must have high Technology Readiness Levels, be easily integrated and adapted, and have validated technical performance achieved through agile testing and evaluation processes. These combined, focused efforts will bring the Marine Corps GBAD capabilities well into the 21st century.

Notes

1. Department of Defense, *DOD Counter-Small Unmanned Aircraft Systems Strategy*, (Washington, DC: January 2021).



These combined, focused efforts will bring the Marine Corps GBAD capabilities well into the 21st century.

cifically the Ground/Air Task-Oriented Radar and components of the Common Aviation Command and Control System Air C2 and Sensor Netting with the Israeli Iron Dome's mini-Battle Management and Control and Tamir missile. As stated in a recently released media report:

The MRIC is a missile system which detects, tracks, identifies and defeats enemy cruise missile threats and other manned and unmanned aerial threats ... It is planned to provide ground based air defense for permanently fixed and operationally fixed sites.

ful live fire engagements. Additional live fire testing is planned during the remainder of Fiscal Year 2022. Pending results, the Marine Corps will decide whether to potentially certify the prototype for deployment or establish an MRIC program of record with the intent of fielding MRIC batteries in support of force design requirements.

To stay relevant in today's contested environment, a new approach to acquisitions will require a paradigm shift for the Program Office and Industry. Instead of a classical major acquisition program approach using an Industry

Future Force Modeling and Simulation

Innovation in wargaming capability development

by Mr. Tyson C. Kackley

s the Marine Corps continues to prepare for the future fight in a time when technology is influencing tactics at all levels of war more so now than previously argued, investments into Force Design 2030 and further will be critical to sustaining the edge on the battlefield. Likewise, so too has the ingest of data into algorithms that maximize the performance of artificial intelligence and machine learning software that refine the probability of potential outcomes or solutions; amplifying the often generalized *superforecasting* in the likely movement from competition to conflict and returning to the desired state of competition. Program Manager Wargaming Capability at Marine Corps Systems Command was established as an acquisition command in August 2017 and chartered to lead the procurement of the Marine Corps Wargaming and Analysis Center (MCWAC) to house cross-domain network infrastructure to include state of the art modeling and simulation (M&S) capabilities built upon authoritative data sources and feeding cutting-edge realtime analytics to inform and defend big-ticket decisions inherent in the Corps' Force Design 2030 initiative. Since its inception, the program management office has pursued a three-phase crawl-walkrun approach to identifying, assessing, competing, and then acquiring and integrating the best-in-breed software, hardware, and cloud approaches to meet the current need and simultaneously establish a modular open systems archi-

>Mr. Kackley is the Modeling and Simulation Lead/Prototype Technical Lead for Program Manager Wargaming Capability, Marine Corps Systems Command. Prior to his involvement with wargaming, he led a number of complex, high-priority simulation efforts aimed at improving the Naval Enterprise's ability to conduct analysis of MAGTF-to-ship integration. He holds Master's Degrees in Mathematics and Operations Research. This article was reviewed by the Program Manager, LtCol Ray Feltham.



Figure 1. Artist's conception of the MCWAC. (Figure provided by author.)

tecture in which individual components can be improved or replaced with the latest technology for years to come, ensuring a modern relevant capability for the life of the system.

In order to meet the demanding analytic requirements of the *Force Design* 2030 initiative, the wargaming system would have to span a number of capability axes. First, the envisioned series of games will be at the strategic, operation-

al, and tactical levels of war. Second, all warfighting domains will be involved, to include land, air, sea (and undersea), space, cyber, and information. Third, across these domains and levels of war, the system would be required to include each game's focus on one or more of the warfighting functions (maneuver, fires, intel, force protection, command and control, logistics, as well as information). Fourth, the games would be in

support of three primary use cases: capability development, concept development, and operational plan assessment. Fifth, the system would be required to support every level of simulation integration with the game—from strictly seminar-style games in which the system may support only modest game management, collaboration, and visualization functions up to state-of-the-art artificial intelligence-enabled modeling and simulation of multi-sided capabilities and tactics—deeply integrated into and supporting many different game cells within the overall event.

An end-to-end integrated prototype is currently under development employing a number of innovative solutions to this challenging problem space. The design employs a robust cloud architecture, which provides a reliable capability to scale up compute resources as needed to address complex high entitycount strategic and operational simulations as well as immersive graphically intensive three-dimensional tactical simulations. The system is capable of automatically ingesting and organizing massive amounts of structured and unstructured data from myriad authoritative sources via multiple DOD and intelligence community networks. The system then orchestrates the distribution of these central data elements to each component simulation for proper and consistent model configuration and initialization. In game design, the system streamlines the process of selecting and modifying richly populated world terrain to meet game objectives. During game execution, high-fidelity models are synchronized across time, entity state, and environmental characteristics to ensure each specialized component contributes to the integrated Common Operating Picture, providing both ground-truth as well as side-based perceived views. Simulation outputs are then exhaustively captured and logged for realtime dashboarding and postgame in-depth analysis.

A Framework of Simulations

Designing a wargaming system of the future is much more than just selecting an appropriate simulation tool. To be sure, many excellent simulation tools exist already, each with its own specialty and focus areas. Just take a trip to Orlando for the annual Interservice/Industry Training, Simulation, and Education Conference, and you will be overwhelmed by the latest commercial and government offerings and capabilities. While much of the focus of these

rics on combat deadlined vehicles and consumption of MREs, water, and ammunition. The framework collects these output metrics and routes them to the unified analytics engine. The analytics engine produces dashboards of relevant information during gameplay for participants' reference, as well as provides

Designing a wargaming system of the future is much more than just selecting an appropriate simulation tool.

offerings are in support of training requirements, many have immediate applicability to wargaming needs as well. Each tool comes with its own strengths and history of usage across the training enterprise, lending credibility to results. Some of these simulations excel at land operations, some at air and naval operations, some at a tactical level, and others at an aggregated operational level. None excel in all the domains, levels of war, and warfighting functions, from concept development through to operational plan assessment. Instead, a framework of simulations is required so that the weaknesses of one tool are augmented by the strengths of another. An initial collection of tools has been selected for the initial prototype, but these are merely a starting point. The framework is designed with a level of flexibility that supports adding or removing tools as technologies evolve.

This framework orchestrates the data movement from point of ingestion through game preparation and distribution to the component simulations. Simulation time is synchronized, and massive entity-count state data is orchestrated amongst the component simulations via a technology incubated in the Army's Synthetic Training Environment program.

The framework continuously collects and logs the voluminous data each component simulation produces during game execution. For example, an air simulation may produce metrics on fuel consumed or sorties executed per day. A land simulation may produce metoperations researchers a mechanism to data-mine the game results of not just one but an entire series of games, or many repetitions of such games, after the fact.

The framework furthermore eliminates the need for experts in the operation of each underlying simulation. Instead, wargame planners and analysts learn a single system, which translates wargamer scenario, order of battle, terrain, courses of action, and hypothetical assumptions into the specific configuration specifications of each underlying simulation. Training on the system then remains relevant, even when simulations change.

Conceptual Model Approach

Conceptual models (CMs) are the abstract mathematical, algorithmic relationships between input and output variables, which are the underpinnings of every simulation system. Formal validation, and thus defensibility, of analytic findings comes down to an assessment of the underlying conceptual models together with the data that feeds them. The difference between well-understood and researched CMs, and vague un-documented CMs is the difference between defensibility and "smoke and mirrors." As the Marine Corps' M&S enterprise moves toward a common library of validated conceptual models underlying the breadth of simulations in use across analysis, acquisition, training, and experimentation, the approach with wargaming is likewise first to codify the required CMs

and then develop and integrate them, informed by both the priority of need and the technical complexity for each.

Third parties will be able to contribute CM expertise via a model-based systems engineering process. In this scheme, a system designer or independent research organization develops their CM in SysML and delivers them to the SysML repository, which is maintained by an independent government lab. This human-readable library facilitates validation by subject-matter experts as well as eventual implementation in the wargaming system. As systems development increasingly incorporates the principles of Model-Based Systems Engineering, the integration of accurate representations of these emerging systems is eased by this approach.

Data Management

With such an emphasis on defensibility, identifying authoritative data sources sufficient to feed the immense appetite of this library of conceptual models is key. Depending on the nature of the need, these data sources come in two varieties: well-maintained databases with codified interface control documents and data held in pockets of expertise where the associated modeling efforts are nascent. Either way, the wargaming system brings in both types of data in a highly efficient manner, regardless of the classification level at which that data exists. During preparation, a planner may then modify that data to meet some type of hypothesis of the wargame under development. As these modifications are made, there is a danger of losing configuration control and the pedigree of the data. (Where did it come from originally, how was it changed, by whom, and under what rationale?) The wargaming system both facilitates these purposeful changes in data, but at the same time reliably records all such changes to maintain data traceability.

In order to orchestrate the data distribution to all component simulations reliably and efficiently, a unified data model has been developed for the system. This data model then forms the basis for simulation entity state information to pass back and forth between

sims on the framework backbone. The consistency of representation across the system, combined with the configuration management of any and all changes from the data source, are among the core components necessary for the verification and validation of the system of simulations.

In wargaming, the need arises for certain higher-classification components of a contemplated scenario to be both rigorously modeled and understood at the required classification level and then to inform the broader lower classification game with certain lower classification effects. The requirements and resulting design for a transfer cross-domain solution are being planned in order that the system can handle this common use case securely, efficiently, and accurately.

... the system design facilitates continuous improvement and validation ...

Live and Continuous Verification, Validation, and Accreditation (VV&A)

In order to meet the external scrutiny expected once wargaming simulation results are used to justify big-ticket decisions, M&S VV&A must be addressed. Critics will point out there is not enough time to conduct VV&A and keep faithful to the intent for the system, namely timely insight and analysis for senior leaders. This is a valid concern, given traditional VV&A processes, which typically involve years of effort before a formal accreditation is granted for a specific simulation use case.

What is needed therefore is a kind of live and continuous VV&A approach. In this approach, the system begins on day one with a set of simulations that already come with a degree of credibility. Then the system design facilitates continuous improvement and validation, capitalizing on the very nature of wargaming. With each game executed, a plethora of subject-matter experts across

all areas of expertise are continually brought into the center. As these players witness the synthetic environment unfold during a scenario, they will see up-close exactly what the simulations are claiming happens next. These participants naturally will question what is purported as reality. When this happens, the system facilitates an immediate investigation. When a player asks, "What data is that behavior based on?" the system can immediately surface the rationale, doctrine, algorithm, or whatever appropriate artifact addresses the question. The participant then has the opportunity to allay the concern or just as valuably recommend a change to better reflect that player's understanding of reality, whether recommending an alternative database, an alternative behavior, or an additional constraint—whatever the key is to reflect that participant's sphere of expertise. The system takes in this recommendation and makes it available to planners and developers to address in future games. In this way, the system is always being improved while amassing an ever-growing body of evidence that the system results can be relied upon for consequential decisions. If for any reason a more traditional VV&A process is required for some specific purpose, the system's ability to surface the configuration-controlled key data, algorithms, constraints, and models again facilitates such a process.

Outlook

The Marine Corps' focus on *Force Design 2030* and the tools, people, and processes needed to get there drove the development of this approach. Each of the pieces outlined here is essential to achieve the desired outcome. As this system comes online in the new MC-WAC and continues to mature in years to come, the bold vision to provide senior leaders with timely, defensible, data-driven insight into the Corps' complex operating environment will become reality.



Logistics Operations in a DDIL Environment

Sustainment when C4 is denied, degraded, intermittent, and low-bandwidth (DDIL)

by Mr. Brent Lancaster, Mr. Patrick Gallaher, Capt Mathew Williams & Mr. Greg Kellenberger

o maintain information superiority, Logistics Information Technology (LOG IT) must be adaptable to meet evolving business operation needs of the MAGTF. The Marine Corps currently faces logistics communication challenges in non-permissive environments and requires innovative approaches to improve data accessibility and accuracy. To sustain the force in the 21st century and fulfill the 38th Commandant's Planning Guidance, the Marine Corps is committed to achieving solutions that maintain continuity and integrity from garrison to the tactical edge to ensure that warfighters make more informed decisions and can execute service, supply, and maintenance requirements effectively.

The Marine Corps must develop next-generation technical architecture to seamlessly support LOG IT business process resiliency to achieve a tactical advantage over adversaries. Program Manager, Logistics Integrated Information Solutions, an Acquisition Program Office in Marine Corps Systems Command and PEO MLB, is enabling this expansion and demonstrating valuation of data and informed decisions by increasing access to information, accuracy, and timeliness through DDIL MC Log.

Background

The Global Combat Support System-Marine Corps/Logistics Chain Management (GCSS-MC/LCM) is

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the technology centerpiece for logistics business operations in the Marine Corps. It provides accurate, near-realtime, integrated logistics information and enterprise-wide visibility of logistics data, enabling Marines to make informed logistical decisions at the speed of relevance. Currently, GCSS-MC requires a sustained internet connection and has limited accessibility and use under disconnected or disadvantaged network conditions. Host networks are used to connect GCSS-MC users with the system to provide web connectivity to the garrison, shipboard, and expeditionary operational environments. When reliable web connectivity cannot be achieved, Marines must document actions manually and enter them into

GCSS-MC later once internet connectivity is obtained.

DDIL MC Log Vision to Pilot

To meet the Marine Corps' need to innovate, adapt, and succeed in a rapidly changing operating environment, LI2S-MC conducted a one-year prototype development effort with subsequent pilot demonstrations that would identify the availability of technical solutions that could resolve the warfighter's experience in a challenging environment. The pilot was supported by user representatives and sought to prove the ability to perform GCSS-MC functions in like environments (garrison, MAGTF-afloat, and ashore) under DDIL conditions.

The successful pilot proved GCSS-MC functionality in the Marine Corps Tactical System Support Activity Cyber and Network Engineering Lab testing environments by simulating logistics business operations in DDIL environments (Figure 1). The team verified that service, supply, and maintenance requests transactions within GCSS-MC successfully synchronized in disconnected and disadvantaged scenarios while assuring effective cybersecurity. The demonstration resulted in zero functional errors on more than 2,500 transaction scenarios. The pilot proved that greater sync capability, effective data exchange, and ease of use would considerably improve logistics communication in an austere tactical environment.

After the successful pilot, the LI2S-MC team aggressively awarded a critical capability production contract. This solution was named DDIL MC Log, and it will provide an extension of GCSS-MC capabilities to all operational environments and will allow GCSS-MC users' continuity of operations for logistics business processes under degraded or absent network conditions.

DDIL MC Log Development Process

DDIL MC Log employs an Agile "whole team" approach to deliver a complete end-to-end structure for iterative system development and testing. The integrated Agile team is comprised of the Product Owner, Program Management Team, GCSS-MC subject-matter experts (SME), developers, and users from both the Acquisition Community and the functional, user community. This cross-organizational team composition ensures a customer-centric, collaborative, and adaptive environment to foster meaningful customer-focused results.

DDIL MC Log will be hosted on the secure and accredited Marine Corps Business Operations Support System service provider Amazon Web Services GovCloud hosting environment. DDIL MC Log makes full use of cloud benefits through this hosting environment, such as availability, reliability, and other vital non-functional requirements that support user mission and the Security

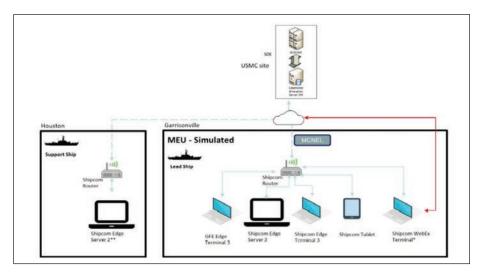


Figure 1. DDIL MC Log-Operational View 1 (Simulated). (Figure provided by author.)

Control Inheritance Model and Marine Corps Business Operations Support System Secure Cloud Computing Architecture components.

DDIL MC Log Capabilities

Currently, Marines in a non-permissive environment must record information through various manual means for follow-on digital entry into GCSS-MC. Unreliable or overburdened connections disrupt the normal work process as GCSS-MC requires a consistent connection to complete updates. The FMF currently has no reliable digital tool sup-

porting mobile technology, resulting in services, supply, and maintenance requests captured with pen and paper until connections with GCSS-MC are reestablished.

Envision a Marine performing a limited technical inspection in the well deck of an amphibious ship or at a forward operating base, capable of capturing data or taking notes electronically that can then be directly used to support logistics processes. DDIL MC Log allows Marines to enter and store data when web connections are poor or unavailable and synchronize the stored

Login/Logout
Create or Update Field Service Request
Request for Supply and Associated Task(s)
Request for Service and Associated Task(s)
Request for Maintenance and Associated Task(s)
Flag Operational Status
Order Part
Approve Requests
Assign Requests to Specified Organizations

GCSS-MC Core Functions Provided in DDIL MC Log

Receive Requests from Other Organizations

Provide Feedback Response on Actions Taken

Attach Funding Appropriations Data to Part Requests

Display/Manage Request

Table 1. GCSS-MC Functions in DDIL MC Log.

data once a reliable connection has been established through an intuitive graphic interface

The functionality delivered during the first year of the DDIL MC Log has been developed around a subset of thirteen core functions from GCSS-MC (Table 1) identified by the GCSS-MC functional subject-matter expert team. Using a commercial off-the-shelf application loaded on forward deployed computer systems, DDIL MC Log allows tactical users to select the time and place of their choosing to smart-sync the geographically distributed device with the enterprise service. The enterprise service then delivers the necessary information to GCSS-MC, receives appropriate updates, and provides the updates to the local computer. The operator can perform its core functions regardless of an active link to GCSS-MC.

The current effort will provide a highly scalable solution of critical functionality to extend field service supply chain management maintenance processes in disconnected and disadvantaged environments. The solution is built with functional experts working shoulder-to-shoulder with developers giving realtime feedback as the product advances. Through userbased tactical interfaces and advanced reporting dashboards, the solution will provide Marines with enhanced alert and notification functions, search and audit features, advanced key performance indicators, and management capabilities for GCSS-MC reporting as the Accountable Property System of Record. Extending access to GCSS-MC capabilities to all operational environments, specifically to DDIL environments, would better support garrison, shipboard, and expeditionary functional requirements and processes for GCSS-MC users.

The DDIL MC Log application will enable the full exploitation of *sense* and respond logistics, giving end-users the ability to track shipments, effectively manage inventories, and monitor equipment status while enabling predictive—vice reactive—logistics without any noticeable interruptions to users or ongoing transactions. This technology will provide Marines the ability to offset

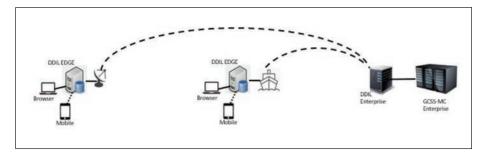


Figure 2. DDIL MC Log-Operational View-1 (Production). (Figure provided by author.)

enemy capabilities by resupplying faster, reducing repair cycle times, and provisioning on-demand parts. Additionally, LOG IT business processes will be more secure and will realize significant improvements to property accountability, traceability, and data integrity by allowing disconnected users to continue on-site activities, capturing up-to-date data, and synching the information to the enterprise when practicable.

The first year of effort for DDIL MC Log is focused on producing a minimum viable product for a selected MEU. LI2S-MC is currently executing a Critical Data Analysis which is developing a model integrated with the Deputy Commandant Combat Development and Integration led and Deputy Commandant Installation and Logistics advocacy supported capability base assessment, which will identify gaps in LOG IT. This output will be used to inform the next capability expansions of DDIL MC Log and legacy system replacements. The DDIL MC Log application is scalable by design and can support a broad range of additional logistics services, enhancing the Marines Corps' capacity to operate effectively in a non-permissive operational environment.

Conclusion

The FMF is focused on preparing for a near-peer opponent and structuring itself to operate in a non-permissive environment. The DDIL MC Log concept of employment supports the core functionality of logistic supply and maintenance support for the disconnected user. The application fulfills the needs of critical weapon systems maintainers and supporting equipment. These maintainers and supply Marines need

to conduct day-to-day logistics transactions and status reconciliations while not relying on a constant reach back to GCSS-MC through the web. Removing the dependency on a continuous internet connection and providing a solution to conduct operations in challenging environments allows the fleet Marine to perform tasks without interruptions from LOG IT business systems operational requirements.

The DDIL MC Log application, as part of the portfolio of actions under development in the LI2S-MC modernization space, contributes to the critical capabilities necessary to support the Marine Corps in future conflicts. DDIL MC Log allows forward-deployed operators in the non-permissive environment to execute their mission while disconnected, building on the local information and enriching the data and information provided to the commander when connectivity is established. LI2S-MC is working toward placing DDIL MC Log functionality into the hands of the Marines by the conclusion of the current year. Subsequent active engagement with the fleet user will establish an immediate feedback loop that will be integrated with CDA/CBA outputs to identify areas for future enhancement, expansion, and legacy system replacement.



Progressive Web Applications

Tactical applications built for the future

by Mr. Joshua Adams, Mr. Edgar Valles, Mr. John (Rick) Bobst, Capt Matthew Lowery & Maj Lucas Burke

ny conflict against an adversary will require Marines to operate in an environment that is a dichotomy: data-heavy requirements for an information-enabled force that operates in environments with potential disconnects from sources of data or Marines that are unable to maintain connectivity to higher echelons of command to receive information. As the Marine Corps shifts capabilities and operations to confront adversary capabilities, conventional transmission pathways and always-on connectivity may not be available to those troops engaged in conflict.1 Marines conducting decentralized operations will have to find ways to communicate and share information. Understanding requirements and the operating environment will be critical to enabling Marines on the battlefield to operate independently with maximum lethality.

Acquiring new equipment and technology is a challenge and software acquisitions problems are manifold when it comes to delivering software capabilities to the Marine in the fight. From technical challenges and outside influences on a Marine's ability to move data, variability in end-user device capabilities and a general lack of awareness of how Marines use software applications to support their operations can slow down an entire mission.² These problems compound during the acquisitions process, resulting in cost and schedule overruns and delivering capabilities that are obsolete by the time they are released to the FMF. Ultimately, these failures run counter to Commandant of

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A Marine with 5th Mar reviews and provides feedback on a new Marine Corps website, the Infantry Weapons Information Tool, 15 January 2021, aboard Marine Corps Base Camp Pendleton, CA. This easy-to-use, common access, card-enabled site provides Marines with relevant technical doctrine, training manuals, instructional videos, and other tools needed to make them a more effective force. (Photo by Amy Forsythe.)

the Marine Corps, Gen David Berger's guidance: "Everything starts and ends with the individual Marine."

To empower Marines with the knowledge required to operate their weapons systems in a communications-denied environment, the Marine Corps Tactical Systems Support Activity's Warfighter Support Division (WSD) in support of Program Manager-Infantry Weapons (PM-IW) built a Progressive Web Application (PWA) that can be accessed with credentials over any network for which it has an authority to operate and can grow and evolve with the needs of the Service.

Creating and disseminating weapon system data was PM-IW's primary opportunity for partnering with WSD's team of professionals. WSD determined that infantry Marines comprised the largest MOS in the Marine Corps with the greatest number of Marines without non-classified Internet Protocol Router Network access, Marine Corps Enterprise Information Technology Services accounts, and access to the numerous other sites hosting training material and technical data on weapons systems listed in the Marine Corps inventory. Ultimately, the Marines who need access to information the most are not afforded the opportunity to access it because of this capability gap. Marines resort to non-secure social media to ask peers and seniors alike to share information. [Author's note: to prevent further dissemination of these websites, we are withholding the data we collected for requirements generation.]

Building a solution mainly for junior Marines operating forward in an environment envisioned by Force Design 2030, WSD's development team engaged directly with the FMF and observed them navigate prototypes while providing recommended updates. Through this observation and realtime feedback, developers decided that a progressive web application (PWA) met many of the requirements to operate in a semi- or non-permissive communications environment. PM-IW provided resource oversight of the program, but the broad requirements for the application made a free flow of information between the development team, the fleet Marines, and the program office to expedite decision making and necessary code changes. Additionally, PM-IW detailed a project officer to MCTSSA for twelve months to assist in programmatic decisions and utilized remote working capabilities to ensure program management leadership at Marine Corps Systems Command in Quantico were engaged in the development process.

Through iterative fleet engagement and Program Office guidance, the development team decided that a PWA would provide a rapid solution that runs on an Android tablet, with the look and feel of a native Android application. This was important because the current

inventory of handheld devices fielded by Marine Corps System Command are Android-based operating systems. Creating a PWA allowed WSD to leverage its current workforce of web, software, and user interface development teams without the need of hiring Androidspecific developers. WSD also utilized the talents of a software engineering college intern from the University of California at San Diego and supported the development team for the summer. PWA's use of web technologies allows developers to create an application that is compatible with most systems that support mobile browsing, which met the requirement from PM-IW.

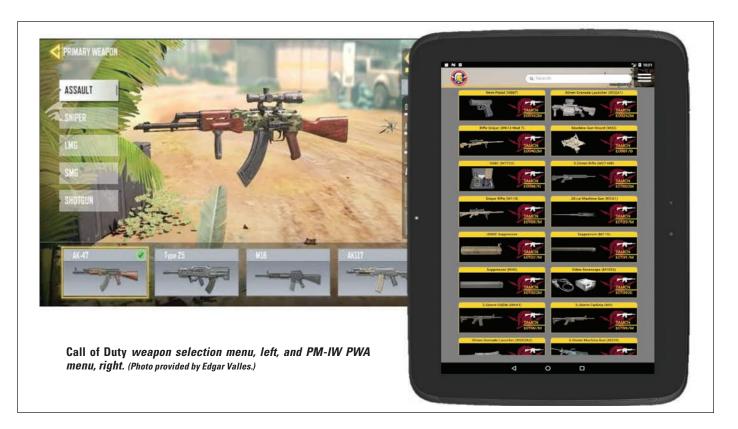
Leveraging this technology allowed WSD to build a web application (PM-IW website) that could be converted into a PWA with minor changes being made. For the PM-IWs use case, the PWA had to be packaged into an Android Application Package because of the use of offline mobile devices. PWA's can be packaged to all common operating systems allowing them to be compatible with current and future programs of records within the Marine Corps.

Building the Future

The first step in building a PWA was to access the documented and cataloged information related to Infantry Weapons on MCTSSA's Common Access Card (CAC)-enabled SharePoint site.



Screen grabs from the application running on an Android Tablet emulator from left to right: PM-IW Hompage, PM-IW Navigation, PM-IW Documents View, and PM-IW Weapons View. (Photos provided by Edgar Valles.)



Utilizing an authoritative source for data mitigates the ubiquitous version control issues across the FMF or Marines referencing out-of-date information. MCTSSA's site allows for two-way conversation between fleet Marines and the Program Office, but it is CAC-enabled and limited the type of access required for a junior fleet Marine.

PWA requirements vary, but using Google's list of requirements for developers provided a start point for determining if a PWA would meet the requirements of not only PM-IW but any Marine forward deployed as part of a Marine Littoral Regiment.4 Some of the requirements included inherent security, the ability to operate offline (disconnected from the source of data), and fast load times on latent or slower networks when a Marine was able to connect. Additionally, once connected, a Marine should only pull data that has actually changed ("delta" changes), vice an entire update to the application.

This decrease in data usage has real-world implications for signature management and force protection considerations, enabling survivability and

lethality by allowing the Marine to practice an *I'm up, they see me, I'm down* technique in the electromagnetic spectrum against a peer adversary. A Marine can select which delta changes they are interested in updating, allowing the user to individually customize the size of the data package they are willing to download in their current operating environment.

Utilizing Scrum as the development framework allowed the team to create iterative prototypes and near-constant feedback loops between the development team, fleet Marines, and the Program Office. Scrum is a software development methodology that is supported by the Centers for Adaptive Warfighting and is part of the NavalX and the Assistant Secretary of the Navy for Research, Development, and Acquisitions. Using Scrum, the development team applied customer requirements and translated them into a feature list, which it then presented to the program manager for approval.

Paramount throughout each development cycle was testing the capabilities in a closed-test environment that mirrored the command and control (C2) archi-

tecture deployed Marines would utilize, including Samsung tablets and bandwidth limitations that mimicked an AN/PRC-117G radio operating on ultra-high-frequency bands.

WSD also capitalized on the colocation of the MCTSSA Global Support Center to ensure that key subjectmatter experts were on hand to establish networks, run application installation steps for documentation, and test features based on real-world fleet Marine operations at a speed that made updates relevant and timely for the end-user. Additionally, PM-IW arranged to have the applications field-tested with infantry battalions aboard Marine Corps Base Camp Pendleton, with programmers both on-site and in remote locations to collect feedback on the application and make changes or talk through more complex corrections to the code and layout to ensure it met the Marines' intent.

Then-Assistant Secretary of the Navy for Research, Development & Acquisitions, James Geurts stated at Modern Day Marine 2020, "Anytime we can close down the distance between operator [and] acquirer ... you automatically can better illuminate opportunities and

better handle issues." With this guidance, the development team aimed to close that loop to create faster capabilities and was able to move the application from idea conception to prototype and field testing with junior Marines in under three months. By reusing code, updates and changes were minimal and allowed the developers to create new features requested by the program and fleet.

Feedback: Meeting Marines Where They Are

Feedback loops were instrumental in accelerating the development of the PWA. One feedback session focused on ways to reduce the training required to utilize the application; the development team researched the best way to get Marines to use the PWA, and the development team decided on a *Call of Duty* videogame-style graphical user interface (GUI) to capitalize on usability and knowledge fleet Marines already had for navigating the videogame menus.

Based on observed and anecdotal feedback from Marines, the *Call of Duty* menu for selecting weapons during gameplay was viewed as ubiquitous by the development team and approved by PM-IW as the GUI to link Marines with the weapons system information they are seeking. Field testing in January 2021 with 1/5 Mar aboard Camp Pendleton allowed the developers to modify the GUI in near realtime to meet the expectations of the Marines, with most change requests occurring within a week of receipt.

Future Web Applications in EABO

Progressive web applications within the FMF could and should be an option for future application development. Hosting content in a cloud-enabled, authenticated source and making it downloadable on-demand preserves a commander's valuable bandwidth in a tactical or denied environment. The maturation of PWAs in the Marine Corps could lead to two-way communication flows between fleet Marines and supporting establishment through that same architecture, ensuring Marines are receiving updates to technical documen-

tation and have subject-matter experts available to talk to when they are able to connect. Ultimately, this will move Marines off social media for sharing equipment tactics, techniques, and procedures, best practices, and other capabilities in a denied environment with a reconnaissance/counter-reconnaissance mindset. The idea of only connecting to the network when required, with pre-determined uploads and downloads based on individual tab-

Progressive web applications can be built to support anything, from headspace to cyberspace, providing critical information to those who need it most.

non-public information that should not be stored on commercial, non-secure servers

Originally designed specifically for PM-IW as a communication tool for widespread dissemination of technical knowledge, MCTSSA has laid the groundwork and built the architecture to completely revolutionize the world of logistics, training, and technical support communication with Marines forward deployed in a semi- or non-permissive operating environment. This is accomplished by hosting or querying all technical doctrine from multiple service databases into a single, intuitive platform.

While a technical solution is no match for the ingenuity of the individual Marine, helping them understand their own capabilities with the information they need on-demand in a disconnected environment increases survivability and lethality of those forward deployed forces as realized through recently developed concepts like the Stand-in Force, Expeditionary Advanced Base Operations, and formations like the Marine Littoral Regiment.

The infantry weapons app is in its infancy with the potential to grow past any initial expectations. It provides Marines with a CAC anonymous portal where they can access information over any network for which it has the authorization to operate without needing additional SAAR forms or email accounts in an easy-to-digest format. This application paired with new and ever-developing tactics, techniques, and procedures have limitless

let connection history, will effectively create signature management down to the lowest level. Built-in algorithms know what to pull from the application's last update, so the user is only connected for a fraction of the time it takes for current systems to update. Progressive web applications can be built to support anything, from headspace to cyberspace, providing critical information to those who need it most. Inherently, this will make Marines more capable, lethal, and less detectable.

Notes

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A Special Relationship

SOF AT&L and MCSC

by Maj Jonathan Ritchey

stationed at MacDill, Air Force Base, Tampa, FL.

he special and mutually beneficial relationship between Special Operations Forces Acquisition, Technology and Logistics (SOF AT&L) and Marine Corps Systems Command (MCSC) is the result of common requirements, continued technology collaboration, and persistent capability transition. Relatively speaking, this is a very young relationship that only started after the initial designation of U.S. Special Operations Command as a functional combatant command in 1987.1 Although SOF AT&L's name has changed several times since then, its relationship with MCSC has grown into a close collaboration environment of shared capabilities and vision.

Background

To better understand the relationship

between SOF AT&L and MCSC, it is important to understand each organization's mission. SOF AT&L's mission is to provide rapid and focused acquisition, technology, and logistics to special operations forces.2 MCSC's mission focus is to equip and sustain Marine forces with the most capable and cost-effective systems for current and future expeditionary and crisis-response operations.³ These statements are very similar, with the main difference being who is supported. However, the different communities supported by these organizations share many common missions and much operational utility.



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The Marine Corps is the premiere crisis response force of the United States. This creates a need for the Marine Corps to always be ready to conduct force projection across the globe at any time. The 38th Commandant's Planning Guidance further identifies the Marine Corps as a Naval Integrated Force that must learn to maintain a persistent naval forward presence.⁴ This requires Marines to be able to sustain themselves autonomously and continuously without traditional logistical and operational support and a large requirement for long-range communications capability at the small unit level. This is something that the SOF community has been doing for a long time, which has pushed them to develop some of the best secure, long-range, and scalable communications capabilities.

For example, in the Program Executive Office (PEO) for Command, Control, Communications, and Computers, a SOF requirement for the AN/ PRC-161, also known as the Handheld Link 16 radio, allows a dismounted user access to the Link 16 network, which dramatically reduces the kill chain time for long-range fires. The PRC-161 allows for full participation in joint and partner nation tactical data link networks. Since 2019, when SOCOM began fielding the capability, there have been additional use cases across the services beyond long-range fires because of the close collaboration with SOF AT&L. This capability is now fielded



SOF AT&L and MCSC have a mutually beneficial relationship. (Photo by MSgt Barry Loo.)

to the Marine Corps and is critical for the Marine Corps to be successful in the implementation of the *38th Commandant's Guidance* for more complete naval integration.⁵

Technology Collaboration

At SOF AT&L, the Marine acquisition professionals are comprised of five Marine acquisition officers assigned throughout the nine PEOs of SOF AT&L and one Marine Corps Systems Command liaison officer to Special Operations Command. This team identifies requisite counterparts within MCSC program offices to compare acquisition strategies of similar equipment to see if there may be some cost-sharing, development-sharing, or acquisition strategy sharing between the commands.

In addition to these relationships, MCSC has a direct relationship with Marine Forces Special Operations Command (MARSOC) as reflected in the Memorandum of Agreement for using Marine Corps Special Operations Command as a user jury.⁶ This allows MCSC to work with MARSOC to rapidly assess equipment and potentially rapidly field commercial off-the-shelf technologies for the Marine Corps and SOF community.⁷

In PEO-SOF Warrior (SW), they have developed the SOF Warrior Innovation, Technology, Collaboration Huddle concept to align the community of interests towards integrated deterrence.⁸ This government-only concept takes common interests within the purview of PEO-SW and the other Services, including the Marine Corps, and identifies future collaboration, unified strategic messages, common messages to industry, and acquisition strategy alignment. Many times, a technological breakthrough, such as a special type of ammunition for a specific SOF purpose, is developed. However, over time, it is more beneficial for that capability to be transitioned to one of the larger Services, as long-term ammunition sustainment is better suited for a larger Service like the Army.

Additionally, in PM Precision Strike, PEO-SW, the SPIKE Non-Line of Sight capability was tested by MARSOC uti-



In addition to collaboration with SOF AT&L, MCSC has a direct relationship with MARSOC. (Photo by MSgt Barry Loo.)

lizing a combat evaluation. After a successful combat evaluation, MCSC and SOF AT&L co-funded the procurement of three additional systems utilizing an Other Transactional Authority. These three systems are planned to be fielded to MARSOC in 2022 giving them Initial Operational Capability (IOC). Furthermore, this capability is being looked at by MCSC as a potential candidate for SOF to service transition.

It is important to collaborate with other organizations that have similar objectives ...

In PEO-Special Reconnaissance (SR), quarterly meetings have been established between Portfolio Manager (PfM), Command Element Systems (CES) to review relevant programs within each command to identify technology integration and potential SOF to Service transition opportunities. These meetings have included members of the Combat Development and Integration (CD&I) division of Marine Corps Combat Development Command to also identify potential material solutions

within SOF AT&L that have already been developed before developing a potentially duplicative capability that takes longer to get to a Marine downrange.

There are few times great ideas are generated from a single organization for that single organization's purpose. It is important to collaborate with other organizations that have similar objectives in the technological space to develop the best capabilities relative to the needs of the community. Applying current technology to new problem sets or requirements can lead to innovative approaches that create evolutionary advances of current technology. In other words, looking at current SOF AT&L technology and looking at it through a Marine Corps requirements lens can lead to new applications of that technology and potential ideas for further advancing it, which subsequently benefits SOF AT&L or vice versa.

Persistent Technology Transition

Technology or capability transition from SOF AT&L to MCSC is commonly understood as a SOF-to-Service transition. This is when a program that currently resides in SOF is transitioned to another Service. It is important to understand that this is only a transition of program oversight and not necessarily a transfer of capability, as many times

SOF AT&L continues to maintain the capability. This allows a Service with a larger budget using Major Force Program 2 (MFP-2) funding, instead of the MFP-11 funding that SOCOM uses, to manage the program, potentially providing large cost savings with economies of scale. This is mutually beneficial to the Service as the Service saves time in development by transitioning an already mature capability that may only need a minor development cycle to match service requirements.

PEO-SW has conducted a SOF-to-Service transition with their Program Manager (PM) Family of Special Operations Vehicles (FSOV) and is set to complete yet another. Initially, the Marine Corps had an Urgent Needs Statement (UNS) for a lightweight, internally transportable, agile, and off-road logistics vehicle.⁹ Instead of going through the long process of developing their own capability, they were able to use the Polaris MRZR, a Utility Task Vehicle that SOCOM had already developed and fielded to the SOF community. After several years, this capability is being phased out and replaced by the Ultra-Light Tactical Vehicle, which was also developed at SOCOM and is set to be fielded to the Marine Corps in 2022.¹⁰

This is not only an example of a successful SOF-to-Service transition but also an example of close collaboration between SOF AT&L and MCSC. During the development of the Ultra-Light Tactical Vehicle, the MCSC program office and PM FSOV of SOF AT&L regularly collaborated during development to ensure the requirements remained common for both organizations. This is the more common scenario for a SOF-to-Service transition. It is rare for any Service to randomly look to SOF AT&L for a capability and stumble on to the next perfect capability fit for its new requirement. There is usually a service member at SOF AT&L that is collaborating with their service counterparts to create these opportunities that benefit the SOF community as well as the other Services.

Challenges

Although this article focuses on the successes of the SOF AT&L and MCSC

relationship, there are always challenges when trying to match requirements and synchronize competing acquisition strategies and timelines between SOF AT&L and MCSC. One of the common challenges is matching requirements. There are times when there is a clear technological advancement that would be advantageous for the Marine Corps to possess; however, our counterparts at CD&I have not published a requirement yet. To be fair, there are many times CD&I cannot anticipate requirements as many arise quickly as the result of a new adversary capability or knowledge of a new technological breakthrough in a certain area. Additionally, publishing a requirement is a deliberate and arduous process to ensure that a capability is both needed and not duplicated. That said, there must be a conversation about having a more streamlined process for writing requirements for an already existing capability that exists outside of the Marine Corps.

Another common challenge is a lack of direct programmatic counterparts. For example, an MCSC program may include equipment and capability that reside in separate PEOs at SOF AT&L. This means there are several different contracting strategies and potentially competing priorities between PEOs, which could further complicate a potential capability transition. This can be an obstacle when trying to transition a capability on a single contract effort or within the scope of a single system.

These challenges are not insurmountable and the team of Marine acquisition professionals at SOF AT&L have solved these problems in the past and will continue to solve them in the future.

Summary

The special relationship between SOF AT&L and MCSC continues to thrive. The SOF-to-Service transition is the most tangible output of this relationship; however, it should not be seen as a sole measure of success. As outlined in this article, the regular close collaboration between SOF AT&L and MCSC has led to acquisition strategy confluence, knowledge of other SOF-to-Service transitions that the MCSC

can still benefit from, and a better understanding of potential future capabilities for the Marine Corps. Finally, the common requirements, continued technology collaboration, and persistent capability transition will continue to provide the Marine Corps with streamlined opportunities for getting the right equipment quickly into the hands of the Marines downrange.

Notes

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- 2. Staff, "JSOU Course 22A Course Introduction," (MacDill AFB, FL: Joint Special Operations University, n.d.).
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- 5. Ibid.
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- 7. Ibid.
- 8. PEO-SW Systems Brief.
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Electric Vehicle Technology

Modernizing the Marine Corps' tactical wheeled vehicle fleet

by Mr. Marc Paquette

s of this writing, the United States has over 1.8 million electric vehicles (EVs) registered in the United States. In comparison to the world stage, the United States represents a mere 17 percent of the 10.2 million EVs. The EV's popularity comes with a push from the current administration to grow the capability and pressure from Congress to adopt the technology on Tactical Wheeled Vehicles (TWV).

The payback of acquiring EVs for the military are many and may include such benefits as lower sound and infrared signature, superb mobility, higher reliability, and perhaps—at some point—lower maintenance cost. The technology also offers the ability to inaudibly export onboard power for such mission support as a silent watch, mobile command post, medical support, and much more.

The total life cycle implications of electrified TWVs are not yet fully understood. More specifically, the logistics required to sustain and maintain electrified TWVs are in the early infancy stage, and much remains to be discovered.

This article is not an endorsement to electrify or not electrify the Marine Corps Tactical Wheeled Vehicle fleet or to define what degree of electrification the Corps should pursue. It is instead the author's interpretation of the current state of readiness to proceed and identification of the pitfalls if done hastily as well as gains to be achieved if done methodically.

State of the Technology

Industry has come a long way in making the batteries better, lighter, and last longer. The average battery pack on >Mr. Paquette is a NH-IV/GS-15, assigned to Marine Corps Systems Command.

commercially available e-vehicles lasts ten-fifteen years with minimal loss of capacity. Any casual observer will notice that much growth has occurred to ensure rapid charging stations are operational in many shopping centers located near highways and byways.

Very little has however been done in terms of supporting a battalion of e-TWVs. How will we recharge our fleet in forward areas? Will it take a larger footprint to transport or place forward charging stations? It is not like we will be performing a combat mission on I-95 with the ability to drive to a Walmart rapid charging station. No one can say for sure what it all means in terms of the Concept of Operations and sustainability.

The time to look at EVs for the Marine Corps is indeed now but a measured and deliberate approach is required.

The first step of an incremental approach is already well underway with our industry partners cementing e-TWV using Independent Research and Development dollars. Billions are being spent on vehicle designs, battery and battery management systems, production facilities for vehicles, as well as production facilities to produce U.S. manufactured batteries. These e-TWVs will no doubt possess superb off and onroad capability, offer reliability and ease of maintenance, long-lasting battery life, provide low detectability, and the potential ability to export high levels of power. These benefits will also undoubtedly come at a cost, and operational trade-offs such as range and payload will have to be made.

For the past decade, Naval Surface Warfare Center Crane has been advancing electrification of the light and ultra-light tactical vehicle space. These endeavors have included extensive modeling and simulation in addition to the development and testing of multiple technology demonstrators ranging from fully electric to diesel-electric vehicles.



MTVR fording. (Source: https://commons.wikimedia.org/wiki.)

The results of these efforts reveal that fully electric vehicles are not viable on the tactical edge with present commercial EV technology. This is largely because of the relatively low energy density of automotive lithium batteries with respect to that of kerosene-based fuels. In order to perform the same mission requirements, the dry weight for a fully electric vehicle can be expected to be at least twice that of its internal combustion engine counterpart. This would result in reduced flexibility of employment (e.g. payload capacity degradation, exceeding floor pressure for internal air transportability, etc).

Another area little understood at the moment is fording in fresh and saltwater environments. Development and Operational Testing will yield valuable information on the system and operational suitability and reliability for all of the electrical systems and components when immersed. The data will also provide insight into the engineering required to

make the systems suitable for Marines to use in all climes and locations.

Transportation and storage safety procedures and mitigation strategies will also prove to be challenging. Funding will need to be allocated to research

Lithium-ion battery fires can create what is referred to as a "three dimensional fire ..."

and develop safety systems that may require the retrofit of ships, aircraft, and facilities. Navy ships have not been fully evaluated for their ability to support the transportation of e-TWVs. The storage of lithium-ion batteries presents challenges and investigation of what will be required to safely store them aboard

Navy ships is in an embryonic stage. Firefighting and HAZMAT capabilities aboard Navy ships are designed to respond to fuel fires that spread across the deck of vehicle storage compartments. Lithium-ion battery fires can create what is referred to as a "three-dimensional fire," which burns within the vehicle obstructed behind vehicular panels with no direct access.

At a minimum, we will need to explore the following:

- What ship modifications and certifications will be required?
- What will the facilization cost be?
- What facilities will we need in garrison and in the Expeditionary Advanced Bases to charge, maintain, and store the new battery technology?

The issues described above need to be investigated and pursued using an incremental approach totally grounded in experimentation in order to prove or otherwise demonstrate the warfighter's and supporting establishment's ability





JLTV exposed to salt water during recent Marine Corps employment. (Photo by LCpl Drake Nickels.)

to adopt and sustain the new e-technology.

To this end, the Marine Corps should at the onset, identify and designate an infantry battalion to operate using electrified tactical wheeled vehicles and conduct experimentation on scale. This approach would have the added benefit of setting conditions for concept development and would inform requirements. It would perhaps be ideal for this infantry battalion to be based at Twentynine Palms with an added portion of the experimentation in deployed cold weather conditions to assess the cold weather impact on e-TWVs.

Initially, an Integrated Product Team (IPT) should be formed with participants from the chosen infantry battalion, the Office of Naval Research (ONR), Naval Surface Warfare Center Crane, Combat Development Command, and a Marine Corps Systems Command (MCSC) Acquisition Program Manager well versed in experimentation.

The next three to six months should be spent identifying the current state of technology with such excursions and documentation to fully capture the realm of the possible. Such data as weight to range; weight to cube; and vehicle class. A vital portion of the experimentation is forward support and this experiment would examine how e-TWVs are supported both in garrison, as well as in the forward areas with an eye on Expeditionary Advanced Bases of Operations (EABO) and operations in the littorals. The Integrated Product Team would equip itself with desired operational concepts and requirements grounded on the realm of the possible.

Once the requirements are fully vetted with the infantry battalion tasked to perform the experiment, a platoon's worth of prototype e-TWVs would be designed and built over the next 18 to 24 months.

... the possibility of electrification for military TWVs promises many returns ...

Once the prototypes are built and delivered, the experimenting infantry battalion would embark on a sixmonth experiment conducting various mission profiles utilizing a mixed fleet of baseline vehicles and e-TWVs—to include a dedicated period of time in cold weather.

During the above establishment of what is possible and formulation of the

requirements, we must keep a solid perspective on acquiring a new system with consideration on the impact to the FMF by considering doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy. This analysis is the first step in the Functional Solutions Analysis. The Functional Solutions Analysis (FSA). determines/recommends if a non-material approach or a material approach is required to fill a capability gap identified in the Functional Needs Analysis. It includes the entire life cycle, including the sustainment; environment, safety, and occupational health; and all human systems integration domains.

In closing, the possibility of electrification for military TWVs promises many returns and prospectively will provide enhanced capability in terms of exporting power, reduced detectability, increased lethality, amplified persistence, improved performance, reduced fuel cost, greater reliability, and will potentially offer the use of non-organic resupply options such as host nation power grid and fuel scavenging. The unique challenges we are facing with e-TWVs are weight penalty, transportation, forward area of operations support posture, and the high cost of acquisition. However, questions remain that must be examined before the Marine Corps can proceed and an e-TWV experiment at scale offers the proven ability to validate operating and sustainment costs, to develop a concept for operations, and to ultimately inform requirements.

>Author's Note: Contributing editors for the article include Col John T. Gutierrez, Portfolio Manager, Logistics Combat Element Systems, Marine Corps Systems Command, and David Keeler, Lead Technologist, Logistics Combat Element Systems, Marine Corps Systems Command.



The Marine Corps' War on Corrosion

Prioritizing maintenance to prevent deterioration

by Mr. Eric Brown & Mrs. Lauren Paladino

little more than 25 years ago, the Marine Corps Corrosion Prevention and Control (CPAC) Program was established; its mission—to fight corrosion. Years of low-prioritization of necessary organizational-level corrosion maintenance had led to substantial deterioration of Marine Corps ground equipment, as the Marine Corps did not have the resources or process dedicated to corrosion prevention or repair. In fact, by 2004, corrosion was so prevalent 70.6 percent of assessed Marine Corps ground equipment required intermediate or depot-level maintenance to repair corrosion.

Corrosion can present itself in numerous ways, ranging from seized bolts, non-functioning electronics, and seized gun turrets. Mission success depends on equipment availability, and the effects of corrosion on performance are unacceptable. Unfortunately, even today, while corrosion health has improved, the enterprise still contends with system failures that require Engineering Change Proposals and equipment overhauls to mitigate the effects of corrosion. Force design has helped reduce the amount of equipment the CPAC program assesses and provided a means to divest of ground equipment requiring extensive corrosion repair. Nevertheless, corrosion of newly fielded equipment is making up for the lost quantities of divested equipment that required corrosion repair. This issue is exacerbated by way of the current requirements and acquisitions process of new capabilities.

Per *DOD Instruction 5000*, corrosion prevention and control begin early in the acquisition process. However, cor-

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rosion on newly fielded equipment is evidence that corrosion prevention and control is not a priority in program planning. In some cases, program managers are not including corrosion prevention requirements in the system specification or corrosion protection requirements in the contract to reduce program costs. This situation also applies to joint programs or Army programs the Marine Corps is leveraging. The Army and other Services operate in a different operational environment than the Marine Corps and corrosion prevention priorities are not the same. At the end of the day, the result of these decisions is the Marine Corps is fielding ground equipment without mitigating the effects of corrosion. Some of these corrosion issues will negatively affect equipment availability and readiness; most will reduce the intended equipment life cycle and require a costly overhaul. For example, the CPAC program has assessed assets that were within two years of the date of manufacture and identified the following issues:

- Inoperable emergency brakes.
 - Seized engine access panels.
- Non-operational communications systems.
- Corroded wheel hubs.
- Cracked armor.
- Failed electrical connectors.

- Deteriorated fittings.
- Voids that see equipment rust from the inside out.
- Moisture retention areas where water pools, paint failures, and uncoated areas.

Figures 1 and 2 (on following page) are photos of corrosion issues on some of the Marine Corps' newest combat systems.

The Fight

How is CPAC taking on this fight? CPAC is on the attack with a threeprong approach to address the issue. First, CPAC is engaged with equipment program managers to incorporate corrosion protection requirements early in the program development phase to address corrosion-prone design areas prior to production. CPAC can provide corrosion engineer support for Integrated Product Teams throughout the system lifecycle and most crucially in the design phase for specification development. This includes specifying the identification of high-risk areas, primer and paint, and corrosion preventive materials. At present, CPAC is actively engaged to help mitigate corrosion of more than fifteen programs. Teaming with equipment Program Managers is essential throughout the program's life cycle in order to address corrosion protection through program design



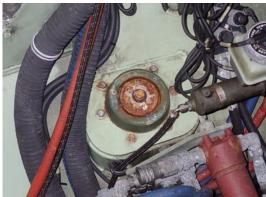




Figure 1. Corroded hydraulic control unit fittings, suspension strut mount, and delaminated exterior paint coating exposing a bare metal substrate. (Figure provided by Eric Brown.)

or to mitigate the effects of corrosion once fielded through modifications. The use of improper or incompatible materials during the design phase can lead to enduring corrosion damage. Reviewing designs for corrosion-prone areas, specifying build materials and processes, providing prime and paint requirements, specifying the application of Corrosion Preventive Compounds, and establishing corrosion quality control steps are all valuable inputs to the CPAC program can provide to equipment program managers to help mitigate corrosion. During the production process, CPAC assists with the review of Original Equipment Manufacturer (OEM) processes and provides recommendations on proposed system changes. Prior to fielding, CPAC assesses the system and creates a plan for preventive maintenance actions to reduce the effects of corrosion. If corrosion issues arise after the equipment is fielded, CPAC will perform a failure analysis and develop a corrective action plan for the program manager's review and consideration.

The second approach is completed through organizational corrosion prevention. The contractor-supported CPAC Corrosion Service Teams (CST)

CPAC will perform a failure analysis and develop a corrective action plan ...

are designed to complement Marine Corps condition-based maintenance efforts, with the goal to minimize the effects of corrosion and reduce the overall maintenance burden and cost on the FMF. The CSTs are at the tactical edge of the war on corrosion. In Fiscal

Year 2021, CSTs serviced and assessed over 60,722 pieces of equipment, resulting in a cost avoidance of over 91,000 maintenance hours that Marines could apply to their core MOS requirements. The CSTs extended the overall service life of ground equipment by applying corrosion prevention compounds, performed surface preparation and small area touch-up painting, and applied sealants. This was all done at the using unit's equipment lot, eliminating the need to evacuate the equipment for maintenance. During the assessment phase, the CSTs record the equipment corrosion conditions, which establishes the current state of equipment and drives future condition-based maintenance requirements.

The third approach is intermediate corrosion repair. The CPAC program operates Corrosion Repair Facilities (CRF) located at each MEF in four geographical locations. The CRFs perform corrosion repairs such as sheet metal







Figure 2. Corroded electrical connections and paint failure leading to corrosion. (Figure provided by Eric Brown.)

restoration, large surface area preparation, and prime and paint operations. In Fiscal Year 2021, 1,416 assets with extensive corrosion damage were repaired at CRFs. The advantage of completing repairs at the regional CRF is the equipment stays in the local area and is not shipped to the depot or OEM. Only when the corrosion is so severe (Category 5) and the CRF is not capable of repairing the equipment, it is sent to a depot, OEM, or in the worst-case scenario—disposal. Currently, there are over 250 corrosion Category 5 assets in the Marine Corps inventory.

Technology Advancements

In addition to the three approaches and ensuring that CPAC is providing the FMF with the best product, the CPAC Engineering Team from Naval Surface Warfare Center Carderock continually researches industry advancements in corrosion-related processes, materials, and products. Over the past decade, the CPAC program has researched and implemented several materials and new processes, which have ultimately extended the useful life of Marine Corps equipment from three to seven-plus years in the absence of physical paint damage. One such process improvement has been the incorporation of a zinc-rich primer onto bare-metal surfaces prior to the application of topcoat Chemical Agent Resistant Coating (CARC) paint to prevent corrosion.

This coating acts as an additional barrier layer and provides sacrificial corrosion protection. For all assets, we have increased the thickness of the traditional CARC primer system and have proven that this additional 2 mil (.002") of coating helps our assets withstand a maritime environment. For the highwear areas that see a heavy foot and fork traffic, we have incorporated chip and abrasion-resistant coatings (bed liner) alleviating wear and ensuing corrosion of flooring and decking. The CPAC program has streamlined CARC best practices across all Marine Corps corrosion facilities to ensure consistent quality standards from one operation to the next. Another industry best practice the CPAC program has studied is a portable vacuum blast capability, which will be an essential component of CPAC operations going forward. This capability will allow the CSTs to perform surface preparation without the need for a large-scale blast booth typically found at a CRF or depot. Leveraging this technology, the CPAC program will implement an enhanced CST corrosion repair capability where surface preparation and paint repair will be performed at the unit's location. This capability will enable an increase in the number of corrosion repairs by a CST, an increase in equipment available for the unit, reduced repair cycle times, and eliminated transportation costs to and from a CRF, depot, or OEM. While not a full replacement for the CRF, we argue this capability will be a force multiplier and may be an essential component for expeditionary corrosion repair.

Are We Winning?

In 2004, 70.6 percent of Marine Corps ground equipment was in a condition that could lead to corrosion-related failures within five years; today, that number is 27.4 percent and getting smaller. While the program's proactive

CPAC is identifying gaps, assessing future FMF needs ...

efforts have had a positive impact on corrosion, the Marine Corps cannot become complacent. More can be done to stave off corrosion, including unit-level training and the participation of Marine operators and maintainers when the CSTs are at their location. These same Marines can utilize the learned skills while operating abroad. As resources become more constrained, the CPAC Program has had to make some difficult program decisions over the past three years. In Fiscal Year 2020, one of two CSTs and a contracted mobile CRF, responsible for the service, assessment, and repair of Marine Forces Reserve equipment were divested resulting in the extension of equipment service intervals

and vehicles not being repaired. Future funding reductions across the Future Years Defense Program to CPAC could result in the divestment of a CRF for at least one MEF.

As the Corps focuses on the implementation of Force Design 2030, the CPAC program envisions additional and potentially more significant corrosion concerns on the horizon. The future operating environment will expose Marine Corps equipment to the highest corrosion conditions in the world. The persistent posturing in the seaward/ landward portion of littoral environments will cause extreme corrosion, up to three times that of current rates, on systems that are integral to the Force Design 2030 operating strategy such as the Joint Light Tactical Vehicle and the Amphibious Combat Vehicle. Moving forward, assessments, program management office engagements, and CST operations are the priority of effort for CPAC.

Failure to provide preventive and corrective corrosion services can cause loss of functionality of essential hardware and electronics systems, rapidly increase maintenance needs beyond field-level repairs, and contribute to the increased mean time between failures and the loss of equipment availability. Ground equipment sustainment and prevention of corrosion are critical to maintaining forward operations to satisfy expeditionary advanced base operations and littoral operations in a contested environment. With this in mind, the Corps' current corrosion mitigation methodologies may not be robust enough to meet the demand.

CPAC is committed to continuing to innovate and build on proven methodologies to support the Marine Corps with these challenges in the years ahead. CPAC is taking a proactive approach to study and understand the effects of harsh operating environments like those found in the Pacific. CPAC is identifying gaps, assessing future FMF needs, and will continue to refine strategies that will enable the Marine Corps to win the fight against corrosion.



Check Tables HSI

The "default tradeoff" of acquisition

by Dr. Jennifer L. McCullough

ost acquisition professionals would readily chastise the groupthink that led to the *Challenger* tragedy or shake their heads at the gross neglect that led to Chernobyl, but do they look at their own omission of the user as integral to the systems that they acquire? Omitting the user could result in mission failure or severe injury or death of operators, maintainers, and support personnel. At the very least, ignoring the "human-ware" as an equal partner with software (SW) and hardware (HW) can often lead to cost overruns, schedule slippages, and performance degradation.

Human systems integration (HSI) uses interdisciplinary technical and management processes to consider the human users within and across all system elements to enable the systems engineering (SE) process. Its goal is to optimize total system performance (HW, SW, and humans) as defined by operational effectiveness, suitability, survivability, safety, and affordability.² The human, as part of the weapon system, must perform within the battlefield environment, which usually means heavy stressors like fatigue, night operations, temperature extremes, protection against nuclear/chemical/biological threat, noise, precipitation, crowding, rough terrain, and the fog of war. As system users are coping with many of these stressors, they must also face increasingly complicated HW and SW that not only must be operated on but also troubleshot and maintained. Moreover, the battlefield has become full of available information so that ultimately decision making for the military user is

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often characterized by a high cognitive workload of sifting through information uncertainty and exacerbated by everpresent time pressure. Warfighters do not have time to struggle with HW, SW, or systems that were partially developed because humans, the very core of the systems, were forgotten or ignored during acquisition.³

How can Marines, the customers of our defense acquisition, be seemingly easily swept aside? Studies have shown that there is a tension of expediency versus effectiveness that affects a full integration of people, technology, and organization. Constrained budgets, workforce manpower, schedules, technology maturity, industrial limitations, among other issues work continually against the battlespace mission needs. The program manager (PM) must continually sift through competing requirements, whether documented or implied, to find a way to field a system that meets cost, schedule, and performance standards. The SE process' focus is all three, and somehow in the fray of acquisition, the warfighter is often either lost or forgotten. Moreover, top-level acquisition leadership supporting HSI is paramount; otherwise, mid-level acquisition leaders are prone to view HSI as an obstacle that can easily be traded

off as they give in to the misguided hope that *Marines will figure it out*. Doing so, however, simply transfers risk from the program office to the individual Marine.

This article introduces the need for integrating HSI within acquisition in terms of its benefits, processes, and ways ahead. Many DOD professionals have dedicated their life's work on this topic; there is a plethora of studies and guidance for the dedicated reader to find. Hopefully, the points made here persuade us to not only consider the Marine user more purposely but more importantly affect change to enable effectively equipped warfighters.

First, to define HSI more clearly, it includes seven domains: manpower, personnel, training, environmental safety and occupational health (ESOH), human factors engineering (HFE), survivability, and habitability. Table 1 (on following page) offers definitions for each of these domains as well as examples of their measures. HSI is concerned with all facets of the human user: physically, mentally, and socially.

While all important, the seven domains have varying emphases in the HSI acquisition process. Manpower, personnel, and training are usually listed as the largest HSI-related cost drivers

HSI Domain	Definition	Examples of Measures
Manpower	number and mix of personnel required to carry out tasks	job tasks; operation/maintenance rates; workloads; operational conditions
Personnel	aptitudes, knowledge, skills, abilities, and experience levels that are needed to perform tasks	job task requirements; certifications; security clearance levels; concepts of operations requirements; workload drivers
Training	learning process by which personnel individually or collectively acquire knowledge, skills, abilities	job task difficulty, criticality, and frequency; curricula gaps; concepts of operation requirements; available learning tools
HFE	designing human-machine interfaces consistent with the physical, cognitive, and sensory abilities of the user population	interfaces include functional, informational, environmental, cooperation, organization, operational, cognitive, and physical
ESOH	physical conditions in and around the system, design features and operating characteristics of a system that serve to minimize the potential for human or machine errors or failure that cause injurious accidents, risk of injury, acute or chronic illness, or disability	temperature, humidity, noise, vibration, radiation, shock, air quality, soil integrity, warning signs/labels, hazards, lift requirements, chemical safety, and human factors issues that can create chronic disease and discomfort
Survivability	system design features that reduce the risk of fratricide, detection, and the probability of being attacked	detectability from system noise and light emission; ease of emergency egress; system volatility; system error tolerance
Habitability	living and working conditions that are necessary to sustain the morale, safety, health, and comfort of the user population	lighting, space, ventilation, sanitation; noise and temperature control, religious, medical, and food services availability; berthing, bathing, and personal hygiene

Table 1. Navy/Marine Corps HSI domains definitions and measures.4

for a system's entire lifecycle, whereas ESOH, HFE, habitability, and survivability costs are more pronounced during the system's acquisition portion of its lifecycle. This is not to say that they have no associated costs after fielding, such as poor human interfaces could incur direct and indirect costs for system effectiveness and efficiency; however, manning a system with the right types, number, and trained users is a continual cost for the life of the system, even through disposal.⁵ That said, the PM should consider focusing on four main areas for a system: task allocation and workloads in terms of man versus machine, training implications for the human users, workspace design and anthropometric considerations including

the design of displays, and social issues and team performance.⁶

Besides cost-related considerations as well as DOD guidance specifically directing the PM to integrate HSI into all acquisition efforts, HSI carries compelling benefits. The list runs long but can be distilled to the following main points:

- HSI ensures that the system's purpose is kept in focus during the otherwise complicated acquisition process. Requirements creep is always a threat and usually spells disaster for human users.
- HSI ensures that the system's demands align with the user's capabilities. Technology-focused acquisition results in "manning the equipment"

rather than "equipping the man," which often means overwhelmed users and diminished system effectiveness.

- HSI ensures that previous designs, operations, and user feedback are integrated into the system's development/ selection. The users are the subject-matter experts who know the strengths and weaknesses of legacy systems so that new systems have the potential for enhanced effectiveness.
- HSI helps to control lifecycle costs by using operational data to plan manpower, skill demands, and training early in the acquisition process. The earlier this planning starts, the more optimized the system that is developed or selected.
- HSI is critical for risk mitigation when developing and/or selecting the optimized solution for the warfighter. Acquisition centers on risk reduction. When the three-legged acquisition stool of systems engineering, program management, and HSI is missing the HSI leg, the stool loses its stability and strength. There is nothing *but* risk because the user ends up supporting the system instead of the system becoming a force multiplier.⁷

Every acquisition PM operates within a risk reduction framework. Every decision is weighed in light of the cost, schedule, or performance risks it may carry. Acquisition guidance, both DOD and Service-related, continually remind the PM that every step must include risk assessment and, whenever possible, reduction. What has exacerbated the risk potential is the DOD's increasing dependence on commercial off-the-shelf (COTS) and non-developmental item (NDI) systems. The PM has little or even typically no influence on materiel design and little influence on requirements specification for COTS and NDI systems. Therefore, the product is often purchased as a "black box" that may not have the required functionality and/ or effectively integrate with current systems. They can end up with modifications of current systems into which the new system must integrate myriad training fixes as workarounds.8

The COTS's purpose is to ultimately save time and money and to do so usually results in compromises.

Finding a solution that industry has already devised to meet another requirement seems much cheaper and more expedient than starting from scratch. However, the solution's initial targeted requirement is rarely exactly what the DOD needs for its warfighters. Even if the materiel is somewhat modified to meet more of the DOD's requirements, and thus segues from COTS to NDI, it still will invariably have shortcomings, especially because as NDI it now has had little to no market scrutiny.9 The extent that a sub-optimal solution will meet a requirement is the foundational question. Generally, PMs are "satisfiers, not optimizers."¹⁰ A seasoned PM once stated, "Good enough' is the only concept you can truly build consensus on. All your trade space revolves around keeping it just good enough. Anything more than 'good' is trade bait." The question remains as to what the definition of "good" is.

The COTS/NDI dilemma of expediency versus effectiveness creates a focus on bending the requirements to fit the chosen system with little consideration of the human who ultimately ends up with a system that marginally meets his functional needs in an operational environment. Indeed, the DOD warns about such acquisition mindsets as it calls for optimizing "total system performance and total ownership costs while ensuring that the system is designed, operated, and maintained to effectively provide the user with the ability to complete their mission." 12

Clearly, military contexts are much more demanding than commercial ones for which COTS products were originally designed, and various impacts result from the mismatch (e.g., physical handling and usability; quality of graphic and physical interfaces; reliability levels in austere environments; integration issues with other hardware, software, and systems; continual training as a result of military manning cycles; space limitations; software upgrade cycles; and incomplete or inadequate glue code to integrate COTS software into existing software).¹³ Contrary to what most program teams would believe, COTS-related systems can involve additional activities because of integra-

SE Activities	HSI Activities	HSI Activities Relevant to COTS
Define required capability	Identify human issues implied by the capability.	Same (should be solution independent)
Identify and assess system options to provide it	Identify human issues associated with predecessor systems.	Identify human issues associated with COTS elements in current use, including user performance.
	2. Identify differences in context of use and predict impact on system options.	2. Same, informed by current use of COTS components. 2a. Seek evidence of compatibility of COTS equipment with intended target audience and operational tasks
	3. Assess human-related risks and requirements for each option.	3. Same
Define system options for comparison and selection	Ensure human parts of overall system (manpower, training, support, etc.) are adequately defined and costed.	1. Same 2. Identify and cost all additional equipment needed to make overall system work. 3. Identify and cost human interventions (selection, training, support, etc.) needed to make overall system work. 4. Identify and cost any performance shortfalls of overall system due to mismatch between equipment and people.
Select option	Take part in option trade-off across all system domains.	Inject the above into the option trade-off process. Focus on the total system, not just the COTS equipment.
Specify system requirements	1. Identify human-related system requirements.	1. Same, but focusing on any freedom within COTS components, on glue components (software code needed to integrate with legacy code), and on performance requirements for the overall system.
	2. Identify human-related risks still to be addressed.	2. Same
	3. Plan activity to mitigate human-related risks.	3. Same

Table 2. HSI Activities for COTS Compared to Non-COTS Systems within the SE Process. 14 (Table created by author.)

tion and compatibility issues with legacy systems, most borne out of mismatched original requirements under which the systems were designed and developed.

Table 2 provides a general comparison of HSI activities for design/developmental systems versus activities for COTS-based systems within the SE

process. Some activities are the same for each; however, others are scaled differently, involving a more holistic approach to evaluating the materiel solution in terms of its integration with current systems as well as how users will support, operate, and maintain the system.

What is the way ahead for PMs who wish to better integrate HSI into their acquisition? The SE technical review process is a powerful tool for PMs to monitor and ensure that their programs are optimally robust in terms of cost, schedule, and performance. Unfortunately, especially in a COTS/NDI environment, the belief is that the human plays a small part in the SE process given that "the system is what it is." Even for those programs that do acknowledge the human as part of the system, they

However, at the ground level of acquisition where DOD professionals partner with industry and the warfighter to define, develop, and deploy systems, there is a possibility of revolutionary change; what has been regarded as a default tradeoff is actually a linchpin of success. The concept seems beautifully logical and simple: materiel systems are comprised indivisibly of HW, SW, and humans. Testing and evaluating a vehicle without attending to how humans will occupy and work with that vehicle makes no

7. Staff, "Human Systems Integration and NASA JSC Human Health and Performance Capabilities," (PowerPoint presentation, NASA, n.d.), available at https://www.nasa.gov.

8. Anne Bruseberg, "The Design of Complete Systems: Providing Human Factors Guidance for COTS Acquisition," *Reliability Engineering and System Safety*, (Amsterdam: Elsevier, December 2006); Glen Hewitt and Dino Piccione, "Human Systems Integration Roles in a Systems Acquisition Culture," in H.R. Booher (ed.), *Handbook of Human Systems Integration*, (Hoboken, NJ: John Wiley & Sons, Inc., 2003); Department of Defense, *DODI 5000.02T*, *Operation of the Defense Acquisition System*, (Washington, DC: April 2020); and *Handbook of Human Systems Integration*.

9. Ibid.

10. DODI 5000.02T, Operation of the Defense Acquisition System.

11. Ibid.

- 12. Ibid; and "The Design of Complete Systems: Providing Human Factors Guidance for COTS Acquisition."
- 13. John Harrison and Melanie Forster, "Human Systems Integration Requirements in Systems Acquisition," in H.R. Booher (ed.), *Handbook of Human Systems Integration*, (Hoboken, NJ: John Wiley & Sons, Inc., 2003).
- 14. Handbook of Human Systems Integration.

15. Ibid.

16. A. Meilich, *Human Systems Integration—A System of Systems Engineering Challenge*, (Alexandria, VA: Lockheed Martin Advanced Concepts, 2006).

17. Alexander Landsburg, Larry Avery, Robert Beaton, J. Robert Bost, Carlos Comperatore, Rajiv Khandpur, Thomas Malone, Christopher Parker, Stephen Popkin, and Thomas Sheridan, "The Art of Successfully Applying Human Systems Integration," *Naval Engineers Journal*, (Alexandria, VA: American Society of Naval Engineer, May 2008).

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The concept seems beautifully logical and simple: materiel systems are comprised indivisibly of HW, SW, and humans.

usually know very little about the details of the principles and methods of HSI. 15 What often happens when programs do not address the human component is the human users end up becoming de facto architects for the system as they must manipulate it to meet their changing needs given the ever-changing mission environment. The users need to make on-the-spot decisions to address system shortcomings that should have been identified and addressed during the SE process. 16 Clearly, however, this should not be.

The PM who truly wants to support the Marines and equip the Warfighter (all mantras that Marine acquisition professionals are taught to repeat) will put down this article and immediately call in the systems engineer to account for how HSI is integrated into the PM's SE technical review process. In other words, how are the acquisition teams being held accountable for HSI and how can it be improved? Without leadership support, multiple research studies have shown that infusing HSI into the acquisition process will meet opposition at every turn due to lack of commitment.¹⁷ In short, the culture will resist it or at best treat it as an obstacle to skirt around or leap over.

DOD acquisition is a large, complicated process beset by thousands of regulations. That much will not change.

more sense than testing and evaluating a vehicle without making sure that it brakes and accelerates. Omitting HSI from acquisition obscures a whole view of the system for the program office, the vendor, and most importantly for the humans who must interact with and use the system.

Notes

- 1. Staff, "Human Systems Integration Working Group," *INCOSE*, (n.d.), available at https://www.incose.org.
- 2. Ben Schwartz, "Human Systems Integration," *SEBOK*, (October 2021), available at https://www.sebokwiki.org.
- 3. Susan Archer, Donald Headley, and Laurel Allender, "Manpower, Personnel, and Training Integration Methods and Tools," in H.R. Booher (ed.), *Handbook of Human Systems Integration*, (Hoboken, NJ: John Wiley & Sons, Inc., 2003).
- 4. "Human Systems Integration."
- 5. "Manpower, Personnel, and Training Integration Methods and Tools."
- 6. Nita Miller, Jeffrey Crowson Jr, Jennifer Narkevicius, "Human Characteristics and Measures in Systems Design," in H.R. Booher (ed.), *Handbook of Human Systems Integration*, (Hoboken, NJ: John Wiley & Sons, Inc., 2003).

Do This, Not That

Some thoughts from the OT trenches

by Ms. Kristine Kassekert & Ms. Christy Rivers

n order to allow the DOD to tap into commercial technology as a means to possess a technical edge over adversaries, Congress through Section 815 of the Fiscal Year 2016 National Defense Authorization Act—enabled the DOD to bypass the requirements of the Competition in Contracting Act and award a follow-on production contract to a non-traditional defense contractor where the Government determined that a prototype was successful. But with the constraints of the Federal Acquisition Regulation (FAR) gone, how can program managers effectively leverage this new ability?

This article discusses lessons learned from Marine Corps Systems Command programs that have attempted to use other transaction agreements to acquire or build upon existing technology. While other transactions (OTs) may not be faster than a traditional FARbased approach on the front end, an OT's flexibility, including the ability to test and refine different prototypes without regard to the requirement to treat all companies the same, allows the Marine Corps the opportunity to test different designs, in real-world situations, with minimal up-front costs, to best meet Marines' needs. Additionally, OTs do satisfy the need to have contract vehicles that are able to mirror the iterative learning and adaptation that are inherent in the Marine Corps' Force Design 2030.

Leverage Demonstrations as Prototypes

Traditional FAR—based acquisitions require the Government to develop detailed statements of work in order to define the characteristics of the goods it wishes to procure, and then the Government has to develop evaluation criteria in advance of the competition

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so that it can judge companies based on the same established set of criteria. However, other transactions afford the Government a certain level of flexibility to use broad evaluation criteria and let companies demonstrate the advantages of their products. The Government can choose whether those advantages are worth pursuing based on that particular technology without needing to do an apples-to-apples comparison with other technologies and pre-defining what weight the Government will assign to a particular approach at each stage—nor does the Government need to worry

about choosing a "brand name" as opposed to the "generic" version. This flexibility encourages the program to engage with companies to understand the capabilities of the existing technology in a manner that the typical market research report would not be able to access.

A prototype under the OT authority for prototypes pursuant to Title 10 U.S.C. § 4003 includes a demonstration.² Programs that identify existing items that may meet their needs or existing items that may be modified (even significantly modified) to meet their needs can have companies demonstrate their goods in the environment where they will be used and see whether there is a fit. The initial demonstration is not required to determine whether the prototype is successful, but for a relatively nominal sum, companies are often willing to demonstrate their products, including adapting them to



Demonstrations of prototypes are a requirement under other transaction authorities. (Photo by Sgt Micha Pierce.)

specific Government environments, along with providing knowledgeable individuals who can answer questions about those products.³ The demonstrations may formally or informally include a question and answer session (in a formal setting, often resembling oral presentations) for a back and forth with the Government team. In this environment, the questions do not need to be the same for every company, as they should be tailored to the company's individual capabilities, and there is limited protest risk such that the need to script the conversation ahead of time or record the session is unnecessary.

Establish the Scope to Support an Entire Program or Capability

The lore is that OTs enable programs to purchase items faster than the traditional FAR-based acquisition process. This is not only a fallacy but treating the OT process as a simple swap of one process for another overlooks the scope of what a program can accomplish by putting in place an OT with a broader scope that covers the needs of an entire program or capability—instead of for an individual item. Thus, instead of awarding an OT to three companies for a widget, the Government may be wise to award the same three OTs to support everything within the portfolio of a program manager or a capability needed within a group of portfolios.4 This approach enables the program to develop relationships with awardees over time and has the benefit of preserving a competitive environment for a relatively longer time, resulting in long-term cost and schedule benefits. The result is also an existing contract vehicle for the program to leverage to obtain feedback from industry on ideas and develop prototypes. Not all prototypes will go to production, but since there is a direct path to production based on this type of award, the Government call is more likely to garner serious attention than the traditional request for information. Further, any disagreement about a contract award or interpretation of a contract term is seen in a different light by a company maintaining a relationship in pursuit of a potential future award.

As a practical matter, the Government should be careful to preserve its ability to add new companies as other transaction awardees over time as it identifies additional companies with relevant products and experience. The Government also needs to be conscious of its expectations with respect to intellectual property and technical data rights and engage industry before the award of the prototype OT to avoid misunderstandings that can derail a follow-on production award. Smart planning upfront can speed up the overall timeline for the acquisition.

Leverage Contract Terms and Prototyping Appropriate to the Risks

In a traditional FAR-based acquisition, there is often minimal discussion about how the contract terms intersect with testing the quality and functionality of the item being procured because the FAR establishes the contract framework, and the program team is versed in the *DOD 5000* Series. Because the Government can make a production

The lore is that OTs enable programs to purchase items faster ...

award based on the OT authority for prototypes under *Title 10 U.S.C.* § 4003 without relying on the FAR, at least for a commercial item, the Government is not constrained by the reliance on the company's quality assurance system pursuant to FAR Part 12. Thus, in some cases depending on the Government's concerns, the Government can and should request detailed information about the quality controls and manufacturing process in an OT above and beyond what would be appropriate for a FAR-based award.

Programs should note that the acquisition framework set forth in the DOD 5000 Series has not been relaxed with respect to OTs. One question that frequently arises is how much testing (that is, what is necessary for the rel-

evant milestone, authority to proceed, or minimum viable product/capability release) needs to be accomplished during the prototype phase to determine that a prototype is successful andonce a follow-on production award is made—what additional testing is required. When using demonstrations as prototypes, the Government can and should establish subjective and objective means for evaluating whether the prototype can meet the Government's needs, which may or may not need to feed into the decision of whether a prototype is successful. However, there is nothing that requires that every material aspect of a prototype be tested before moving to production, and a program may decide to test only a limited set of capabilities with the expectation that the production award will require certain functionality to be tested, for example, for first items or at fielding. That said, programs should be careful not to continue prototyping after the production award in such a way as to undermine the analysis that led the team to determine the prototype was successful.⁵ In making this decision, the program needs to identify what testing would be required before delivery of an item, ensure that there is a plan to fully test critical functionality before determining to go to production, and then discuss with counsel and the agreements officer what contract terms should be in place to protect the Government from risks associated with going to produc-

In this regard, for a follow-on production award that is not subject to Chapter 137 of U.S.C. Title 10, the program needs to carefully define how it will handle disputes over quality issues. For example, is the company required to strictly perform with the requirements, or is substantial performance acceptable? Under what circumstances can the Government withhold payment, and in the case that the Government withholds payment, is that a remedy that fully protects the Government (both in terms of the timing of the withholding vis-àvis the company and the ability of the Government to use any withheld funds elsewhere in accordance with applicable fiscal law constraints)? If the Government terminates, is any payment due and, if so, how is the amount calculated? The less tolerance a program has for working through quality issues with a company, the more important the remedies and dispute provisions become.

Be Smart About Purchasing Services to Support the Prototype

While many successful prototypes will require the purchase of services to maintain the item, the OT authority generally does not authorize the purchase of services. However, where the primary purpose of the follow-on production award is to produce the successful prototype, it has become common practice to procure related services. In this regard, the program team will want to be able to defend its decision to include services as part of the follow-on production award. 7

One approach is for the program to document the services requirement as those required for operation or maintenance of the item that is successfully prototyped. For a piece of equipment, the original equipment manufacturer may be required to maintain the equipment. Where software is incorporated into the item, the OT awardee may be the only authorized software maintenance provider. During the demonstration phase, the Government should question companies about any support they typically provide and obtain an understanding of the training and skillsets the company brings to the table. Where possible, even if it is not included in the definition of success, the Government should establish the demonstration plan, so it has an opportunity to observe the provision of those services. Further, early in the planning process, the Government team needs to think about how they intend to ensure quality standards for the services. Programs may request a copy of a company's commercial terms and conditions as a deliverable during the demonstration, compare the level of effort and ask individuals about their skill sets during the demonstration.

Conclusion

The Marine Corps has been given a powerful acquisition tool to be able to test prototypes and move into production without further competition. In order to use this tool effectively, program managers need to change the lens that they have used to succeed in the FAR-based contract world. Instead of one contract award followed by the delivery of a good or service, OTs can and should be used to support a group of dynamic needs using creative ap-

OTs can and should be used to support a group of dynamic needs ...

proaches to testing existing technology to see if existing technology can meet those ever-changing needs. While there is flexibility in the process, the need for planning in order to procure a successful prototype remains, and that requires the program and the agreements officer to think about the terms and related services prior to negotiating the production terms and conditions.

Notes

- 1. Initially codified in 10 U.S.C. § 2371b, effective 1 January 2022, this section is being transferred as part of the transfer and reorganization of part V of subtitle A of Title 10, Defense Acquisition Statutes and the new statutory citation is 10 U.S.C. § 4003. For purposes of this article, the statutory authority will be referenced as the "OT Authority."
- 10.U.S.C. § 4003 (d) describes the appropriate use of the authority as the inclusion of one nontraditional defense contractor participating to a significant extent in the prototype project, all of the significant participants as small businesses, or requires that one-third of the total cost of the prototype project be paid out of funds provided by sources other than the Federal Government.
- "Successful completion" of the prototype is defined as having "(1) met the key technical goals of a project; (2) satisfied success metrics incorporated into the Prototype OT; or (3) accomplished a particularly favorable or unexpected result that justifies the transition to production." Definitions and Requirements for Other Transactions Under *Title 10, United States Code*, Section 2371b, Office of the Secretary of Defense Memorandum, 20 November 2018.

- 2. "[A] prototype project addresses a proof of concept, model, reverse engineering to address obsolescence, pilot, novel application of commercial technologies for defense purposes, agile development activity, creation, design, development, demonstration of technical or operational utility, or combinations of the foregoing" (emphasis added).
- 3. The authors note there are other statutory authorities that can be used solely to demonstrate products. However, the OT for prototyping authority under 10 U.S.C. § 4003 enables the Government to use that as a means to award a follow-on production contract.
- 4. This approach is distinguished from a consortium agreement, which is another option for structuring an OT in that the Government retains control over the relationship with the companies instead of working through a third party.
- 5. See, for example, GAO's decision in Oracle America, Inc., where the Government modified the prototyping contract to add what they characterized as an in-scope modification after they claimed the prototype had been completed. Staff, *B-416061*, (Washington, DC: Government Accountability Office, May 2018).
- 6. The authors note that there is an argument that because a prototype includes a business process, and the production of a business process may require labor, it is possible that the prototype is a service. However, there is no question that the typical understanding of a "service" can not be prototyped within the statutory construct and applicable DOD guidance.
- 7. DOD has determined that the Service Contract Labor Standards (formerly the Service Contract Act) do not apply to other transaction agreements. ("Generally, the statutes and regulations applicable to acquisition and assistance do not apply to OTs.") See Department of Defense, Myth #4, DoD Other Transactions Guide, (Washington, DC: November 2018). This is in line with the standard interpretation that requires application where, among other requirements, the primary purpose of the contract is to procure a service, and for an OT, the primary purpose is to procure a good (i.e., the prototype). Programs should be cautious not to document anything that may undermine that determination.



Advancement of Fires Education

Professionalizing the community

by Capt Kyle T. Gannon

The fires community in the Marine Corps must sustain capabilities vested in the MAGTF. As the force prepares for competition and crisis, the Marine Corps must ensure all Marines develop a deeper understanding of the MAGTF warfighting functions with an emphasis on fires. Current fires training and education practices are not optimized to support the MAGTF and naval forces. Continued education provides the primary method for Marines to develop and sustain competitive advantages over time.1 The fires community must seek to professionalize the fire support community's educational experience by developing coursework focusing on airspace integration, operations in the information environment (OIE), and maritime integration within a command capable of MAGTF education.

Presently, fires training does not provide Marine artillery officers (MOS 0802) with a complete understanding of integrating fires at a MAGTF level. The current education requirement for an 0802 is to attend Marine Artillery Officers Basic Course (MAOBC) conducted at Fort Sill, OK. MAOBC is a five-month course that introduces lieutenants to the principles of cannonartillery gunnery and fire support basics.² Unfortunately, upon completing MAOBC, there are no additional educational requirements as officers progress throughout their careers. Companygrade officers will likely serve in several billets, such as battery fire direction officer, platoon commander, fire support officer (FSO), battery executive officer, or battery commander. While all billets >Capt Gannon is an 0802; he also carries 0510/0577. He has held every billet in a battery and FSO; additionally, he was a MAWTS-1 Fire Support Instructor. He is currently serving as a Battery Commander for S 5/11.

develop an individual's knowledge of fire support, not all officers will serve as company-grade FSOs. Critically, the FSO billet develops an individual's experience and knowledge, providing initial exposure to combined arms' employment in support of maneuver. The current structure does not ensure that an individual slated to fill a MAGTF fires billet has the appropriate education and training to succeed in those billets.

tegration into MAGTF staff planning, including execution and assessment.4 Weapons and Tactics Instructor-Air Assault and Fires Integration Course is seven weeks that covers planning various operations such as air assaults and raids while integrating six functions of Marine aviation.⁵ Joint Operational Fires and Effects Course is two weeks that emphasize joint force doctrine and the integration of this doctrine from the planning phase to execution with the firing unit. The Amphibious Warfare Introduction course is two weeks centered on indoctrination in amphibious operations, including ship-to-shore movement, supporting arms, tactical air, landing force organization, and functions.7 Tactical Tomahawk Commanders' Course is one week that familiar-

Presently, fires training does not provide Marine artillery officers (MOS 0802) with a complete understanding of integrating fires at a MAGTF level.

Additionally, individuals may attend various fire support-related courses throughout their careers, but the instruction periods are inconsistent. Currently, these additional courses are not a prerequisite to serving in any fires billet. The two-week Fire Support Coordination Center course focuses on planning, coordinating, and executing fire support for battalion-sized operations.³ Intermediate MAGTF Information Operations Practitioner Course is a two-week course that concentrates on an intermediate level understanding of OIEs in-

izes staff strike planners and designated warfare commanders with the technical detail of the Tomahawk Land Attack Missile weapons system operation and Tomahawk tactical employment considerations. Upon review, each course provides vital skills and tools to successfully integrate fires within the MAGTF and Navy. With the current education and training structure, an 0802 will rarely have the ability to attend many of these courses.

In previous years, the artillery community attempted to provide guidance

on the fire support education continuum. In April 2011, Marine Corps Training and Education Command published the Marine Corps Artillery Fire Support Training Standing Operating Procedure (P3570.2a). This document outlines procedures and requirements for training and tracking fire support personnel at all Division Fire Support Coordination Center levels at the artillery regiment.9 The P3570.2a details suggested courses for individuals to attend while filling specific billets, but Marine Officers are not required to attend any specified courses. Various commanders interpret the standard operating procedures differently, as they seek to balance daily mission requirements and their officer corps' educational progression. The education pipeline is not standardized, which creates a material difference in the planning and execution of MAGTF fires. Currently, the Artillery Training and Readiness Manual (T&R) requires officers to conduct eight individual events. These T&R events consist of performing various duties in different billets while conducting fire support planning, dynamic targeting, and counterfire. ¹⁰ These eight individual events will not develop an officer's education and fall well short of maintaining the skills needed to conduct MAGTF fires. The fires community's current education and training requirements do not ensure that MAGTFs receive individuals who can succeed in those fire billets.

This task will only become more complex as OIEs are integrated as non-lethal fires supporting joint maritime commands.¹¹ As force design continues to mature, the fires community will need to establish an educational framework that will allow the FMF to complement and augment the Joint Force Maritime Component Commander and fleet commander.¹² The fires community must develop a course providing instruction on airspace integration, OIEs, and maritime integration.

This course should be titled "MAGTF Fires and Effects Course (MFEC)," which would be suitable for artillery officers serving in field-grade fires billets. This course would serve as a mid-career educational opportunity



Current training and education for artillery may be overly focused on the fundamental of cannon artillery and basic fire support to the exclusion of MAGTF and Joint Fires and Effects and OIE. (Photo by Cpl Nicholas Lienemann.)

for fires officers, directly professionalizing officers serving in fires billets at the MAGTF level. MFEC would necessitate the development of a new T&R, conferring an additional MOS designator upon completion. As envisioned, MFEC must educate officers across surface fires, aviation fires, OIEs, and maritime integration. Students would execute a series of simulated tactical scenarios during the course, supporting the practical application of the material.

As envisioned, the course would require five total weeks, dedicating two weeks toward planning and execution simulations that would challenge the students to employ fires at a MAGTF level. Developing this course directly supports the 38th Commandants Planning Guidance and naval integration. This curriculum would ensure that each officer serving in a MAGTF fires billet receives baseline knowledge to support the planning and execution of MAGTF fires.

MFEC has two potential commands: Marine Detachment (MarDet) at Fort Sill, OK, or MAGTF-Training Command (MAGTF-TC), Twentynine Palms, CA. MarDet provides all Marine officers and enlisted their initial MOS-specific training and supports community-wide tactics, techniques,

and procedures. Currently, none of the MarDet buildings have Secure Internet Protocol Router capability.¹³ MarDet cannot rely upon support from the Base Commander. The Army SIPR and Secure Video Teleconferencing systems are challenging to establish and maintain connections with Marine Corps systems. 14 Also, classified classrooms will be necessary for advanced-level instruction. The current MarDet Table of Organization does not support the required rapid changes, redesign, and creation of the multiple future publications currently envisioned. 15 MarDet is a crucial component to the initial training pipeline but does not have the staff, infrastructure, or ideal maritime terrain to support future Navy and Marine Corps integration.

MAGTF-TC manages advanced individual training and the Service Level Training Exercise Program. This mission supports Service-level MAGTF multidomain combined arms training, enhancing FMF combat readiness. As envisioned, MFEC would focus on individual MOS training. Under MAGTF-TC, various commands conduct individual MOS production training. Commands such as Marine Corps Tactics Operations Group and Marine Corps Logistics Operations

Group focus on developing operation officers within the GCE and LCE. The last individual training command is Marine Aviation Weapons and Tactics Squadron One, which offers standardized advanced training primarily to Marine naval aviators. Clearly, the Marine Corps must value advanced individual training across the MAGTF. MFEC would provide similar advanced education and training opportunities.

As the Marine Corps moves to more distributed operations in support of the Navy, Marine artillery officers must revitalize their educational pathway. The future requires officers with the requisite education necessary to employ MAGTF and naval fires successfully. Clearly, MAGTF-TC represents the command best positioned to man, train, and equip this course. The creation of MFEC would standardize the education for MAGTF fires officers. Ultimately, creating a mid-career educational experience focused on airspace integration,

OIEs, and maritime integration will allow for a faster kill chain, preserving the MAGTF fires advantage.

Notes

- 1. Headquarters Marine Corps, MCDP 1-4, Competing, (Washington, DC: December 2020).
- 2. Jonathan Bush, "On Target: The Future of Field Artillery Officer Basic Training," *Leatherneck*, (Quantico, VA: May 2020).
- 3. Marine Corps Training Information Management System available at https://mctims.usmc.mil.
- 4. Ibid.
- 5. Ibid.
- 6. Ibid.
- 7. Ibid.

- 8. Staff, "Tactical Tomahawk Commander's Course," Tactical Training Group, Pacific, (n.d.), available at https://www.ttgp.navy.mil.
- 9. Headquarters Marine Corps, *Joint Regimental Order P3570.2, Marine Corps Artillery Fire Support Training Standing Operating Procedures*, (Washington, DC: April 2011).
- 10. Headquarters Marine Corps, NAVMC 3500.7C, Artillery Training and Readiness Manual. (Washington, DC: October 2018).
- 11. Gen David H. Berger, 38th Commandants' Planning Guidance, (Washington, DC: July 2019).
- 12. Ibid.
- 13. Personal email correspondence between author and Maj Louis Ballard regarding FD&I Information Paper, *MarDet Fort Sill Force Design Initiatives* in October 2020.
- 14. Ibid.
- 15. Ibid.



Decision Making at the Service Level

Moving from risk-aware to risk-informed management

by Maj Julia Weber

peration EAGLE CLAW, the failed attempt in 1980 to rescue 52 personnel held at the U.S. embassy in Tehran and end the Iran hostage crisis, is a textbook example of insufficient risk assessment. EAGLE CLAW mission planners failed to consider how aircraft reliability rates would affect the probability of mission success. Failing to account for the high probability of aircraft failure and sending too few aircraft ultimately led to the death of eight service members.1 When asked later if there was anything he would have changed about his presidency, Jimmy Carter famously said the one thing he would have done differently, out of everything he did as President, would have been to send an additional helicopter on the EAGLE CLAW mission.² If President Carter had been presented with a quantitative analysis of the probability of mission success before deciding how many helicopters to send, he would have sent that extra helicopter.

Since the 1980s, the Navy and Marine Corps have diligently worked to improve risk management. The Services have done a commendable job of simplifying risk assessments with a useful construct and simple-to-follow instructions that are appropriate for use at the tactical level. The Marine Corps Risk Management order, MCO 3500.27C and OPNAV Instruction 3500.39C, Operational Risk Management, provide a framework to bin both the probability and severity of an event into a few simple categories and thus determine whether an event is either high, medium, or low risk. These orders also provide guidelines for when and how to either accept the risk or take steps to >Maj Weber is a Huey Helicopter Pilot turned Financial Management Officer who recently graduated from the Naval Postgraduate School with a Master of Science in Operations Analysis. She has deployed overseas multiple times, including to Afghanistan, Pakistan, and Guatemala. She is currently serving as an Operations Research Analyst at Headquarters Marine Corps, Programs & Resources.

mitigate it. This level of risk assessment and management creates a force that is *risk-aware*. These simple procedures have produced significant improvements in safety and effectiveness for the Department of the Navy (DON).³

Unfortunately, this practice of simplifying the probability and severity of an event into a few generic categories has also permeated strategic planning and decision-making processes. One of the areas where it is most dangerous is in the planning, programming, and budgeting processes. This is in spite of the fact that orders specifically call for more in-depth planning at higher levels and when time allows. MCO 3500.27C even suggests that Marines should research available data and use "analysis tools, trends, and formal testing."4 This advanced level of risk assessment and management, one that is dependent on data and quantitative analysis, is being risk-informed. DON risk management orders do not provide specific examples or give guidance on what in-depth, quantitative risk analysis can or should entail. All simply state that in-depth risk analysis should be done. Likewise, professional military education courses such as the Staff Non-Commissioned Officer Academy, Expeditionary Warfare School, Command and Staff College, and the Naval War College do not address quantitative risk analysis techniques. It is not surprising then, that as leaders mature, they

stick with what they know. It is rare to see planning or programming decisions that are supported by quantitative risk analysis, yet the consequences of failing to do so are dire.

For Operation EAGLE CLAW, mission planners determined a minimum of six helicopters would be needed to carry all the U.S. forces and hostages away from the embassy during the rescue, but the planners failed to adequately assess the probability that maintenance issues, weather, and flight hazards would prevent some of the helicopters from completing the mission.⁵ Given a reliability rate of roughly 75 percent for each helicopter, mission planners assumed that sending 8 helicopters would be enough to ensure that at least 6 were able to complete the mission.⁶ However, when the reliability rate is aggregated correctly using the binomial theorem, sending 8 helicopters only results in a 68 percent chance that 6 will complete the mission. In order to mitigate risk and increase the probability to either 92 percent or 99 percent that 6 helicopters will complete the mission, either 10 or 12 helicopters must be sent, respectively. Of the eight helicopters that were sent to the final staging area, only five arrived in an "up" or operational condition. One encountered hydraulic problems, another was caught in a sand storm, and the third showed signs of a cracked rotor blade.

As a result, the mission was aborted, but not before delays in decision making put the helicopters in critical fuel states and one ended up crashing into a C-130 while attempting to refuel.⁷

More recent examples of poor risk assessment include Service-level planning and programming boards and working groups where senior leaders decide what capabilities to invest in given limited resources. These working groups form opinion-based priority lists using verbal descriptions of the risk of not investing in certain capabilities.8 These risk descriptions are provided by program and platform advocates and rarely include quantitative measures to define the risk. When quantitative measures are included, the measures are specific to the technical aspects of the platform or program in question and do not support standardized, quantitative comparison of risk across programs or platforms.9 Capabilities receive funding based on the eloquence of their advocates and not on quantitative, defendable risk analysis.

As part of current Planning, Programming, Budget, Execution, and Audit reform efforts, Headquarters Marine Corps, Program and Resources is developing Commander's Organizational Risk Estimate (CORE) reports. Headquarters Marine Corps, Programs and Resources has advertised that the CORE reports will:

Enable senior leaders to make evidence-based resourcing decisions that consider the impact and risk of resourcing shortfalls ... [as well as] codify measures of success and [a] supporting data architecture that will enable leaders to monitor progress towards goals.¹⁰

These reports give commanders a means to weigh in on the programming process and push commands to adopt consistent measures of performance and effectiveness, but they still only address risk superficially at the Service-level. Rather than looking at risk from the traditional, functional area perspective in the manner of program evaluation boards, the CORE reports instead address risk from a command perspective. In their current form, they do not provide a standardized, quantitative means



Aerial refueling is both hazardous and mission essential. (Photo by LCpl Quince Bisard.)

of comparing risk across commands. Each CORE report identifies mission-critical tasks for that command and includes a verbal description of the risk of receiving insufficient funding, but the means of assessing and presenting risk are left up to each commander. The result is that the CORE reports provide a different perspective from which to make planning and programming decisions than did program evaluation boards, but they do not provide an improvement to the way Service-level risk analysis is conducted.

At the operational and strategic levels, using the simple methods of risk assessment presented in DON risk management orders and relying on advocates' ability to verbally define risk in a useful way is both dangerous and unacceptable. In light of the growing complexity of operational environments, Navy and Marine Corps Service leaders must implement methods of risk assessment that involve standardized, quantitative measures, which enable the comparison of risk across a diverse set of options. Senior leaders are not well versed in the specifics of each mission, program, or platform that they will be asked to evaluate—nor should they be. Our senior leaders need standard, quantitative means of comparing the alternatives. There are three things we must do in order to achieve this.

First, the DON needs to implement a standard, quantitative measure for comparing risk across commands, functional areas, proposed courses of action, programs, or platforms. I propose that the DON require the calculation of expected loss when conducting in-depth risk assessments and prior to making significant resourcing decisions. This aligns not only with the tradition of evaluating risk from the perspective of "What happens if we do not adequately fund this program/resource this mission?" but also with the requirement to conduct cost-effectiveness analysis as outlined in MCO P3121.1, the Marine Corps *Planning and Programming* Manual. Calculating expected loss will allow decision makers to compare the expected loss with the cost of mitigating it by providing the requested funding and resources. It will also allow them to compare the expected loss associated with multiple items competing for limited resources.

Expected loss (*EL*) is calculated by multiplying the probability (*p*) of a hazard or event occurring during a given period by the impact or cost (*c*) of the event:

 $EL = p \times c$

Probability is measured on a scale of 0 to 1. Cost can be measured in a number of ways but several standard categories that would apply to military decision

making include recovery or down-time, man-hours, dollars, or the number of casualties.

One example of how this could be used would be in assessing whether or not to invest in building upgrades to harden facilities against hurricane events. Say the probability (p) that a hurricane of the magnitude of Hurricane Florence will hit the east coast in the next five years is 0.5. If the damage cost (c) in terms of dollars that the hurricane would likely inflict on Camp Lejeune facilities is \$1.7 billion, then the *EL* would be 0.5 times \$1,700,000,000 or \$850 million.11 If the base can preemptively harden facilities so as to avoid hurricane damage at a cost of \$850 million or less, say with \$500 million, then statistically (and financially) it makes sense to spend the money to harden the facilities even though we are not certain hurricane damage will occur. Here we use the expected loss value to decide whether or not the hardening cost of \$500M is worth it in light of the risk.

We can also use expected loss values to compare what to fund given several alternatives. Say we have \$500M to spend. We can either spend it on hardening our facilities or on improving our cyber security.¹² We have already established that the expected loss to our facilities from hurricanes is valued at \$850M. If the probability of a cybersecurity breach in the next five years is 0.33 and the forecast recovery cost is \$2.1B, then the expected loss would be around \$700M. In either case, spending \$500M is worth it to avoid the expected costs of \$700M or \$850M, but if we have to choose, it is better to spend it on the facilities and avoid \$850M in expected losses.

The main counterargument to using expected loss calculations is that expected loss while providing a quantitative measure of risk, may still result in an oversimplification of the risk. Hazard events can cause a range of outcomes so using a single expected loss value for comparison may not paint the whole picture and may result in valuations that seem counterintuitive. For example, when comparing a low probability and high-cost event such as nuclear war to a high probability and low-cost event such



Quantitative measures of risk do not replace the experience and judgment of leaders. (Photo by Petty Officer 2nd Class Hector Carrera.)

as a vehicle accident, the expected losses could be valued the same for both. One means of addressing this problem with expected loss calculations would be for decision makers to pick a minimum set of time-limited scenarios for which they want expected losses to be calculated. For anyone that has written a standard five-paragraph order, this is akin to considering both the enemy's most likely course of action and the enemy's most dangerous course of action. It may be impractical or impossible to calculate expected losses for all possible outcomes, but that will not preclude the benefits and insight gained from considering a few representative scenarios.

Implementing the use of expected loss calculations as a factor in decision making will not preclude the need for well-intentioned leaders with the applicable experience to still have the final say. There will always be some items that do not fit well into a standard assessment methodology and some intangibles that cannot be definitively measured but which must be considered, such as effects on public opinion. A common sense or "sanity" check should always be applied to any results developed from purely quantitative measures, but this is not a valid reason to forego a quantitative assessment or to fail to define risk on a common scale. Given

the simplicity of the formula, $EL = p \times c$, immediately implementing at least a rough measure of the expected loss in risk assessments will not be difficult. At first, the accuracy of the values used for probability and for cost in these calculations may not be great. However, as program managers, platform advocates, and mission planners get used to using these measures and develop historical data from which to draw on, the accuracy will improve. Ranges of values can and should be used as appropriate.

The second thing the DON must do in order to transition to risk-informed decision making is to pick relevant metrics for our programs, platforms, and operations and STICK WITH THEM! One of the main factors preventing the DON from becoming a data-driven organization is the lack of consistent historical data to draw on. What we track and how we track it changes with each change of leadership, each software upgrade, and each fiscal year. In order to develop reliable measures of probability and cost, we must consistently and accurately track what we spend, how we train, and how we perform over time. Jim Collins, in his book Good to *Great*, discusses why some companies achieve sustained great performance. One of the key reasons some companies achieve greatness is that they adopt what

he calls a Hedgehog Concept.¹³ They pick a simple, easily understood concept or metric/goal and drive toward it with fanatical consistency. For example, from 1975 to 2000, returns from \$1 invested in Walgreens (the highest performing company in Collins' study) would have beat the returns on \$1 invested in the general stock market by fifteen times. Walgreens' Hedgehog Concept during that 25-year timeframe was to have the most convenient drugstores with the highest possible profit per customer visit.¹⁴ If the DON hopes to sustain overmatch in a great power competition, we must determine how we can be the best in the world, remain laser-focused on that goal, and consistently collect accurate and relevant data to assess and adjust our performance.

The third and final thing the DON must do to achieve risk-informed decision making is to provide our leaders with better risk management education. As Marines and Sailors take on additional responsibility, we have to teach them more about quantitative risk analysis techniques. OPNAV Instruction 3500.39C states: "The level of [risk management] training should be commensurate with rank, experience, team, crew, or leadership position ... Emphasis for more senior personnel should be on in-depth or deliberate risk management."15 This is not to say that all leaders need to become statistical experts, but they need to know enough to recognize the limitations of their own understanding. In the words of Charlie Munger, Vice-Chairman of Berkshire Hathaway, Inc., "If you know what you don't know, you might still have to make a decision, but your approaches for making that decision will change."16 Leaders need to know what quantitative tools are available for advanced risk analysis, and what sorts of information those tools can give them, so they know when it is appropriate to transition from the simplistic binning of risk to data-driven, quantitative risk analysis. Professional military education courses must include introductions to quantitative risk analysis, so leaders know when and where to seek advanced analytic support. The DON has a robust cadre of specialists ready to

help with this type of advanced analysis: Operations Research and Systems Analysis experts. These include Marines with the 8850 and 8852 MOSs, Naval Academy graduates with a B.S. in Operations Research, Naval Officers with the subspecialty code of 3211P, and government civilian employees with a series code 1515.

Only when we provide senior leaders with standard, quantitative means of assessing and comparing risk will they truly be able to say they are making *risk-informed* decisions and properly leveraging "the data we have to identify the decision space in manning, training, and equipping the force" as called for in the *Commandant's Planning Guidance*.

As I learned from multiple discussions with Dr. Peter Denning and from reading his book, *The Innovator's Way: Essential Practices for Successful Innovation*, the best way to drive innovation in an organization is to start with an enticing offer. ¹⁷ I offer my commitment, time, and expertise to help any DON unit or organization develop and implement quantitative risk analysis practices. If you would like to discuss this further, I can be reached at julia.weber@usmc. mil.

Notes

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- 3. Staff, "ORM Issue, Back to Basics," *Sea Compass*, (Norfolk, VA: Naval Safety Center, 2014).
- 4. Headquarters Marine Corps, MCO 3500.27C, (Washington, DC: November 2014).
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- 6. Anonymous, "Applied Probability and Simulation to Understand Risk in Operation Eagle Claw," (PowerPoint presentation, NATO, 2021).
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- groups follow to develop the service's Program Objective Memorandum. While this order is dated (published in 1991), the process has not changed remarkably from what is described therein.
- 9. This assertion is based on the author's review of the information contained in MCPRIME, the Marine Corps' database of program information that is used by decision makers to build the POM. Review conducted in January 2021. Additional information is available at https://cprobe.army.mil.
- 10. Staff, "Commander's Organization Risk Estimate Validation Checkpoint #1," (PowerPoint presentation, Boston Consulting Group, 2020).
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Small Unmanned Aerial Systems: Train as You Will Fight

Marines need improved training on new sUAS and counter-UAS equipment

by Capt Patrick Cirenza, GySgt Cooper W. Hampton, Cpl Kellen Hunsberger & Cpl Charles Serdinsky

The days leading up to the mass casualty rocket attack at Enduring Expeditionary Advisory Platform (EEAP) Bost, a small, now retrograded Marine position in Helmand Province, Afghanistan, were defined by the interplay of the enemy and friendly group one small unmanned aircraft systems (sUAS). When 4th Platoon, Golf Company, 2/6 Mar, arrived at EEAP Bost as the new security force platoon, one or two enemy sUAS flew almost every night in patterns around the outpost and occasionally directly over the platoon's posts. During the relief in place (RIP) with the previous security force platoon, their platoon leadership explained this had been going on for some time and advised us that enemy sUAS had become part of the baseline for the area. The sUAS continued to reconnoiter EEAP Bost nightly up to and a few days past the rocket attack, which occurred soon after the RIP. Cpl Hunsberger, one of 4th Platoon's sUAS operators, put it simply, "We pretty much got soaked [by enemy surveillance]." Friendly sUAS played a role as well. In the two days before the rocket attack, the platoon flew sUAS twice at the same time each day, investigating the area from where the rockets would later be fired. Partner nation forces (PNF) also twice further investigated the area but did not report finding anything suspicious. On the third day, the rocket attack occurred

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>>> Cpl Hunsberger (MOS 0341) is currently an electrician's apprentice residing in Pennsylvania. At the time of the writing of this article, he was a Team Leader and Small Unmanned Aerial system operator for Fourth Platoon, Golf Company, 2/6 Mar.

>>>>Cpl Serdinsky (MOS 0351) works for the New Jersey State Park Police and is a Specialist UAS maintainer with Delta Company, 104th Brigade Engineer Battalion, 44th Infantry Brigade Combat Team. At the time of the writing of this article, he was a team leader and small unmanned aerial system operator for Fourth Platoon, Golf Company, 2/6 Mar.

"To train as you will fight is the fundamental principle upon which all Marine Corps training is based."
—MCTP 8-10A Unit Training Management Guide

shortly before the time the platoon had flown the sUAS the previous two days with evidence to suggest that the attack was premature. Friendly sUAS after the rocket attack proved essential for battle damage assessment, surveilling the dead space in the 360-degree engagement area, and supporting and

supplementing both Marine and PNF daily patrolling efforts.

As leaders and sUAS operators, it was frustrating to arrive in Afghanistan under-trained on sUAS, which played a dominant role in the platoon's area of operations. 4th Platoon fell in on a diverse suite of sUAS and counter-

sUAS equipment with truly impressive capabilities; however, the platoon lacked critical familiarity and the requisite training to fully employ this equipment. During the workup, the platoon leadership had been confident that the platoon had the necessary skills to utilize sUAS and counter-sUAS equipment in Afghanistan because it sent multiple Marines to every available sUAS course offered for the pre-deployment training program. During the RIP, it quickly became apparent that beyond the basic operation of sUAS, the platoon had major gaps in knowledge on most of the sUAS equipment now in its possession.

This was not the case for other similarly complex, theater-specific pieces of equipment that the platoon fell in on, such as its vehicles, counter-improvised explosive device tools, or weapons. For these items, the training the Marines received was excellent and had prepared the platoon well for the wide variety of circumstances in which it needed to use the equipment, but there was a gap on sUAS equipment. Focusing internally to master the platoon's sUAS equipment at the beginning of the deployment diverted critical attention away from developing an external defensive baseline and an efficient platoon battle rhythm at EEAP Bost.

From our vantage, 4th Platoon's experience seems to meet the intent for a stand-in force envisioned in Gen Berger's Commandant's Planning Guidance and Force Design 2030.1 In contested terrain, working with PNF, and utilizing advanced sUAS, the platoon conducted a complex security mission in a distributed operation while receiving support from a wide array of enablers equipped with cutting edge technology. The Commandant's force design vision focuses more on Navy-integrated, littoral operations fighting a peer adversary in the Indo-Pacific than a static platoon defense in the desert of a landlocked country against a non-peer adversary. Yet, many lessons from 4th Platoon's experience directly translate to supporting the Marine Corps' impending transition to more distributed operations leveraging sUAS and emerging technologies. Our intent is to share these trainingcentric lessons regarding friendly and enemy sUAS to help Marines in future operating environments mitigate and overcome warfighting challenges like those that 4th Platoon faced.

Friendly sUAS Training

- *Imagery Analysis:* While 4th Platoon's operators were outstanding pilots of the sUAS platforms because of the courses that they attended in the workup, they had relatively minimal training on analyzing what they were seeing on the ground from the air. The platoon leadership and sUAS operators would sit together and look at live feed or photographs after sUAS missions to arrive at an amateur's assessment while almost certainly missing many key visual indicators. A month into the deployment, a contractor gave some informal training on overhead imagery analysis to the sUAS operators. Recommendation: Add an additional week of training dedicated to the fundamentals of air reconnaissance for all sUAS operators. Ideally, it would be a condensed version of the Combat Hunter Course from an aerial perspective, teaching the Marines how to identify key visual signatures in the day and at night and in different terrain—combined with a pre-deployment brief on what known enemy tactics, techniques, and procedures (TTP) looks like from the air.² This training would go a long way to helping sUAS operators discern basic patterns of life, identify telltale signs of the enemy massing, and conduct battle damage assessment. It would also make them more efficient at integrating sUAS abilities into their unit's kill chain of find, fix, track, target, engage, and assess.
- First Echelon Maintenance for Hardware and Software: The platoon put its sUAS through the paces—often flying multiple times daily, employing them on patrols, pushing the limits of the equipment in rough weather, and cycling through batteries to get the sUAS back up in the air to extend periods of observation. Over time, the sUAS began to show wear and tear. The Marines were trained on the basics of repair on some sUAS, but not on all of the platoon's specific gear set,

which downed critical assets over time. The operators were eventually able to keep most sUAS in the air by tinkering in teams and learning from field support representatives. Additionally, some sUAS needed software updates, which had operators like Cpl Hunsberger not taken the initiative to conduct the updates, would have left frequently used reconnaissance assets vulnerable to cyber exploitation. Recommendation: Train operators in the basics of repair, provide repair kits for all sUAS in theater, and provide clear guidance and instructions on software updates and troubleshooting. Provide a guide that Marines can take on deployment with step-by-step instructions on how to fix common issues.

- Officers and Staff Non-Commissioned Officers (SNCO) Knowledge on sUAS Integration: Over the course of the deployment, Cpl Hunsberger became the undeniable sUAS subject-matter expert of Task Force Southwest and was requested by name on multiple occasions for consultations with a colonel, three majors, two gunners, his company commander, his executive officer, his platoon commander, and his platoon sergeant about sUAS employment. While this was an excellent experience for Cpl Hunsberger and higher and adjacent units, the reliance on a single Marine is evidence of a training deficiency for leadership. Recommendation: Include sUAS familiarization courses throughout Training and Education Command curriculums for SNCO and officers. Establish a common and wellunderstood knowledge baseline to enable informed decisions by teaching the capabilities and limitations of sUAS as well as the basics of their employment. • Advanced Tactical Employment: Au-
- dible and visual compromise are key target indicators of sUAS. Sometimes while the operators were employing sUAS, they would be audibly compromised and persons of interest would change their behavior. At night, it took the operators some time experimenting with the various thermal palettes (White Hot, Black Hot, Sepia, Iron Bow, Artic) to optimize night reconnaissance missions.³ On dismounted and mounted patrols, pre-scanning the

route, injects from intelligence, and requests from the Marines on the patrol required sUAS operators to invent and implement a variety of creative TTP. *Recommendation:* Integrate more UAS operations into routine training such as the infantry immersion trainer, mounted patrols, and heliborne assaults. Combine fixed and rotary wing and lethal and nonlethal sUAS to expand the pre-deployment experience of sUAS operators.

• Integration With Larger UAS and Manned Intelligence, Surveillance, and Reconnaissance Platforms: Large UAS or manned intelligence, surveillance, and reconnaissance platforms often impeded the use of sUAS. 4th Platoon was routinely denied restricted operating zones to fly sUAS and eventually learned to never even attempt to ask for one when larger aircraft were nearby. While this is an understandable precaution for deconfliction, it was a missed opportunity to integrate different groups of UAS to reconnoiter compounds or persons of interest from various angles. *Recommendation:* Train sUAS operators in the basics of deconfliction by altitude, lateral space, and time and how to request permissive permanent restricted operating zones while also appreciating other air control measures. In 2017, the leaders of 3/5 Mar writing about sUAS suggested, "the airspace above the GCE should belong to the GCE up to around 1,000 feet AGL [above ground level]."4 Joint terminal attack controllers could also practice integrating sUAS and light miniature attack munitions into their stacks so that a platoon can control air reconnaissance, airspace, and air-delivered fires organically in a distributed fight. An sUAS Center of Excellence could facilitate the development of TTP, standardization of training, and evaluation of units' sUAS kill chain integration while also building repetitions and trust between sUAS operators, pilots, and joint terminal attack controllers.

Counter Enemy sUAS Training

• *Utilizing Counter UAS Equipment:* 4th Platoon learned about how to employ almost all of the powerful

counter-UAS equipment at EEAP Bost on the job and in-country while enemy sUAS was flying overhead. It soon became exceedingly clear that 4th Platoon lacked critical skills that it could have learned during the predeployment training program, particularly given limited field support representatives' assistance at the remote location. For instance, one piece of critical equipment kept crashing because the platoon did not know that it had to (or was allowed to) delete the massive amounts of data collected on birds and bats flying in the vicinity of the outpost. Another critical device stopped functioning but would remain on when the battery energy dropped below a certain level. As sUAS operator Cpl Serdinsky put it, "We had to figure it out. There was no course on 'this is what to expect." *Recommendation:* prior to deployment, teach the basic capabilities and limitations of counter-UAS equipment such as the max effective range, limitations because of weather and wildlife, and conflicts in the electromagnetic spectrum between different types of equipment. Teach basic hardware and software maintenance troubleshooting.

 Conducting Counter-sUAS Battle Drills: The Marines that 4th Platoon relieved did great work during the RIP, but only experience can help Marines on post and on patrol discern in the dark what sUAS looks and sounds like in a starry sky filled with distant aircraft against the sounds of a city, gunfire, helicopters, and occasional explosions. The clearance process for utilizing the counter-UAS equipment was well-intentioned but caused a significant delay between when the platoon first detected sUAS and when the platoon could activate counter-UAS measures. The platoon was fortunate that none of the sUAS that it encountered carried lethal payloads. Recommendation: Practice with Marines to identify sUAS and give ADDRACs in the day and night, at various heights and distances, and with various types of sUAS before arriving in-country. Adjust battle drills so that they minimize the delay before clearing the use of counter-UAS equipment.

• Countering Enemy UAS Observation: While the platoon took action to make its position a harder target for enemy sUAS observation, a more formal education in how best to do this would have been helpful at a static position that was soaked with enemy sUAS coverage. Recommendation: At small unit leader courses, teach Marines how to do an sUAS overhead visual and thermal self-audit and how to conceal and disguise a position to deny, deceive, and divert enemy aerial observation.

4th Platoon's Best Practices

- Anomaly Logbook: GySgt Hampton, 4th Platoon's platoon sergeant with previous experience in Afghanistan, recommended that the platoon start an anomaly logbook. What essentially began as an additional watch logbook, evolved into a fusion of intelligence sources (including sUAS) that allowed the platoon to pick out anomalous patterns over time that it would have missed before. The squad leaders briefed these patterns to the Marines on the outpost, which built their situational awareness on what to be on the lookout for and fed better information back into the intelligence cycle.
- Gridded Reference Graphic (GRG): The platoon utilized a GRG for its position and gave it to all the post standers. This greatly reduced the amount of time it took for the post standers to give an ADDRAC on enemy sUAS to Marines in the base defense operations center trying to locate and counter the sUAS.
- Tactical Mindset to sUAS: The platoon's operators minimized flying directly over EEAP Bost and deleted photos that they took after the sUAS operators downloaded them so that if the enemy recovered a downed sUAS, the images and the platoon's position would not be compromised.
- Utilizing Friendly sUAS to Find Insider Threats: During the deployment, the platoon moved from EEAP Bost to Contingency Location Shorab, a mid-sized base with few high vantage points. One of the platoon's new missions was to provide a base quick reaction force for insider threats. Ac-

customed to using a GRG for AD-DRACs, the platoon would launch sUAS during counter-insider threat drills. As the Marines went to the general sector of the threat with GRGs in hand, the sUAS operator was able to give them an ADDRAC to the exact building so that the Marines could rapidly build situational awareness.

4th Platoon's experience with friendly and enemy sUAS in a remote location in Afghanistan is likely going to be very different from that of the Marines who follow us in distributed operations within the contact layer elsewhere around the globe. The platoon's experience and lessons learned are neither remarkable nor comprehensive—the platoon did what all Marines would do by adapting and overcoming. However, formalizing some of 4th Platoon's lessons into improved sUAS instruction at the small unit level will support optimal concrete outcomes from the Commandant's vision in a world where UAS are rapidly

proliferating. Just as Gen Berger wants to increase the Marine Corps' lethal, logistical, and loitering sUAS, U.S. adversaries' use of lethal and non-lethal sUAS from non-state actors to peer competitors is also on the rise.⁵ As the Marine Corps continues to provide excellent friendly and counter-sUAS capabilities, it is essential to train future Marines in how to best use their equipment. Better training on new sUAS equipment is a simple idea, but it is one that will foundationally support the Marine Corps making sUAS a competitive advantage and will have an outsized impact on small unit lethality downrange when the stakes are higher than they were for 4th Platoon.

Notes

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A Resilient, Combat-Capable EAB

Employing lessons from the Midway garrisons to design a robust EAB in a future conflict

by LTJG Jeong Soo Kim

n the recently published Tentative Manual for Expeditionary Advanced Base Operations, the authors at Headquarters Marine Corps define such operations as follows: "a form of expeditionary warfare that involves the employment of *mobile*, *low*signature, persistent, and relatively easy to maintain and sustain naval expeditionary forces." While this manual is a monumental leap in the Marine Corps' warfighting doctrine against a pacing threat, I argue that instead of mobile and low signature, the Marine Corps ought to also invest in resilient, credible-threat expeditionary advanced base operations (EABO) that will force an enemy fleet to become victims to a classic "hammer and anvil" maneuver executed by the Navy-Marine Corps team.

Difficulty in Avoiding Detection in Modern EAB Operations

With the significant improvement in UAV surveillance and satellite technologies developed by both the United States and its adversaries, establishing an undetectable, low-signature EAB would be extremely challenging, and outright impossible in the future. Considering the logistical scale required to sustain enough combat power (ordnance, sensors, command and control [C2], combat support) to threaten an advanced, sophisticated, second-generation phased array equipped surface combatant or modern tactical aircraft, keeping this force "under the radar" from a hostile sensor for the duration of the conflict will be nearly impossible. Once even a reinforced platoon lands on an island in the Western Pacific Island chains (any>LTJG Kim is a Civil Engineering Corps Officer currently assigned to Commander, Fleet Activities Sasebo. He previously served in a Seabee Battalion, Naval Mobile Construction Battalion FIVE as a Platoon Commander and Detachment Officer in Charge. He is the winner of the 2021 Marine Corps Essay Contest hosted by the U.S Naval Institute and is published in Proceedings.

where west of Hawaii), a satellite parked in geostationary orbit above Chinese aerospace will be capable of spotting it and relaying realtime imagery back to its command nodes. Furthermore, if the island is inhabited, even curious bystanders can transmit data to opensource social networks utilizing their mobile devices. Considering that the United States and other advanced nations run enormously efficient data collection and analysis operations, a pacing threat would immediately be aware of such deployment. It would be nearly impossible for any significant military unit to hide its presence while sustaining credible combat power.

However, the inability for an EAB to be operationally low signature does not mean units should abandon mobility and low signature methods. On the contrary, the ability to "shoot and scoot" is vital to preserving combat power under hostile fire. Survivable units must train to disperse their vital C2, sensors, and munitions more quickly than the enemy can detect, relay, and implement mid-course corrections. This tactical mobility can be achieved through mechanizing vital sensor and weapons platforms, strong communication links with timely early warning via UAVs, and through the employment of patrol aircraft and satellites. Furthermore, in a battlespace where consistent logistical support is not guaranteed, an EAB must aspire to be low signature enough to be combat-capable even under the most austere and isolated logistical situations.

If EABs cannot evade enemy detection and be constantly under hostile surveillance the moment it enters a contested theatre, then is it a viable strategy in a modern kinetic conflict against a pacing threat? If the maritime Services perceive the joint Navy-Marine Corps force as a hammer-anvil relationship, then the Marine Corps-led EABO will play a central role in forcing hostile offensive maneuvers into a premature culminating point and enable the Navy-led mobile fleet assets to execute a decisive counteroffensive operation. The Battle of Midway is a prime example of how a resilient and combat-capable EAB (Midway Garrison) can be a linchpin to a Navy-Marine Corps hammer and anvil strategy that delivered a decisive victory against a numerically and qualitatively superior foe.

The Battle of Midway from an EAB Operations Perspective

Most consider the Battle of Midway a carrier-on-carrier engagement where a smaller American carrier force (three) decimated a larger Japanese carrier force (four). However, there was an unsinkable fourth American carrier, Midway Garrison, which significantly blunted Japanese offensive capabilities by absorbing one-third of the Japanese carrier force's strikes and diverted risk away from the American carrier force. Midway Garrison successfully withstood a well-coordinated airstrike that would likely have disabled or sunk the American carrier force, quickly repaired its facilities, and continued to remain a credible threat to Japanese carriers. It could be argued that the resilience of EAB Midway forced VADM Nagumo into his infamous dilemma and gave ADM Fletcher and Spruance the opportunity to destroy the Japanese fleet in midst of its refit and rearm evolution.

At 0430 on 4 June 1942 (first day of the battle), VADM Nagumo launched a 108 aircraft strike against Midway Atoll defended by 64 aircraft of Marine Air Group 22 of which only 28 were fighters inferior to the A6M Zero. Predictably, all but two aircraft of MAG 22 were destroyed or damaged, but the combination of ground anti-air fire and heroic defensive efforts from MAG 22 inflicted 51 aircraft casualties to the Japanese carrier strike group. While withstanding intense fire, Midway Atoll remained operational as an operational airbase, able to sustain air operation supporting amphibious PBY-5 and B-17/B-26 operations after the intense initial strike. Upon returning from the strike, Japanese pilots reported that Midway was still combat-capable and will require further strikes prior to attempting an amphibious landing. VADM Nagumo now had to decide whether to arm his additional aircraft for potential fleeton-fleet action or for another ground strike against Midway Atoll.

Nagumo's tactical dilemma and his decision to strike Midway Atoll turned the tide of the Pacific War. He was forced to decide between striking the *resilient* Midway Atoll with a high confidence of causing non-critical damage or consolidating his forces to strike the carriers, with a lower chance of discovering the carriers but with the potential to deal a crippling strike. Nagumo ordered his planes to strike Midway again but quickly reversed this order upon the intelligence of sighting the American



The World War II battle of Midway provides an example of how a well-designed and supported EAB can contribute to sea control. (Photo by Petty Officer 2nd Class Daniel Barker.)

carrier force. As a result of this hesitation, ADMs Fletcher and Spruance caught the Japanese fleet off guard, and by the end of the battle, four Japanese fleet carriers had been sunk.

Despite EAB Midway's static and detectable nature, its resilience and ability to remain operational forced the Japanese fleet commander into a hasty decision that doomed his fleet and the course of the Pacific Campaign, Like the Midway Garrison of 1942, a welldesigned and resilient EAB can blunt a focused strike and open up an opportunity for the Navy's fleet assets to maneuver and hammer a critical strike against the enemy. The lessons learned from utilizing Midway Atoll as an effective EAB can be easily utilized today in a potential conflict in the Western Pacific.

Three Preconditions to the Anvil EAB Employment

The effective employment of EAB Midway in the Battle of Midway does not mean that the Navy-Marine Corps team should utilize a detectable EAB as a panacea for a qualitative and quantitative disadvantage in the Western Pacific. While EABs are certainly a cost-effective and powerful asset in the fleet commander's toolbox, there are preconditions that may be needed

to ensure that EABs are an effective combat formation.

1. Resilience: If VADM Nagumo had crippled Midway Atoll to a degree where it could not support combat sorties for the duration of the battle, EAB Midway would not have forced Nagumo into his critical tactical blunder. If it is not viable to hide an EAB in the Western Pacific Island Chain, resilience must be the first priority. Whether this is achieved by diluting a saturation missile strike via a dense missile defense, an ability to "scoot" to avoid incoming missiles, or engineering capability to recover combat power post-strike, a non-resilient EAB loses much of its tactical value as the anvil element.

2. Proximity of the maneuvering fleet hammer element: Without a significant fleet element that lurks in the fog of war near the EAB, effective enemy fleet forces can surround, isolate, and destroy even robust EABs with sufficient time and effort. EABs defended by Marine Littoral Regiments (MLR) by their nature will be able to sustain heavy damage but will be overwhelmed when singularly facing a fleet equipped with next-generation guided-missile destroyers (DDGs), carrier air wings, and submarines. In order for this EABO tactic to properly

IDEAS & ISSUES (EABO/INNOVATION)

function, it is critical that a maneuverable and offensively minded fleet force is lurking in the fog of war, waiting for the enemy to expend its combat power beyond its culminating point against the EAB. Without this hammer element nearby, an MLR left to its own defense will fare no better than the Japanese garrisons of Iwo Jima and Peleliu—driven into decimation against a superior foe.

3. Credible Combat Power: An EAB will require enough offensive capability to negate an enemy commander's option to bypass it. The adversary's reconnaissance assets will inform their leadership of the EAB's presence in her area of operation. Without credible offensive combat power (for example, long-range anti-ship missiles, anti-air missiles, aviation support for F-35 combat sorties), the enemy commander will preserve her offensive capabilities to prepare for combat against the U.S. maneuvering fleet force, hence giving the adversary an option to avoid being placed between the hammer and the anvil. It will require significant planning, wargaming, and testing to determine an MLR composition that will cause a tactical dilemma forcing the enemy commander to place herself between the EAB anvil and the fleet hammer. Deploying EABs lacking

credible combat power will allow the enemy to simply bypass them, producing results similar to the Japanese garrisons of Truk and Wake—logistical liabilities unable to threaten enemy fleets maneuvering around them.

Fictional Scenario: Navy-Marine Corps Hammer and Anvil Operations in the Western Pacific

It is 2046, and a pro-unification political party has narrowly lost an election in the Republic of China (ROC). It has been discovered that the Unification Party's leader had previously unknown ties to the People's Republic of China (PRC) and that the Unification Party has received significant financial aid to sway the election. Popular opinion has turned against the PRC, and an amendment to the ROC constitution to uncommit from a One-China stance was passed and ratified. The PRC initially utilized aggressive posturing, economic sanctions, and robust military exercises to dissuade ROC from following through with its plan. Without much success, the PLA chose the kinetic option, striking military installations on Taiwan, and handed them an ultimatum: submit to PRC rule or face an amphibious invasion.

The United States intervened, and the President chose to establish a naval blockade consisting of East China, South China, and the Yellow Sea preventing a significant amount of trade to flow in and out of China. III MEF deployed its MLRs to XX-Shima located South of Okinawa to detect, deter, and if required destroy Chinese naval task forces attempting a breakout of the First Island Chain. A well-balanced MLR centered on an anti-ship missile, anti-air missile battalions augmented by airfield operations, force protection, contingency engineers, and logistical support occupy a local regional airport. The III MEF commanding general designated the base as EAB Soviak.

The occupation of the airport and the onwards movement of American combat troops was obvious to the local population, and soon videos appeared on social media. Through this, the PLA Navy became aware of the MLR's deployment and utilized its high-altitude surveillance drone to determine the general combat capability of EAB Soviak from inside the protective cover of its continental long-range air defense network.

A week of relative inactivity ensued as behind-the-scenes negotiations between ROC, PRC, and the United States began at a neutral country. When an impasse was reached, a three-ship SAG consisting of PLAN Type 55 and Type 52D Destroyers launched a salvo of anti-air missiles against ROC Air Force combat fighters conducting combat air patrol over its own territorial water. Out of a four-fighter flight, three are destroyed and one limped back to its base. In retaliation, EAB Soviak's Anti-Ship battalion launched a simultaneous strike of 72 missiles against the PLAN surface action group (ŠAG). This strike was coordinated with a squadron of naval strike missile-equipped P-8s, and this saturation strike sank one Type 52D and mission-killed the other two vessels despite its complex air defense capabilities. The Chinese reconnaissance aircraft had not realized that a significant number of the missile launchers were mounted in unmarked containers, transported on general-purpose tractor-trailers. They had significantly underestimated EAB Soviak's ability to project anti-ship missile power.



An effective EAB requires relevant offensive and defensive combat power. (Photo by GySgt T.T. Parish.)

Then, PLAN fleet headquarters deployed a sizable carrier task force centered on its Type 003 Zhejiang and Type 002 Shandong carriers attempting a breakout. It knew the CVN 80 USS Enterprise, CVN 76 Ronald Reagan was committed to the South China Sea while an additional carrier CVN 81 Doris Miller was committed to patrolling Japanese waters north of Okinawa at the personal request of the Japanese Prime Minister and saw an opportunity to make a breakthrough past the First Island Chain via XX-Shima and prove that the naval blockade is tactically unviable.

The commander of the Chinese Task Force RADM Chen initially intended to bypass EAB Soviak, as striking it with his Carrier Air Wing and escorts risked depleting aircraft and munitions that would be required to face an American task force in the open ocean. However, he realized the previously unknown offensive capability of EAB Soviak and received assurances from his fleet reconnaissance that he would receive early warning if the American carrier strike groups (CSGs) moved toward EAB Soviak. RADM Chen assessed his risk and determined that EAB Soviak was a critical risk to any follow-on naval assets if bypassed. He believed that he could break away from an EAB Soviak strike if he received intelligence that the American CSGs were shifting positions to aid EAB Soviak. Furthermore, he embarked on PLAN's most advanced anti-submarine warfare (ASW) helicopters and was escorted by Type 54 Frigates recently outfitted with the most advanced ASW equipment. Thus, he was reasonably confident that U.S. submarines would not attempt to engage the carriers.

RADM Chen commenced a coordinated strike to include mainland-based DF-21s, as well as naval aircraft-mounted cruise missiles. The strike, numbering over 120 missiles, was measured to overwhelm EAB Soviak's defenses but not overly deplete the task force's missile magazine, as advanced missiles costs had ballooned. EAB Soviak retaliated with its anti-ship missiles realizing that a saturation strike was underway, and its anti-air battalion tried its best to inter-

cept as many missiles as it could, but the EAB suffered heavy damage, losing its communications with III MEF as well as a significant amount of its sensors and combat capability.

However, a reinforced company-sized task force of Marine Corps engineers and Navy Seabees were able to initially repair communications, repair craters, and spalls created by sub-munitions. While engineering equipment was also damaged, they were able to pre-stage and disperse relatively inexpensive commercial off-the-shelf and spare parts around the EAB. Within four hours, communications were established and the EAB commander notified III MEF that a number of surviving fuel bladders and repaired airfields could support F-35 operations. This gave the III MEF commander a Hail Mary offensive option to decisively strike the enemy fleet now attempting to break out.

EABs could allow the Navy-Marine Corps team to ... employ a hammer and anvil operation ...

In coordination with the 36th Wing, the III MEF commander ordered two squadrons of Air Force F-35As to take off from Guam heading for XX-Shima fully aware that the enemy fleet was located beyond the combat radius of the Air Force F-35As. Their instructions were to extend beyond their combat radius, release their missiles against the Chinese task force, and then land at EAB Soviak to refuel. In close coordination, the III MEF commander received confirmation from the commander of the 7th Fleet (C7F) that there was a pair of Virginia Class submarines carrying a payload of 36 maritime strike Tomahawks trailing the task force at a safe distance away from the enemy ASW screen. The III MEF commander informed C7F of the exact time and location of the impending F-35A strike originating from Guam, and the submarines were ordered to launch their Tomahawk missiles to precede the more advanced anti-ship missiles from the F-35As to overwhelm the escort's anti-air system.

This coordinated strike launched 118 anti-ship missiles from various directions and saturated the PLAN carrier task force's air defenses. With the carriers in danger, guided-missile destroyers sacrificed themselves to screen the most valuable Type 003 Carrier, which was spared from significant damage. However, the Type 002 Shandong was reduced to a smoldering hulk, impressively kept afloat by its crew. Three additional guided-missile destroyers and guided-missile frigates escorts were completely sunk. With a significant portion of its screening force destroyed and having expended its air defense missile complement, RADM Chen decided it to be foolish to continue a breakthrough and risk another valuable carrier. He committed fighters to a defensive combat air patrol as the remaining ships recovered and withdrew back to its base in Ningbo. The Chinese negotiators are forced to continue from a position of weakness, unable to break the naval blockade.

Conclusion

The Navy and Marine Corps are certainly on the right track of developing EAB operations to conduct sea denial, control, fleet sustainment, and if needed, put the enemy fleet to the bottom of the ocean. However cognizant of the difficulty in establishing low signature and mobile EAB operations, the Marine Corps should learn from the successes of a resilient and combat-capable *EAB* Midway against VADM Nagumo's fleet during the Battle of Midway. Building and deploying such EABs could allow the Navy-Marine Corps team to effectively employ a hammer and anvil operation against even the most advanced naval adversary and preserve our naval superiority in the Western Pacific.



Small Boats, EABO, and the Way Ahead

While embarked on the USS San Diego, Alpha Company was the small boat company for the 15th MEU during its 2020-2021 deployment

by Company A, 1/4 Mar

fter turning the tide against the Japanese Imperial Navy following the victory at Midway, the United States needed to draw Japanese attention away from the imminent invasion of Guadalcanal. In order to divert Japanese reinforcements from affecting the Guadalcanal invasion, the Navy decided to conduct a raid ten days after the planned attack. The insert method for this diversion raid would be from over-the-horizon by small boat. At the time, and true to the present day, ship-to-shore movements are considered over the horizon if they are at least fifteen nautical miles away. For this particular effort, through training, imagination, and experimentation, the Marines determined that the distance from over the horizon for this raid would be from 2,029 miles away. Through working with the Navy's "Silent Service," Carlson's Raiders set out on their ambitious mission to raid Makin Island. After transiting from Pearl Harbor to their objective undetected, 222 Marine Raiders launched from the USS Argonaut (SM-1, EX-V4) and USS Nautilus (SS-168, EX-V6) in their rubber boats; thus, the Marine Corps' infantry small boat capability was born.¹

After proving small boats were an effective covert insertion method from the sea, the Marine Corps began its onoff fascination with an FMF infantry small boat capability throughout the rest of the twentieth century. In 1991, the 2nd MarDiv established the Small Craft Company (SCC).² The SCC represented FMF's inherent small boat capability, specializing in riverine environs. The mission of the SCC was



Concepts like Stand-in Forces and EABO push the FMFs to look toward inculcating infantry small boat capabilities from amphibious ships such as USS San Antonio and to innovate with alternative platforms. (Photo by Sgt Desiree D King.)

to provide MEUs and MEBs "depth, flexibility, and maneuverability to the littoral regions of the world, turning the rivers from obstacles into avenues of approach." In addition to being resident experts for the fleet, SCC also provided operational expertise with South America, Western Africa, and Operation IRAQI FREEDOM experience. In 2001, the Global War on Terrorism began, mission requirements and priorities changed, and the Marine Corps' Small Craft Company was disbanded in 2005.

Today, as the Marine Corps continues to reinvent itself and posture for INDOPACIFIC operations against the pacing threat, the Marine Corps

needs to commence a new assessment of what small boats can contribute to Naval Service concepts, such as Littoral Operations in a Contested Environment (LOCE) and Expeditionary Advanced Base Operations (EABO). LOCE and EABO provide sound reasoning for the Marine Corps to push its MEUs to inculcate an infantry small boat capability into the FMFs. The Marine Corps has always had most of the personnel and resources available. It now needs to bring all these things together to create a reliable small-boat capability organic to the entire fleet.

As an insert platform, an infantry company using small boats can infiltrate or seize a lodgment to insert, secure, or

recover sea denial capabilities. A small boat force's primary benefit is its low signature and stealth, considering a fifteen-foot-long rubber boat is difficult for radar to discover on the water. Additionally, the communications' footprint ranges from small to non-existent as a small boat force can operate under total emissions control conditions. Furthermore, as small boats transit from over the horizon, they are difficult to target because of their low visual profile on the water. Commanders can also repurpose small boat forces from forcible entry to reconnaissance missions. Finally, if appropriately maintained, small boats have a small logistical tail, and infantry companies can maintain their own equipment.

To cement the foundation for small boat operations, the Marine Corps needs to create a Marine Corps Training Publication for small boat company doctrine. Currently, tactics, techniques, and procedures are tribal. Additionally, infantry small boat knowledge across the service is under-developed regarding support to service concepts such as LOCE and EABO. A finalized doctrine would dictate a formal Task Organization and Table of Equipment (T/O&E) for a standard infantry small boat company. For example, a formal T/O&E according to doctrine could prescribe the addition of a small boat mechanic (MOS 1342) to an infantry rifle company. A finalized T/O&E could also specify the number of boats, type of boats, engines, spare parts, and other equipment a company would need. An official T/O&E could also propose different task organizations and tables of equipment from a Combat Rubber Raiding Crafts (CRRC)-pure company to a CRRC and Rugged Hulled Inflatable Boat mixed company. After setting the doctrinal and organizational foundation, the Marine Corps can focus on training the MEUs' small boat companies.

To truly begin cultivating the small boat capability from a training perspective, changes need to be made. Force Design 2030 initiatives provide an opportunity for the Marine Corps to reassess how it can provide a boat company capability throughout the force. Currently, except for the 31st MEU, not all MEUs have an organic infantry small boat company capability on hand. Every time a I MEF MEU— 11th, 13th, or 15th MEU—or II MEF MEU—22nd, 24th, or 26th MEU decides to create a new small boat company, that MEU's boat company needs to start from scratch. Currently, the last vestiges of fleet Marine infantry small boat knowledge reside at Marine Corps' Expeditionary Warfare Training Group-Pacific (EWTGPAC) and III MEF Expeditionary Operations Training Group (EOTG).6 EWTGPAC and III MEF EOTG currently offer comprehensive small boat packages utilizing a company's worth of CRRCs. CRRCs are fifteen-foot-long rubber inflatable

... the FMF only employs its infantry small boat companies from Navy Amphibs ...

zodiac boats that can carry eight Marines.7 Today, while I MEF MEUs and the 31st MEU receive company-level small boat training, only the 31st MEU has a company's worth of small boats and gear set aside for the MEU to fall in on. As it stands, I MEF and II MEF MEUs that wish to have a small boat capability need to scrounge together a company's worth of small boats, find a place to house their fleet, and hash out the logistics on how to maintain their equipment before deployment.

The Marine Corps will also need to invest in or repurpose existing facilities to create an I MEF boat locker in Camp Pendleton and a II MEF boat locker in Camp Lejeune to mirror III MEF EOTG's boat locker. Boat lockers are open storage facilities located on a base marina with racks and trailers to stow small boats. These MEF boat lockers would house and maintain the small boats, small boat equipment, and resident knowledge for their respective MEF. The resident knowledge would come from the small boat mechanics stationed and working out of the proposed MEF boat locker facilities. Currently, when small boat mechanics receive orders to the fleet, they are under-utilized and do not deploy with a MEU. In fact, most small boat mechanics do not deploy at all. When a MEU is getting ready to composite, a small boat mechanic should attach to an infantry small boat company whose gear set will come from the same boat locker.

Relative to other capabilities across the Marine Corps, establishing small boats as viable forcible entry platform comes at a comparatively small cost. Currently, only III MEF can outfit a small boat company for every 31st MEU because it has a MEF boat locker that houses two company-size suites of CRRCs. One company-level suite is for the currently deployed 31st MEU. The other company suite remains at the boat locker for maintenance and preparation for the next deploying 31st MEU. With a CRRC costing approximately \$32,000, a company suite of 18 CRRCs would cost \$576,000.8 Four companysized CRRC suites (two sets for I MEF and two sets for II MEF) would cost \$2,304,000. With no dedicated boat lockers at Camp Pendleton or Camp Lejeune, I MEF and II MEF could potentially save money by sharing with other units or repurposing boat lockers within Camp Pendleton's Del Mar Boat Basin or one of Camp Lejeune's Marinas. Specifically, I MEF could stand up its boat facilities in the spaces that the 1st Raider Battalion will be moving out of this year.9 If II MEF wishes to build a state-of-the-art boat locker, the initial cost would run upward of \$16 million in Fiscal Year 2020. To conduct "service with the fleet in the seizure ... advanced naval bases" from thousands of miles away undetected, four company-sized boat suites and a new II MEF boat locker will cost the Marine Corps an estimated \$18.3 million. 10 Compare this price to the \$184 million contract awarded to BAE Systems for the Amphibious Combat Vehicle.¹¹

Currently, the FMF only employs its infantry small boat companies from Navy Amphibs (LHDs, LPDs, or LSDs). If the MEFs streamline

IDEAS & ISSUES (EABO/INNOVATION)

processes, invest in infrastructure, and provide structure for a fleet small boat capability, they will free units to train small boat tactics, techniques, and procedures. Doing so will eventually evolve small boat development to the next level by experimenting with the submarine community. Carlson's Raiders proved this concept was possible nearly 80 years ago. Unfortunately, the Marine Corps has ceased to continue this idea. With China's anti-access/area denial capability, the Navy and Marine Corps will need to find new ways to infiltrate and gain footholds throughout the Pacific to support the LOCE/ EABO concept. Small boats working in conjunction with submarines can potentially penetrate undetected into the vast Pacific and potentially avoid the Chinese's anti-access/area denial threat. According to the Marine Operating Concept, "to be detected is to be targeted is to be killed."12 With Chinese capabilities ranging the entirety of the Pacific, the Navy and Marine Corps need to exploit the sub-surface of the ocean as a covered and concealed route to the first and second island chains.

As it stands, FMFs do not train with submarines regularly or at all. The Navy and Marine Corps need to aggressively explore new training exercise opportunities to continue small boat experimentation with submarines. In 2012, LtCol Cuomo and Billy Birdzell identified the need to train with subs and the technical aspects of how to employ small boats from fast-attack or guided-missile submarines in their article, "Submarine Stormtroopers." According to their analysis, small boat infantry companies will have to train to employ small boats from a dry-deck shelter (DDS), which is

a 38-foot long, 30-ton, C-5-transportable sphere that attaches to a submarine ... Marines enter the DDS while the submarine is submerged. The shelter is then flooded and the water pressure inside equalized to the outside environment. The DDS then opens and the Marines surface.¹³

LtCol Cuomo and Mr. Birdzell say that a DDS can support twenty Marines and four CRRCs. ¹⁴ Getting beyond the experimentation phase with submarines and small boats should be a goal for the Marine Corps/Navy team as it transitions to an EABO/LOCE doctrine. Putting all these things in place will enable the Marine Corps to pick up where it left off in 1942.

The Marine Corps will want to ensure that it does not atrophy in a newfound fleet small boat capability. Resurrecting the SCC may eventually be wise to prevent deterioration of any hard-earned progress. An SCC's appointed place of duty could be at each of the MEF's boat lockers, where they will work hand-in-hand with small boat mechanics. SCCs will ensure the small boat community successfully implements lessons learned from experimentation. These companies would perfect their trade and become the resident experts in all things small boats, much like their Navy counterparts in Special Warfare Combat Craft. As MEUs or littoral combat teams deploy, a detachment from the SCC would detach to meet the needs of the mission, much like an Amphibious Assault Vehicle platoon would attach to a compositing battalion landing team's mechanized company.

Almost 80 years ago, the Marine Corps and Navy demonstrated a unique capability that completely caught a peer competitor off-guard. As a new peer competitor has presented itself in the INDOPACIFIC, with maneuverability at sea serving as the coin of the realm, the Marine Corps should look back to its history. The Marine Corps also needs to reevaluate its current, though small, capability sets to reinvigorate its small boat programs, increasing flexibility to combatant commanders and providing additional means for the insertion of forces ashore. The Marine Corps' approach to the fleet small boat capability problem has been haphazard up to this point. By providing a solid doctrinal basis, investing in up-to-date equipment, and providing proper infrastructure to a fleet small boat community, the Marine Corps can have a Service-wide covert insertion platform to gain a foothold in the LOCE/EABO concept. A long-distance naval infiltration capability needs to be an arrow in combatant commanders' quiver, especially with a peer China.

On the other hand, the infantry small boat capability could continue

to exist without a doctrine and off scavenged equipment.

Notes

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Want to Retain Marines?

Let them do it themselves

by Capt Evan M. Slusser

onventional managerial assumptions include the notions that with respect to people, management is the process of directing their efforts, motivating them, controlling their actions, and modifying their behavior to fit the needs of said organization.1 Further, the underlying assumption in this conventional thought—and the Marine Corps' contemporary retention challenge—is that the average person is by nature indolent. That is to say, they work as little as possible.² Too many organizations still operate from assumptions like these that explain how the human potential and individual performance in outdated, unexamined, and other ways more rooted in folklore than science.³ This results in a continuation of short-term

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measures or inadequate pay-for-performance schemes that often do not work or do more harm than good.⁴ Marines, though often cited for exceptionalism and indoctrinated regularly into such thought, are in truth no different than any other military or civilian workforce. As such, I offer three reasonable, yet normatively outlandish, considerations

for increased retention: sabbaticals, MOS flexibility, and a reconsideration of current monetary-based incentives and obligations.

The use of sabbaticals to improve employee motivation and morale is growing rapidly as companies seek to find ways to retain their star performers and fight the effects of job burnout. Novel—to my knowledge—in commonplace military personnel management, sabbaticals offer a unique opportunity to stave off further manpower losses. Clearly, there will be concerns on both sides of the aisle that need to be addressed.

Is It Effective?

Some researchers suggest that benefits do outweigh the costs but only when sabbaticals are implemented properly and with a good understanding between employee and employer regarding all expectations involved. It is no secret that the Marine Corps is undermanned and overworked while work-related stress is becoming an endemic, if not fully expected, aspect of any Marine's life. Looking at another profession where these traits are no less common, we can see empirical evidence suggesting a supportive correlation between sabbaticals and career longevity.



Programs like the Hiring Our Heroes Corporate Fellowship Program focus on transitioning Marines. Can a longer-term sabbatical program incentivize retention of the best Marines? (Photo by Sgt Gabino Perez.)

The demands confronting teachers today are probably greater than ever before.⁷ Findings from a 2006 study between teaching, sabbaticals, and job burnout provided encouraging results. On the whole, the findings indicated that a sabbatical, in conjunction with a professional training program, had a great impact on strengthening the teachers' professional image while reducing their feelings of job burnout and intentions to leave their workplace or profession.8 Though there are clear-cut findings in this particular study, the literature on the subject remains in need of further exploratory research, but it is suggestive that sabbaticals implemented in a coherent manner will prove effective in retention. This may be more beneficial in the Marine Corps if tied to professional military education and defense or technical universities.

Regarding MOS flexibility, it may be more helpful to view the problem not as why do Marines quit their job but rather as why do Marines not stay? Granted, the conclusions on the root cause of retention issues remain contested—especially in Marine aviation—consideration should be given to the fundamental nature of MOS finality. Many Marines are not assigned their first choice of jobs and even less are given an opportunity to change throughout their career. The Marine Corps must be prepared to accommodate diverse and flexible careers despite any number of possible detractors from overall job satisfaction. The need for flexibility cannot be overstated. Not to speak only from a decade of personal experience in the Marines, there have also been studies that highlight the significance of job satisfaction in workplace performance and the effectiveness of non-monetary incentives. Marines may become unhappy or unfulfilled in their role, and in such cases, the Marine Corps ought to allow lateral moves unhindered by FITREP repercussions and credibility concerns. I have personally been rejected on two separate occasions, outright, because I am an F-35 pilot. Other than sacrificing for the greater good, I never understood why you would want to keep someone in a MOS who has no desire to advance professionally in that field.

There are several things I would like to do in the Marine Corps beyond my current capacity as a pilot. Unfortunately, they are so contrived, hidden, and riddled with obligatory service commitments that all desire to take part is outweighed by the frustration of an ambiguous future. I would love to get a terminal degree and teach international relations. In fact, it is precisely what I mean to do when my obligation is up next year. Conveniently enough, there is also a PhD strategist program—ongoing for a few years now in MARADMINs but not widely advertised—offered through the Marine Corps and select civilian universities, which sounded ideal, until I read the six-year service payback after graduating (or failing). Without such an obligation looming overhead, I would have likely applied without hesitation, but the knowledge of being trapped is a powerful deterrent. I realize this is an unfair argument towards the Marine Corps' investment, but there are ways to contain your "loss" while still advocating for the program: limit salary to base pay only during the course of study, have the Marine utilize their GI Bill for the program, or create a terminal degree program at Marine Corps University that employs the Marine part-time in beneficial research or as an instructor. Accommodation is attractive for retention, but at a minimum, modify the paybacks to be equivalent to the course, not double.

Current monetary incentives offer select pilots a generous sum of money for continued service in the aviation community, but the obligations are off-putting for many of my peers—including me—given the drastic nature of the paybacks. The result is an outcome where pilots taking the money were the very pilots who would have been retained regardless. If this is designed to reward loyalty, then great—it is working. But if the intent was to retain pilots who are considering more lucrative or enticing personal opportunities, it has failed among my peers in the F-35 captain community.

We all signed the dotted line to begin with. Any and all further obligations are perceived as entrapment and as a lack of trust or as punishment for "getting a good deal." I urge headquarters to reconsider the current incentive programs in place—not to give pilots or Marines "free money" but to realize that neither money nor entrapment is the answer. Few signed up for the paycheck and fewer will stay for it. Educational opportunities should be encouraged and not followed by further obligations under the guise of "utilization tours." I recently finished an educational stint at Marine Corps University, and my utilization tour is sitting at a desk in a Lockheed Martin factory looking for a way to justify it. On the whole, at least two dozen studies on these extrinsic motivators have conclusively shown two things: (1) rewards do not create a lasting commitment, they merely and only temporarily change what we do, and (2) people who expect to receive a reward for completing a task do not perform as well as those who expect no reward at all.10

We all have self-fulfillment, egotistical, social, psychological, and safety needs as humans. 11 This self-fulfillment need-which I argue is the most vital—is based on the need for realizing one's potentialities, for continued selfdevelopment, and for being creative in the broadest sense of the term. 12 Any person "deprived of opportunities to satisfy at work the needs which are now important to them, behaves exactly as we might predict—with indolence, passivity, resistance to change, lack of responsibility, willingness to follow the demagogue" and with "unreasonable demands for economic benefits."13 All traits which are prohibitive to, if not exacerbated by, current Marine Corps goals and policy. Each undoubtedly with an effect on overall servicemember retention in need of updated and continuous mitigation.

There is no standard Marine nor should there be a standard Marine Corps career path. Any attempt to apply standardized retention measures will only prove that realization as policies fall short of institutional goals. I have been told directly by manpower representatives that circumstances particular to my desires to leave the military are outside of their ability to control or

change. There is no need to stay, nor a desire to stay, in an organization that refuses to change or keep pace with its servicemembers. Do not ask the Marines to be innovative and challenge the norm when your default is to place the blame outside of your ability to control. Offer Marines the ability to be autonomous, master their profession, and find a purpose and your Marines will manage themselves but do not take away a volunteer's right to be a volunteer. 14

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Success in Recruiting

Screening for sales aptitude to build a more efficient recruiting force by Maj Jake Pagragan

"The current manpower model does not accommodate a Marine whose interests change over time, tends to average performance over time instead of weighting current performance more heavily, forces Marines to move out of skills they excel at in the name of developing them."

he 2019 Commandant's Planning Guidance provides a clear way forward for the Marine Corps linked to identified priorities for the future force. For the Service to adhere to and execute this detailed guidance, it is vital that it is able to compete for the limited available talent with other military branches and the civilian workforce. To accomplish this task, the Service must field the most competent and capable recruiting force. However, the current process for placing recruiters heavily relies upon teaching sales skills, with no emphasis placed on sales aptitude. This is problematic as aptitude, unlike skill, is personality dependent, has little to no impact on an individual's ability to learn the skill or sales processes, but has a significant impact on whether or not they can execute at a high enough level to succeed. The Marine Corps must stop forcing its members to abandon MOS skills at which they excel and, through the adoption of a sales aptitude screening tool, field a more capable and efficient recruiting force as it competes for talent nationally.

This change starts by shifting emphasis away from an overreliance on teaching sales skills to individual Marines and moving to a process of screening for inherent sales aptitude. To achieve this, the Service should implement a personality screening to gauge individual sales aptitude for all Marines on the Headquarters Marine Corps Special Duty Assignment Screening Team (HSST) and all who are screened for the Marine Corps Recruiting Command (MCRC) company-grade slate. These assessments will provide a baseline metric to help predetermine a Marine's ability to succeed in a demanding recruiting role, allow the Service to strategically place Marines based on their aptitude to create a more lean and efficient recruiting force, and better allow the Service to retain Marines by not putting them in positions to fail as recruiters.

Background

The Marine Corps currently screens enlisted Marines through the HSST for a variety of assignments. This team scrubs thousands of service members' records to place Marines in various assignments from recruiter to security forces to drill instructor. The team bases decisions on a few key components: physical fitness test scores, height/weight, tattoo screening, a command screening and endorsement, and whether or not

a Marine volunteers for a specific Special Duty Assignment (SDA). This last point tends to be more important in the slating of recruiters, at least more so than assignments across the other SDAs.²

Similarly, although at a smaller scale, MCRC, through Manpower and Reserve Affairs, solicits for companygrade officers to serve in various roles at recruiting stations (RS) across the country. The most relevant sales billet slated through this process is that of the Officer Selection Officer (OSO). OSO is, for lack of a better term, the officer recruiter. The criteria are the same with the addition that each officer is screened based on performance as detailed in their Master Brief Sheet.³ However, none of the above-listed metrics in the HSST or the MCRC slate allow a candidate for recruiting duty to distinguish themselves as possessing an inherent proclivity towards the job's sales requirements.

Sales Aptitude Defined

Sales aptitude is said to account for 50 percent of sales success and is 100 percent determined by natural personality. The other 50 percent is comprised of sales skills, appropriate sales processes, training, and other tangible aspects tied to the organization. ⁴ It is important to note that psychologists have found that an individual's natural personality is formed as early as seven years old and does not alter significantly over time. ⁵ An individual can learn to stretch his personality to fit specific environments, but by and large, who "we" are starts at

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an early age and is not something that is easily modifiable. Further, an individual can only stretch so far and for so long before reaching their max capacity and ultimately burnout or fail.⁶

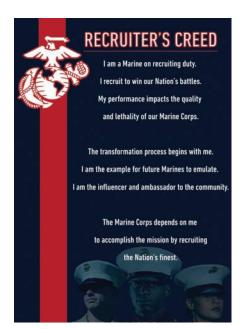
When mapping the importance of sales aptitude and the necessary natural personality that is best suited for a role in sales, there are a variety of closely linked opinions. As an example, in his book *Close Deals Faster*, sales consultant and Navy veteran John Asher has compiled the nine most prevalent based on his own experience and professional development. Additionally, he has, in consultation with CraftMetrics International, offered a reasonable starting point of traits with a rough outline as to where the ideal sales professional falls on a scale of high, moderate, and low.⁷

1. Intensity/Drive: Ideally, a sales professional has a high level of drive and intensity. This is vital to a Marine recruiter who is constantly chasing the mission and demanding quotas that he manages independently.

2. Need for Independence: A high need for independence is required for a sales professional. Sales, much like Marine Corps recruiting, is an independent assignment. Those who do not thrive on independence will not succeed.

3. Assertiveness: High levels of assertiveness are paramount to closing prospects for a sales professional. This extends to Marine recruiters as well. Without an assertive personality, it is difficult to navigate career fairs, high school administrators, and the multitude of other stakeholders—all of whom are critical to mission success. 4. Recognition: Sales professionals have personalities that want and need recognition for individual accomplishments. It is a competitive field, and those who are successful want others to know it. Marine recruiters, especially top performers, thrive on individual accomplishments. The role of the recruiter, unlike many others across the Marine Corps, is driven by individual achievement.

5. Need to Analyze: Sales professionals possess a low need to analyze. Metrics are important, but successful sales professionals do not get mired down in analysis. The same is true for suc-



Recruiting is the Corps' most important noncombat mission. Sales aptitude should be part of assignment to this vital special duty. (Photo by LCpl Kindo Go.)

cessful recruiters. There is not enough time in a recruiter's schedule for a detailed analysis of the numbers. It is all about finding the next prospect.

6. Self-protection: A successful sales professional has a moderate level of self-protection. This means, for a Marine recruiter, that they need to be open to coaching, but with enough of a defensive posture to overcome the daily rejection that comes with the job. 7. Need to Serve: Truly successful sales professionals have a moderate to low need to serve concerning their prospects. For a Marine recruiter, to care too much usually leads to time wasted with unqualified applicants. Recruiters with a low to moderate need to serve will waste less time on the unqualified and move quickly to find the most qualified.

8. Trust: Sales professionals have moderate to low levels of trust. Along the same vein, Marine recruiters screen to disqualify every prospect they meet. Success means never taking an applicant at their word and always conducting thorough due diligence.

9. Optimism: High achieving sales professionals are very optimistic. Sales quotas are incredibly demanding and require constant optimism. This helps

get through the daily grind of the job and projects confidence to prospects. Marine recruiters need this as well. A recruiter will hear "no" ten times before they get a commitment from a prospect. Without high levels of optimism, he will quickly be defeated.

Why Measure Sales Aptitude?

The Marine Corps is both an institution and a business, and it is in constant competition for talent. It is well documented that the eligible population for Service continues to shrink based on several factors ranging from academic requirements to the American population's overall physical health.⁸ This competition is not merely with other military or federal service branches but also with major corporations. As the Service contracts personnel to invest in more in-demand capabilities and equipment, the need to be exceptional in recruiting new talent is critical if for no other reason than it will be required to produce the highest caliber talent to compete on a global scale.

Sales aptitude is the only component to success in sales that is inherent to the individual. As noted above, not only is it inherent to the individual, it bears a disproportionate amount of weight toward sales proficiency in that it accounts for 50 percent of a sales professional's success. To further elucidate this point, there is a common expression in sales that "80% of sales come from 20% of sales people." The same rule applies in recruiting in that it is commonplace for a recruiting sub-station (RSS) to have one or two recruiters carrying a heavier burden in accomplishing the mission. Placing recruiters with personality traits and aptitude that are better suited for this line of work helps bridge the gap between the 80 percent and the 20 percent. Certainly, no organization can source its sales force with *only* those in the twenty percent category. However, by measuring aptitude up-front, the schoolhouse instructors, 8412 Career Recruiters, and the Recruiting Districts and MCRC National Training Team have a head start working with individuals who possess at least half of the necessary requirements to be successful. Not all recruiters will

IDEAS & ISSUES (TALENT MANAGEMENT)

be "A" performers, but those who are "B" and "C" will be more coachable and are more likely by extension to have their career intact after their recruiting tour while benefiting the Service's accession goals.

As MCRC works to place recruiters across the country, having the ability to look at the personality traits of recruiters who are in the training pipeline means that talent can be strategically placed. It would be of tremendous benefit for the RS to be able to look at an inbound Marine's sales profile and place them where they are needed most right out of the schoolhouse. For example, with the MCRC company-grade slate, the RS commanding officer with multiple officers in-bound can determine which roles will be filled within the command. The strongest sales profile is best suited for the OSO billet, the second strongest for the executive officer billet to handle Naval Reserve Officer Training Corps and Marines Musician Enlisted Option, and the third strongest fills the role of the operations officer who generally has little to no direct sales requirements. These three positions are a clear illustration that, armed with the knowledge of who possesses the strongest sales profile, an RS commanding officer can make informed decisions and place their talent where it is best serves mission success.

Another benefit of leveraging aptitude is that the recruiting force will be more efficient as those in sales roles will be naturally inclined to both enjoy and succeed in recruiting billets. By leveraging recruiters with the right personality profile coupled with the right technologies and tangible skills for maximum reach and access to talent, the Service will build a more efficient and potentially more lean recruiting force.

For example, if the average recruiter currently serving is required to write roughly two contracts per month or 24 per year and if this recruiter holds a reasonable closing ratio of 3:1—which is to say for every three interviews, a recruiter closes one applicant—they are required to conduct about six interviews per month. These ratios are multiplied by a factor of four to account for all of the recruiters in a given RSS. That means that to make the monthly mis-

sion, an RSS with four recruiters needs to conduct 24 interviews per month, on the whole, every month for a year. This does not account for unforeseen circumstances such as discharges from the delayed entry program or fraudulent enlistment. The reality is that the number of interviews required is often much higher.

tion at all. In addition, the inefficiency in work leads to additional stressors in a Marine's personal life. There are countless vignettes of Marines who had no business recruiting not only failing their assigned mission but whose home lives are damaged beyond repair as a result. Any RS commanding officer can offer multiple examples of good Marines who

As MCRC works to place recruiters across the country, having the ability to look at the personality traits ... means that talent can be strategically placed.

Those with higher sales aptitude are more competent in effectively avoiding these issues and typically are more effective closers than those who have lower innate sales personalities. This means lower closing ratios, fewer required interviews, and more time for prospecting new applicants. This efficiency is key to the success of the recruiter and can allow for more time spent finding uniquely qualified individuals and a better overall quality of life. Some exceptionally talented and capable Marines burn out over the course of their tour-arguably because they should never have been placed in that posisimply did not belong in a recruiting role, and their careers suffered as a result. While this is possible in any SDA, it is nearly completely avoidable through the implementation of a sales aptitude screening.

Despite the current process, the Service has managed to meet its accession goals almost every year with an unscreened population of recruiters, some of whom do not have the personality traits to be as successful. Through the implementation of a sales aptitude screening, MCRC would build a much more efficient recruiting force across the over 3,000 recruiters and



Sgt Trevor Hurst is a new Marine recruiter at Recruiting Substation (RSS) Brentwood's Permanent Contact Station in Colombia, TN. (Photo by Sgt Devin Phommachanh.)

over 500 career recruiters. Efficiency in sales is paramount to sales success. Increased effectiveness and efficiency in the recruiting force will lead to more opportunities to find prospects with more unique and in-demand skillsets. Furthermore, considerable work could be done through detailed analysis of this new screening process to determine the efficacy of a recruiting force as large as the one the Service employs. Simply by leveraging the right talent across the recruiting force, we better position the Corps for the demanding and ongoing competition for talent while adhering to the Commandant's Planning Guidance.

Finally, the Marine Corps should implement this level of screening to help retain our talented Marines. As the Commandant clearly articulates in the above quote, there is no reason to force a Marine to abandon a skill at which he or she excels for the sake of developing them. If the Service treats recruitment and retention of Marines as a priority, adding another method with which to screen talent for this high-visibility role is a simple step to ensure we keep faith with our Marines by not asking them to do something of which they are not capable.

For example, the best-case scenario when the Service pulls a highly capable Marine from his MOS who is not wellsuited for the recruiting, we lose a capability for a three-year tour or longer, the Marine loses a bit of proficiency, and he returns to the fleet a less capable duty expert but a well-rounded Marine. The worst-case scenario is that the same Marine is forced to recruit despite not having the personality necessary to be successful. He is then likely given poor performance evaluations, becomes less competitive for promotion, and the Service loses what was likely an excellent data Marine (for example). This is, of course, if that same Marine does not get discouraged because we have placed him in an assignment in which they had little chance of success and opts to leave Service or transfer to another branch of the military.

Conclusion

The Marine Corps must stop forcing its members to abandon MOS skills

at which they excel and through the adoption of a sales aptitude screening tool that can assist in predetermining a Marine's ability to succeed in a demanding recruiting role, will allow the Service to strategically place Marines based on their aptitude and build a more efficient recruiting force, and will better allow the Service to retain Marines by not putting them in positions to fail as recruiters.

We have the ability to identify the deficiency through a more thorough screening before we ever set a Marine up for failure. As such, the Marine Corps should leverage the already well-documented research on personality types that the civilian workforce is using to fill their sales ranks.11 Major corporations have the luxury and ability to hire slow and fire fast. If a company hires a bad sales representative, that person has about a three-month window to prove their capacity or they are terminated. The bottom line is that leaders are taught to employ our Marines according to their capabilities, and recruiting is a skill of which not all are capable.

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Scout Snipers

Employment against near-peer threats

by Sgt Travis W. Melick

arine Corps scout snipers systematically erode and destroy the discipline and morale of the enemy by giving the impression that scout snipers are omnipresent, hidden everywhere. The History Channel's documentary, One Shot One Kill, featured a U.S peacekeeping mission involving a surrounded U.S. embassy in Sierra Leone where a violent anti-government group was aggressively posturing outside, pointing their weapons, and making a hostile environment.¹ A scout sniper killed one of the leaders in response. One casualty defused the situation to a point where an armed individual would not pass into view of the embassy without first reducing their weapon to Condition 4 and holding it over their heads—a gesture of body language that would suggest, I have no hostile intent toward the U.S. Marines in the embassy.² Few U.S. military assets wield the same psychological power over enemy combatants as the Marine Corps scout sniper—a de-escalating factor wielded with expert efficiency, which minimizes unnecessary casualties, civilian or otherwise, and reduces the need for higher-scale, costly, offensive measures. In the case of the U.S. embassy in Sierra Leone, a Marine scout sniper provided the mission commander with critical stability and control, restoring security back to the embassy.

The Marine Corps Scout Sniper Program has many unique strengths that directly correlate with Force Design 2030, which states that Marines need to remain undetected within an enemy's weapons employment zone (WEZ) in order to operate as a persistent threat, impacting the decision making and resource allocation of U.S. adversaries. The Marine Corps Scout Sniper Course instructs stalking into

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"Russian Snipers have distinct advantages over Marine Scout Snipers when it comes to support/command control, equipment, and investment development. Additionally, there are distinct capability gaps that will remain a critical vulnerability if the United States Marine Corps fails to stay competitive in Sniper operations."

—SSgt Brandon W. Choo, Course Chief, Scout Sniper Instructor School, Quantico, VA

a final firing position, so a scout sniper may observe, positively identify, and engage the enemy. Every Marine is a rifleman, but scout snipers are trained to engage within one minute of angle accuracy and precision shot placement. Force design's number one on the "Prioritized Investments" is "Expeditionary long-range precision fires and infantry battalion organic fires (organic precision fires—infantry and organic precision fires—mounted)."3 The Scout Sniper Program currently provides both force design requirements for the battalion commander; furthermore, scout snipers are irreplaceable for near-peer combat operations.

Marine scout snipers are still the best asset for employment against Russian sniper and reconnaissance units. Marine Corps scout snipers are currently maintaining a competitive training program for infiltration, deception, and fieldcraft. These capabilities can allow scout snipers to maneuver and infiltrate the enemy's WEZ to detect enemy movement, location, and disposition while targeting Russian forces with supporting arms, all while remaining undetected. The Russian military poses a major threat to Marine Corps maneuvering forces but can be disrupted by a scout sniper team capable of performing an assigned task: engaging selected targets, targets of opportunity, collecting and reporting information, or a combination of all, contributing to the accomplishment of the supported unit's mission.

Russia's asymmetric approach employs snipers to disrupt and harass troop movement:

They employ their Sniper teams to effectively screen and conceal actual operations by occupying their oppo-

nent's focus on the Snipers with their primary combat power; this can be viewed as a form of military deception which ties directly into Sun Tzu's *Art of War* thesis.⁴

Snipers are an economy of force asset to the battalion, which allows for a smaller signature unit with a more dynamic targeting and reporting capability. Battalion commanders can retain combat power to support other operations. Cumbersome, costly, tech-heavy sensors and attack systems, which rely on large, logistic footprints and maintenance plan(s), can be used more conservatively, as sniper teams provide the best return on investment in such situations. Snipers are the all-weather, day and night, surveillance asset to be mobilized at a moment's notice, whereas technology is extremely dependent on favorable atmospheric conditions and can be limited by time. Sniper teams can quickly redirect the resources of a unit, influence operations and freedom of movement in the area of operation. It would be advantageous for the Marine Corps to match the focus of snipers that Russia has. The Marine Corps scout snipers are outperformed by Russian snipers for three main reasons.

First, at the platoon level, there is not a dedicated table of equipment beyond a weapons and collection suite, which are both outdated. The sniper rifles have less max effective ranges and terminal effects compared to the Russian SVLK-14: "The development, designated DXL-5, will be the only weapon allowing operatives to destroy an enemy beyond the horizon line of a standing shooter."5 The Marine Corps' sniper collection suite consists of Canon cameras adopted from civilian use that are vulnerable to surveillance detection devices. Russian snipers have dynamic weapons sets available to their platoons, suitable to mission profile, such as state-of-theart AK pattern rifles with changeable barrels, chambered up to .338 Lapua Mag, .300 winmag bolt actions rifles.⁶ There are specialized urban sniper rifles chambered in various 9mm cartridges, firing subsonic rounds, suppressed. This diverse set of calibers illustrates the understanding of wound ballistics in combination with range and caliber. The Russian military has strived to evolve its sniper program to dominate the modern battlefield. Russia has several formal sniper schools across the country that are extremely demanding, with a precise screening process in which all forces are volunteers (non-conscripts), physically fit, and must demonstrate proficiency in mathematics prior to training.⁷ Russia also has a training continuum, and it should be noted that Russian sniper officers are intel officers and qualified snipers. Russian snipers must attend the Combined Arms Course, Specialist Sniper Course, and the Instructor Sniper Course. Additionally, every few years, snipers are recertified at the schoolhouse with new weapons systems, doctrine, and employment tactics. Their lethality increases by attending courses

From my point of view as an RM Sniper, there seems to be a lack of interest/understanding in sniping from the higher ranks in the Marine Corps—this is a mistake when you look at potential threats and the current operations that UK and U.S. special forces are involved in. If you lose the capability or it continues to be watered down, it will take years to get back, and the Marine Corps would have lost all its experienced snipers in that time.⁹

Not having career progression contributes to an extremely poor return on investment, and there are no organic scout sniper advocates for a formal structure of the Scout Sniper Program. Beyond the platoon, there are no positions for snipers to command. The RM scout

The Royal Marines created the Scout Sniper Branch, which means that an RM has a full 22-year career up to sergeant major as a Sniper.

in mountainous terrain, urban environments, and counter-sniper, or "sniper duel," courses.⁸ All this to say that the Marine Corps' scout snipers go through fewer continuous rigors than their Russian counterparts and would benefit, as would the United States' international presence, from increased funding for munitions modernization and career expansion.

Second, a Marine's expected longevity in a scout sniper platoon is usually between eighteen months to three years before being promoted out of the platoon. Scout snipers are not a primary MOS, nor do they have a formal program with a hierarchy beyond the platoon level. A great difference between Royal Marine (RM) snipers and Marine Corps snipers is job security. Snipers in the Royal Marines often enjoy long careers as experienced marksmen, whereas in the Marine Corps, it is difficult for a scout sniper to stay in the platoon after staff sergeant or captain. From an RM sniper's perspective, looking at the Marine Corps snipers, there is too much friction:

snipers, conversely, go through extensive training and have a professional road map for the sniper MOS. They receive SERE Level C training, allowing them to operate further into the WEZ of the enemy. With the introduction of the RM scout sniper officer, commanders are more knowledgeable about the proper employment of future RM scout sniper operations. The Royal Marines created the Scout Sniper Branch, which means that an RM has a full 22-year career up to sergeant major as a Sniper. That is exceptional from a Marine Corps scout sniper's point of view: snipers being managed, developed, employed, and promoted by snipers. The sniper officers are to ensure proper employment and support. The RM sniper road map includes various sniper courses as well as specialist courses. 10 RM snipers develop skills focused on combating near-peer forces, developing methods to counter the Russians' capabilities for stealth.

Last, scout sniper platoons are the battalion commander's scouts, and if he loses his organic scouting asset, how and who will replace the scout snipers? The

IDEAS & ISSUES (MCISRE/OIE)

battalion would need to request tasking from a Marine Corps recon unit that may not always be available. The Scout Sniper Course has implemented the creation of infiltration lanes, designed to train the Marine to be able to navigate a patrol through an enemy-controlled area. Marines learn to understand the terrain and maneuver into a position both within the enemy's small arms threat ring and be close enough for accurate reporting, as well as having a guaranteed first-round engagement on targets. The commander can then maintain the remaining combat power to support other operations. RM snipers are at the forefront of any commander's plan, as they are the eyes and ears of the commander and provide the ability to neutralize threats to an operation. The RM commanders employ RM snipers as their main organic reconnaissance and surveillance asset with precision strike capability. Marine scout snipers operate in an all-weather environment, day and night, that cannot be matched by any existing intelligence, surveillance, and reconnaissance (ISR) asset. Additionally, the infiltration training that a scout sniper receives results in a relatively low risk of compromise whereas overhead ISR may be easily seen, heard, or detected on radar systems. U.S. ISR can provide ineffective surveillance because of clouds, wind, rain, or be delayed by logistical reasons. The MAGTF Secondary Imagery Dissemination System is widely used by scout sniper and reconnaissance teams to improve the information passed to higher command. Scout sniper platoons utilize high-frequency communication over voice, data, or tac chat as their primary means of communication. These familiarities and capabilities are incredibly important with the new electronic warfare and signals threat. Mike Petersen, a professor at the U.S. Naval War College, shares his insight on Russian equipment vulnerabilities.¹¹ One of Russia's most powerful electronic warfare threats is its integrated air defense system. These systems consist of long-range early warning radars, target tracking radars, and target engagement radars, combined with long-, medium-, and short-range surface-to-air missiles. The most wellknown, and currently longest-range Russian surface-to-air missiles system, is the S-400—also known as the SA-21. One of the scout sniper missions in the area of operation could be to locate this equipment. The target engagement radar associated with the SA-21 is called the GRAVESTONE radar. Russia has the capability to intercept, pinpoint, and exploit other means of communication such as very high frequency and satellite phones. It is also important to note that battalion commanders will lose their

... to kill an enemy sniper, it takes a Marine Corps scout sniper.

precision fire asset for the unit. Even though every Marine is a rifleman, scout snipers are the only infantry unit to gain further marksmanship training beyond the known distance rifle range; they are trained specifically for precision.

In conclusion, the scout sniper platoon consists of the battalion's highest caliber Marines. These Marines volunteer for the platoon and are held to high fitness and academic standards. The scout sniper platoon is the most diverse resource that a commander has ranging from MOS backgrounds—and snipers are recruited from within the battalion. There is a close connection and cross-training between the U.S. Marines and British Royal Marines no other MOS trains as closely as these groups of professionals—and the Marine Corps would benefit from expanding the munitions, training, and career length opportunities for scout snipers, like the Royal Marines have done. In the words of RM CSgt Carl McMullen, "The Marine Corps is failing to look after and develop its best U.S. Marines."13 As the saying goes, it takes a thief to catch a thief; in order to kill an enemy sniper, it takes a Marine Corps scout sniper.

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Principles of War: Objective

by Mr. Joseph Miranda & Dr. Christopher R. Cummins

or the next nine issues, we will be examining the principles of war as they are reflected in board wargaming. To review, the nine principles (US Army *FM 3-0*) are:

- Objective
- Offensive
- Simplicity
- Unity of Command
- Mass
- Economy of Force
- Maneuver
- Surprise
- Security

The principles are useful for the general analysis of military operations and consideration of the strategy and tactics employed. They are not proscribed in a particular hierarchy nor are they comprehensive in evaluating how or why victory or defeat occurred. They are an excellent place to start any discussion of a battle or campaign and examine how each principle was applied by the opposing forces. In board wargaming, it follows that consideration of these principles as they apply to the strategy and tactics to be employed in a game will improve the outcome for the player.

The first principle we will examine is objective. Objective is defined as directing every military operation toward a clearly defined, decisive, and attainable objective. The ultimate military purpose of war is the destruction of the enemy's ability and will to fight.

In board wargaming, the first place to look for the objective is the victory conditions. The victory conditions in many games often indicate certain locations as the key to victory. However, the path to those locations is blocked by the enemy forces, so they first must be defeated to capture those locations. On the other hand, capturing a key location (e.g. a supply head or political capital) may lead to the destruction of the enemy's forces by cutting their supply line or damaging their morale.

Some wargames have victory conditions in which the objective is the defeat of the enemy forces. Let us examine the 30 Years War Battles game system as a wargame where the

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victory conditions are essentially to inflict sufficient casualties on the enemy force such that the enemy force becomes demoralized and quits the battle.

The 30 Years War Battles is a system for modeling battles from the first half of the 17th century. This was the great era of musket and pike warfare, in which gunpowder weapons were becoming dominant on the battlefield but there was still plenty of room for cold steel. The 30 Years War was the great war of its time, involving as it did most of the major powers of Europe.

Battles in the series have included White Mountain (1620), Breitenfeld (1631), Luetzen (1632), Rocroi (1643), and several more major actions of the era. The system is an exercise in combined arms warfare. You have three basic types of combat units: infantry (mixed musket and pike formations), cavalry (some which can charge and others which use pistol tactics), and artillery (which can bombard from a distance). There are also leaders which provide combat bonuses and assist in the rally of disrupted units.

The question becomes, how do you win a battle on these fields? Concentrate on your objectives. These are sometimes geographical in terms of taking critical terrain, and sometimes these are in the non-material echelon, dealing with morale.

Start with maneuver and attrition. You get your units into position to attack then close in. Concentrate on a weak spot on the enemy line and overwhelm it. But you must set up your

They are an excellent place to start any discussion of a battle or campaign and examine how each principle was applied by the opposing forces.

IDEAS & ISSUES (WARGAMING/ADVERTISER CONTENT)

attacks. This is where artillery comes in. Artillery can fire at range, leading to the targeted units becoming disrupted.

Disrupted units lose combat effectiveness and, if disrupted again, are eliminated. There is a reason to create situations of local superiority. Also, by concentrating on a few points on the enemy line, artillery can set up a situation where cavalry can charge in and take a position.



But there is that higher echelon at work. There is a point at which the army loses cohesion, effectively a breakpoint. This was a common enough phenomenon in battles of the 17th century (and many other eras). Often, a hard-fighting force would fall apart under the pressure of combat or an unexpected enemy maneuver, and not infrequently, a small but well-disciplined army would be able to defeat a larger but poorly led foe.

In the 30 Years War Battles system, each army is assigned a demoralization level (DL), a quantification of its overall cohesion. Various game events—usually the destruction of units in combat—will generate demoralization points, which move an army towards that DL. When an army becomes demoralized, its disrupted units will be unable to rally. Obviously, this makes it difficult for its commander to continue the fighting and converts the immediate objective from defeating the foe to conducting rearguard-type actions. The demoralization index is a means to record the shifts to army morale. As the marker recording the DL shifts, players can see how close they are to their objective of forcing the foe over the edge.

Player A Demoralization Level					
	0	00			
	1	10			
	2	20			
	3	30			
	4	40			

What this does is bring in a non-quantifiable factor to the model and player strategy. This gets back to where you maneuver your forces. You have your geographical factors, such as hilltops or artillery positions which you can try to take. But there is also pushing the enemy army over its DL. You must think in terms of what goes on in the bigger picture.

As for the DL itself, this is a common wargame function, seen usually in tactical level games. The idea is that you figure out the overall value of an army in terms of some numerical basis, such as the total unit combat factors. A unit with a combat value of ten counts as ten demoralization points, and so forth.

This way, you can easily total up the morale value of an army. Then you figure the point at which its morale would break. This can be done in a couple of ways. One is to look at the point where historically it became demoralized in a particular battle. Then figure its losses at this point. Another is to look at the overall cohesiveness of the force and assign a percentile value to it. For example, an army with high morale might have a breakpoint of 50 percent, while a low morale force would be 25 percent. Further modifications can be made by playtesting the battle to see if it all works out. The objective is not to just attrition the enemy but to break their morale. Of course, the enemy will be trying to do the same to your army, and therein is the game.

VICTORY POINTS	
Enemy Leaders Eliminated	VP
Baner	25
Torstensson, Hatzfeld, and John Georg	10
Other Leaders	3
Other Enemies Eliminated	VP
Each infantry or cavalry combat strength point	1
Each artillery unit captured and held at end of game	
Each supply train	25
Enemy army reaches demoralization level	25
(Imperial only): At least one Imperial cavalry or infantry unit occupies any entrenchment hex at the end of the scenario.	10

You win a battle in this series by accumulating victory points (VP). These are a function of the relative end-state DLs of each side, and sometimes attaining geographical objectives. Whichever side attains more VP wins. The victory system provides the strategic objectives toward which the players focus.

Two of the recent games in the series include the battles of Luther (1626) and Wittstock (1636). Lutter saw an Imperial Austrian army defeat an opposing Danish force in a back-and-forth battle. At Wittstock, a Swedish army attacked in several columns, outmaneuvering their Imperial foe. Both battles were major turning points, the first pretty much knocking Denmark out of the war and the latter reestablishing Swedish military ascendancy.

In both games, the path to victory is in destroying enemy units. This means integrating your different arms. Each side has several counters representing their big gun batteries, capable of ranged fire. They are useful in disrupting an enemy line, setting up the conditions for closing in with infantry and cavalry attacks to finish them off.

The objective is not to just attrition the enemy but to break their morale. Of course, the enemy will be trying to do the same to your army ...

DEMORALIZATION LEVELS					
Imperial: 63 (of 165 total)					
Eliminated Unit	Demoralization Points				
Each infantry / cavalry combat strength point	1				
Leader Hatzfeld	10				
Detached musketeers	0				
Swedish: 104 (of 209 total)					
Eliminated Unit	Demoralization Points				
Each infantry / cavalry combat strength point	1				
Leader Baner	10				
Detached musketeers	0				

Therefore, these batteries are both strategic and tactical objectives. By capturing the enemy's artillery, you undermine their combat power. This is a two-edged sword since you have to defend your own gun line!

Artillery units are in the main static, being incapable of moving once emplaced. This reflects a range of doctrinal and logistical factors of this era. (Smaller "leather guns" which were used for direct support of infantry are factored into the combat values of the various infantry units.) However, in *Lutter*, the Swedish batteries are mobile because of that army's superior doctrine and the leadership of Lennart Torstenson,

their innovative chief of artillery. Artillery mobility allows for the Swedes to change their focus of operations.

Another system involved here is with leaders. Each army has several leaders who have two general effects. The first is to add extra combat power to friendly units when participating in combat. The





second is to enhance the ability of disrupted units to rally (recover) combat effectiveness. Leaders are quite mobile and getting them to critical points on the battlefield means that you are increasing your overall tactical effectiveness. There's also the bigger element since by enhancing rally you reduce your own army's chances of going over its DL.

The dilemma is as always that there are never enough leaders, but they do give you the opportunity to concentrate against critical objectives as well as stymie the other side's game strategy. Leaders are the human dimension for the big battles of the 17th century. You can see where an army's main focus is on the map by the location of its leaders.

A future battle in the series will be *Vienna in 1683*, where a coalition of European powers defeated a powerful Ottoman Turk army in front of the Austrian Habsburg capital. This game will model tactical developments following the 30 Years War, but the objective is the same: to gain the edge in morale and then exploit it to gain victory.





Maneuverist Paper No. 20

by Marinus

Inmanned aerial vehicles have been around for a long time. Indeed, having first flown in 1915, they are nearly as old as heavier-than-air aircraft of the piloted persuasion. It is only recently, however, that Marines have had to think about the possibility of engaging enemies well supplied with such drones. In particular, the use of large numbers of remotely controlled aircraft in the recent (27 September through 9 November 2020) war between Armenia and Azerbaijan suggests that the employment of large numbers of unmanned aerial vehicles will change the ways in which Marines fight. It also raises the question of the relevance of maneuver warfare philosophy in wars in which flying robots abound.

The first drones to see combat in the conflict in the South Caucasus, propeller-driven biplanes that had been retrofitted with simple guidance systems, bore a remarkable resemblance to the experimental unmanned aircraft of the First World War.¹ Flown over Armenian positions at the start of an operation, these repurposed crop dusters served the singular purpose of convincing Armenian air defenders to turn on their radars and fire their missiles, thereby betraying the locations of both radar stations and missile launchers to purpose-built drones of other types. Some of the latter unmanned aircraft carried guided munitions of various kinds and, unless shot down, returned to base upon completion of each mission. Others

were "loitering munitions," suicide planes that dove into their targets in the manner of the *kamikaze* of the Second World War.

The standard reusable drone of the Azerbaijani arsenal, the Turkish-made TB-2 Bayraktar, carried a much larger payload than the loitering munitions employed by Azerbaijani forces. (The latter include the Israeli-made Harop and the locally manufactured Orbiter 3. While the former had been designed, from the ground up, as a loitering munition, the latter was a repurposed reconnaissance robot.) When combined with its ability to be used many times, the carrying capacity of the Bayraktar made it a much more efficient means of delivering ordnance than a loitering munition. At the same time, the small size of loitering munitions reduced their radar cross-section, thereby complicating attempts by Armenian air defenders to detect, track, and intercept them.

The first wave of purpose-built drones, which followed hard on the heels of the pilotless biplanes, consisted of both loitering munitions and reusable robots. The former, which dove into air defense radars and anti-aircraft missile launchers, formed the main effort of the attack. The latter, which launched missiles against both air defense assets and field artillery emplacements, supported this *Schwerpunkt* in three important ways.² First, they diluted the attention of the Armenian air defenders, who would otherwise have been able

The Turkish-made Bayraktar TB-2 drone was employed by Azerbaijan in Nagorno-Karabakh and is in use by Ukraine in the current war against Russian invasion. (Photo: Wikimedia Commons.)

to focus on the drones most dangerous to them. Second, they allowed the Azerbaijani forces to economize on loitering munitions. Third, they reduced the desire to fire from the Armenian gunners, whether armed with cannon or multiple rocket launchers, who posed the greatest immediate danger to the soft-skinned vehicles that controlled the *kamikaze* drones.

Characteristics of Azerbaijani Drones³

Type of Equipment	Orbiter Loitering Munition	Harop Loitering Munition	Bayraktar Reusable Drone
Wingspan	4.4 meters	3 meters	12 meters
Payload	3 kilograms	16 kilograms	150 kilograms
Communica- tions Range	100 kilometers	200 kilometers	300 kilometers
Ceiling	8,000 feet	15,000 feet	25,000 feet
Endurance	2.5 hours	9 hours	27 hours

Once the Armenian air defense system had been crippled, Azerbaijani drones were free to seek other targets. Some of these were vehicles of various sorts that were engaged as targets of opportunity. Others, such as ammunition depots and the fortified command posts that the Armenians had built over the course of the past three decades, seem to have been identified well before the start of the war. (The Azerbaijani drones sent out in search of vehicles to attack were usually equipped with antitank guided missiles. Those sent against fixed features were often provided with guided missiles fitted with thermobaric warheads.)⁴

The cameras carried by Azerbaijani drones documented much of the damage done to Armenian equipment. On the battlefield, the resulting video feeds facilitated the employment of drones, the assessment of battle damage, and the employment of other weapons. (These included artillery pieces, multiple rocket launchers, and fiber-optic guided missiles.) Off the battlefield, top-down footage depicting the destruction of Armenian vehicles played a central role in Azerbaijani information operations.⁵

On the second day of the war (28 September 2020), Azerbaijani drones continued their attacks upon Armenian air defense units, field artillery batteries, and multiple rocket launchers. At the same time, they began to target Armenian vehicles, whether tanks, infantry fighting vehicles, or trucks that were moving to reinforce the direct-fire fight.

The use of drones in "armed reconnaissance" mode greatly reduced the ability of the Armenian leadership to reinforce, redeploy, and resupply mechanized forces engaged in combat. Thus, while the Armenian tanks and antitank guided missiles inflicted considerable losses on Azerbaijani tanks and infantry fighting vehicles, the commanders of Azerbaijani mechanized units rarely, if ever, had to deal with the sort of surprises that, for more than a hundred years, have characterized engagements involving armored fighting vehicles.

In particular, the leaders of Azerbaijani mechanized units rarely, if ever, had to deal with the possibility that one of their Armenian counterparts might suddenly appear behind them or on a flank.

The tanks and infantry fighting vehicles fielded by both sides in the South Caucasus War were of the same basic types. In order to reduce the chances of friendly fire incidents, Azerbaijani drone operators usually refrained from attacks on Armenian mechanized forces in close contact with their Azerbaijani counterparts. The exceptions that prove this rule took the form of drone attacks against Armenian tanks that had taken up positions in revetments. While those field fortifications provided some protection against the direct fire weapons of the attacking Azerbaijanis, they also allowed Azerbaijani drone operators to identify the tanks in question as Armenian.

The Azerbaijani armed reconnaissance accounts for the large number of undamaged tanks, trucks, and infantry fighting vehicles captured by Azerbaijani forces. It also accounts for the relatively low number of casualties suffered by Armenian military personnel. To put things more bluntly, there seem to have been many instances in the war when the likelihood of destruction at the hands of Azerbaijani drones was so great that Armenian soldiers abandoned their vehicles well before they were struck by drone-fired missiles or loitering munitions. Once on the ground, moreover, many of the recently dismounted Armenian soldiers seem to have managed to reach places of comparative safety well before the arrival of Azerbaijani ground troops.

Notwithstanding the advantages provided by air superiority, the Azerbaijani forces needed a week to break through the Armenian defenses in the main theater of the war. One reason for this was the character of the terrain in question, which allowed the Armenian defenders to occupy positions similar to those enjoyed by the Israeli tank units defending the Golan Heights in 1973. That is, the Armenian tanks and antitank guided missile teams occupied pieces of high ground that overlooked long, gentle slopes that were poorly supplied with features, such as woods and villages, that might have provided an attacker with cover and concealment.

Another reason for the "slow and steady wins the race" approach adopted by the Azerbaijani mechanized forces lay in the realm of strategic purpose. The chief aim of the Azerbaijani offensive was the ethnic cleansing of territory that had been under Armenian control since the early 1990s. To this end, the Azerbaijani leadership wished to convince Armenian civilians to flee from their homes well before the arrival of Azerbaijani ground forces. This effect, in turn, required that Armenian civilians living in the contested territory believe that the Azerbaijanis possessed an unprecedented ability to conduct precision strikes both wherever and whenever they wanted. In short, the documented destruction of a tank by a camera-carrying drone did more for the Azerbaijani war effort than the traditional destruction of the same armored vehicle by old-fashioned direct-fire weapons.

The synchronization of the actions of Azerbaijani ground forces with information operations fit well with both the

political culture of Azerbaijan and the operational culture of the Azerbaijani armed forces. The Azerbaijani state, in which the president reserved all important decisions for himself, might well be described as the present-day equivalent of an absolute monarchy. In keeping with this centralized political system, the Azerbaijani armed forces adopted a top-down approach to command and control (C2), one better suited to the execution of script-like plans than the exploitation of fleeting opportunities.

While the Azerbaijani forces were fighting the "thin red line" of Armenian tank and mechanized infantry units, their approach to C2 worked well enough. Indeed, given the need to let their propaganda work its way into the minds of the Armenian civilians living in Nagorno-Karabakh, the failure to make the most of battlefield success may well be counted as a virtue. However, once the fight moved into the heavily wooded mountains that covered much of Nagorno-Karabakh, the preferred command style of the Azerbaijani forces proved to be a liability.

The failure of Azerbaijani mechanized forces to crown their battlefield success with a vigorous program of pursuit allowed many Armenian soldiers to escape into heavily wooded areas. There, the vehicle crewmen, field artillerymen, truck drivers, and air defenders reverted to the same self-directed manner of fighting that had enabled their fathers to take control of Nagorno-Karabakh in the 1990s.⁷ That is, sheltered by trees from the hostile gaze of Azerbaijani drones, they turned guerrilla.

The Azerbaijani forces reacted to the challenge of fighting Armenian guerrillas in the heavily forested highlands in three different ways. First, they conducted a long series of limited-objective attacks, each of which aimed at the capture of a well-defined piece of ground. Second, they used white phosphorus shells to start forest fires. Third, they sent special forces teams into, and through, the wooded areas occupied by Armenian guerrillas.

As a rule, the deliberate attacks succeeded in bringing particular terrain features, whether pieces of high ground or villages, under Azerbaijani control. In doing so, they fulfilled the direct strategic purpose of seizing places lost to the Armenians in the early 1990s. At the same time, each successful attack brought Azerbaijani forces closer to the capital of Nagorno-Karabakh. (Azerbaijanis refer to this town of some 50,000 people as Khankendi. Armenians call it Stepanakert.)

The methodical manner in which the Azerbaijani leadership conducted deliberate attacks gave the Armenian guerrillas plenty of opportunities to escape decisive engagement. Indeed, even when Azerbaijani special forces blocked roads prior to the start of an attack, the Armenians were usually able to escape into a different part of the forest. In other words, the Azerbaijani seizure of ground rarely resulted in heavy Armenian casualties, let alone the annihilation of complete Armenian units.

In sharp contrast to the campaign of methodical attacks, the setting of forest fires did little, if anything, for the Azerbaijani war effort. One reason for this was the Azerbaijani policy of limiting such fires to wilderness areas. (The Azerbaijani political leadership seems to have feared that the widespread destruction of forests near inhabited areas would reduce the willingness of Azerbaijani refugees to return to their homes.) Another cost of the use of forest fires as a weapon was the spectacular sights that resulted from the explosion of white phosphorus munitions on heavily forested mountain slopes. Images of these explosions made it easy for Armenian propagandists to paint Azerbaijani leaders as war criminals willing to inflict a great deal of damage upon the environment for the sake of minor tactical advantage.

The Azerbaijani special forces that infiltrated through the forests of Nagorno-Karabakh fulfilled two tasks. The first of these was to film the raising of the Azerbaijani flag in places behind the areas where Armenian guerrillas were operating. (Such places were often the tops of mountains, which allowed the flag-raising ceremonies to take place against spectacular backdrops.) The second duty of the special forces teams was

... Azerbaijani armed forces adopted a top-down approach to command and control (C2), one better suited to the execution of script-like plans than the exploitation of fleeting opportunities.

the pinpointing of targets for long-range weapons of various sorts, whether artillery pieces, multiple rocket launchers, or drones. (During the last two or three weeks of the war, such teams operated in places overlooking the main Armenian supply route into Nagorno-Karabakh, thereby preventing both Armenian military convoys and civilian traffic from moving freely on that highway.)

Both the raising of flags and the attacks upon traffic served to convince both Armenian guerrillas and Armenian civilians to evacuate particular pieces of ground. In other words, they served both the operational purpose of bringing Azerbaijani forces closer to the capital of Nagorno-Karabakh and the strategic purpose of driving Armenian inhabitants out of the contested territory. There were, nonetheless, occasions when Azerbaijani special forces teams fought against Armenian guerillas. (These firefights often occurred in places where Armenian guerrillas controlled ravines and other choke points along the routes that the Azerbaijani forces wished to use.)⁸

The last great event of the war, the capture of the town on top of the hill that dominates the capital of Nagorno-Karabakh, took place on 7 November 2020. (This town is called Shushi by Armenians and Shusha by Azerbaijanis.) As had been the case with the capture of so many towns in the course of this war, this operation began with actions designed to both induce Armenian civilians to leave their homes and convince Armenian soldiers that they would soon be surrounded. To this end, the Azerbaijani forces combined

precision strikes against a small number of high-profile targets with the actions of special forces teams.

The South Caucasus War ended on 10 November 2020 with a ceasefire brokered by Russia. The Armenian motivation for the end of hostilities was clear. Had the war continued, they risked losing that part of Nagorno-Karabakh that remained in their hands, and, in particular, the city at the center of the contested territory. The willingness of Azerbaijan to make peace, however, is harder to explain. After all, the war ended while Azerbaijani forces were making significant advances every day.

One explanation for the Azerbaijani willingness to make peace was the prospect of fighting in the heavily forested mountains of northern Nagorno-Karabakh. In such a struggle, the Azerbaijani advantage in drones and long-range weapons of other types would not be able to compensate for the absence of the one indispensable arm in that sort of terrain—light infantry of the classic European type. 9 Another possible reason for the Azerbaijani decision to quit while they were ahead was the role played by Russian diplomacy. While oilrich Azerbaijan was not nearly as dependent upon Russian weapons as Armenia, the Azerbaijani leadership could not easily ignore Russian calls to put an end to the fighting.

The most obvious lesson for Marines to draw from the 44-day war for Nagorno-Karabakh is the importance of being able to thrive in situations where we no longer enjoy control

of the air. That is, in order to defeat an opponent who is well supplied with flying robots, we will have to master the arts of fighting at night, exploiting heavy cloud cover, and operating in places that are well supplied with trees. We will also have to develop methods for combatting unmanned aerial vehicles, confusing the people who control them, and confounding the data links they depend upon.

A more subtle lesson concerns warfighting philosophy. The Azerbaijani drones were employed in accordance with one of the chief competitors to maneuver warfare, an approach to military operations that students of the art of war have come to call methodical battle. 10 Characterized by centralized decision making, the extensive use of scripted battle plans, and strict limits on the freedom of action permitted to junior leaders, methodical battle sacrifices the ability to exploit fleeting opportunities on the altar of efficiency, predictability, and synchronization. 11 In keeping with this creed, Azerbaijani planners preferred the drawing of rigid battlefield control measures to trust in the tactical judgment of drone operators. Similarly, the commanders of Azerbaijani ground units oriented their actions to the capture of specific terrain objectives, even when doing so allowed local Armenian forces to escape destruction.

On the Armenian side, the prospect of "shooting galleries" comparable to the one enjoyed by the Israeli tanks of the Golan Heights in 1973 led to the disastrous policy, laid down



many years before the outbreak of war in 2020, of attempting to defend the contested territories with mechanized forces deployed in open terrain. The Armenians would have been far better off defending the extensive forests of the contested areas with classic light infantry. Likewise, rather than acquiring a small number of expensive vehicle-mounted anti-aircraft missile launchers, the Armenian Army should have invested in large numbers of man-portable air defense systems, small caliber anti-aircraft guns, and devices capable of confounding the radio signals that connect drones to their operators.

The effectiveness of our response to the challenge posed by ... unmanned aircraft will rely on the virtues, skills, and attitudes ... associated with the practice of maneuver warfare.

Marines of the near future will have to adopt comparable measures. That is, we should bolster our ability to fight in heavily wooded areas, move at night, exploit poor flying weather, set traps for pilotless aircraft, and meddle with electronic links. In addition to this, we will have to develop the combinations of technology, technique, and tactics that will allow us to conduct landing operations in situations where the sky is thick with hostile drones. This will involve the fitting of large numbers of relatively light anti-aircraft weapons to amphibious ships and landing craft, an increase in the number of armed escorts for our transport aircraft, and, perhaps, the fielding of "anti-drone drones." It will also require that we make use of alternate means of putting Marines and their gear ashore, whether submarines, civilian vessels, or new forms of air delivery.

The success of most of these measures will require much in the way of creativity on the part of commanders, as well as a good deal of initiative, adaptability, and problem solving on the part of small unit leaders and individual Marines. The effectiveness of our response to the challenge posed by the proliferation of unmanned aircraft will rely on the virtues, skills, and attitudes that have long been associated with the practice of maneuver warfare.

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- 3. The figures in this chart are taken from promotional materials published by the makers of the drones in question and consulted on 25 January 2022; and Staff, "Orbiter 1K Loitering Munition UAS," *Aeronautics*, (n.d.), available at https://aeronautics-sys.com; Staff, "Harop Loitering Munition System," Israeli Aircraft Industries, (n.d.), available at www.iai.co.il/p/harop; Staff, "Bayraktar TB2," *Baykar*, (n.d.), available at www.baykartech.com.
- 4. For one of the few accounts of the 2020 war in the South Caucasus that pays substantial attention to Armenian field fortifications, see Can Kasapoglu, *Hard Fighting In The Caucasus: The Azerbaijani Armed Forces Combat Performance and Military Strategy in the 2020 Nagorno-Karabakh War,* (Ankara: Ministry of Foreign Affairs, 2021).
- 5. For an account of information operations in the 2020 war in the South Caucasus, see Marinus, "Information Operations and Maneuver Warfare," *Marine Corps Gazette*, (Quantico, VA: October 2021).
- 6. For an impartial attempt to catalog the Armenian vehicles captured by Azerbaijani forces, see Stijn Mitzer et al., "The Fight for Nagorno-Karabakh: Documenting Losses on the Sides Of Armenia And Azerbaijan," *Oryx*, (September 2020), available at https://www.oryxspioenkop.com. (The publication date of this blog post is misleading. While the first iteration of the piece appeared on the first day of the war, the authors subsequently added a great deal of information about equipment destroyed between 27 September and 10 November 2020.)
- 7. For the way in which Armenian volunteer units formed and fought in the early 1990s, see Thomas De Waal, *The Black Garden: Armenia and Azerbaijan Through Peace and War*, (New York, NY: New York University Press, 2013).
- 8. For an account, written soon after the end of the war, of the techniques used by Azerbaijani special forces teams, see Ron Synovitz, "Technology, Tactics, and Turkish Advice Lead Azerbaijan to Victory in Nagorno-Karabakh," *Radio Free Europe/Radio Liberty*, (November 2020), available at https://www.rferl.org.
- 9. For more about classic European light infantry, see Franz Uhle-Wettler, Battlefield Central Europe: Danger of Overreliance on Technology in the Armed Forces. The typescript of this anonymous translation of Gefechtsfeld Mitteleuropa: Gefahr der Übertechnisierung von Streitkräften, (Munich: Bernard und Graefe Verlag, 1980) can be found online at the Military Learning Library, available at teachusmc.blogspot.com.
- 10. Robert A. Doughty coined the term "methodical battle" in the course of writing his definitive study of the development of military methods in the French Army in the period between the two world wars. Robert Doughty, *The Seeds of Disaster: French Military Doctrine 1919–1939*, (Hamden, CT: Archon Books, 1985).
- 11. For a concise introduction to the concept of methodical battle, see Gerard Roncolato, "Methodical Battle: Didn't Work Then ... Won't Work Now," *Naval Institute Proceedings*, (Annapolis, MD: U.S. Naval Institute Press, February 1996).

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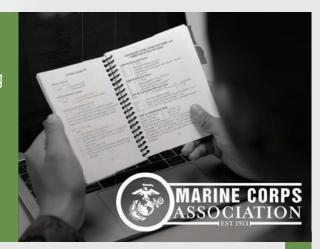
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"Butt-Fans"

by Maj Corydon Cusack

er the 38th Commandant's Planning Guidance, reconnaissance teams are at the forward tactical edge of the FMF. They must be enabled by combat service support functions, ultimately to support expeditionary advanced base operations (EABO) in exploiting positional advantage, application of hydrographic surveys, and defending key maritime terrain that enables persistent sea control and denial operations forward. The Commandant notes that innovation will be critical, but it is the actual implementation of our innovative concepts that translate great thoughts and concepts into action.

Currently, reconnaissance teams employ high altitude free fall parachute systems, specifically the Parachute System-2, for insertion of personnel from offsets up to 56 kilometers and altitudes up to 35,000 feet to conduct battlespace awareness and shaping operations. High-altitude inserts with high offsets offer commanders a reduced risk to insert platforms and personnel and thus increase mission effectiveness.

Innovative concepts, such as the Military Augmented Parachute System (MAPS) or non-standard power glider butt-fan, translate an already in-use civilian concept into an actionable military application. The MAPS would complement and not replace the Parachute System-2—providing an alternate method of specialized insertion for reconnaissance teams by Fiscal Year 2024–28.

MAPS power glider is a single-manned parachute system with a powered fan attached to the back of each operator. This system is capable of transiting a 220-mile distance, with a 90-pound load, at a speed of 15–50mph, between 300–18,000 feet above ground level, and on a 4-gallon tank of gas. The MAPS is not yet a program of record and can be procured, via open purchase, at a cost of \$8,000–15,000.

Increases in adversary anti-access/area denial capabilities degrade friendly forces' ability to influence the battlespace. Aircraft are an already limited high-value commodity, and without presumed air superiority in modern warfare against a peer or near-peer adversary in an EABO environment, air assets will not be able to persist inside the weapons engagement zone for a sustained period of time. The MAPS eliminates the need to send Marines airborne from an air asset platform—allowing them to take off from the ground, with additional potential to takeoff from a moving platform such as a ship, all with a lower emissions signature.

EABO operations will be focused in the Indo-Pacific Theater; thus, likely areas of operation will be the Philippines or Taiwan. The MAPS will increase the ability of friendly forces

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to positively impact and shape the EABO battlespace. The MAPS maximum reach of 220 miles allows transit to key locations in the Pacific to include travel around Taiwan and throughout the Philippines. Specifically, the distance between Mindoro and Palawan is 160 miles, Palawan to the Spratly Islands is 176 miles, and Taiwan to China is 124 miles makes the MAPS an ideal candidate to facilitate reconnaissance battlespace shaping to reduce the adversary anti-access/area denial capability, thus setting conditions for the follow-on force flow.

Other items to consider are first, what military occupational specialty conducts maintenance and maintains the MAPS: 0451 rigger, 1342 small craft mechanic, or 3521 motor transport mechanic? What are the safety-related concerns, such as risk associated with system failure between littorals, forcing a water landing, and subsequent rescue extract? What are the licensing/training frequencies and requirements? Further, who will utilize MAPS, reconnaissance teams for specialized insertion and battlespace shaping, or riggers for resupply to advanced bases? Immediately noting both reconnaissance and logistical applications will undoubtedly open up a wide array of employability for the MAPS capability in the near future.

The MAPS is a power glider already used in the civilian sector that may prove to be a valuable concept to translate into a military application. Deployable from the ground or a ship with low signature and with extended reach up to 220 miles, MAPS provides commanders an alternate method of specialized insertion for reconnaissance teams for battlespace shaping during EABO. Further, the system has potential for employment by parachute riggers to enable fleet sustainment through the conduct of limited resupplies across island chains in a modern operating environment.



Commanding the Pacific

reviewed by Maj Skip Crawley USMCR (Ret)

s Stephen R. Taaffe points out in Commanding the Pacific: Marine Corps Generals in World War II, Marine Corps battles in the Pacific in World War II are well known, but the generals who fought them are not:

Although such Marine battles as Guadalcanal, Tarawa, and Iwo Jima are well known, most military enthusiasts are unaware of the generals who led the leathernecks through these horrific engagements. This contrasts sharply with the experience of the Army and the Navy. Army generals such as George Marshall, Dwight Eisenhower, Douglas MacArthur, and George Patton are readily recognized among people with even a passing familiarity with World War II. Even the naval commanders Ernest King, Chester Nimitz, and William Halsey ring a bell with the historically literate. The names of Marine Corps generals ... have been all but forgotten.

What accounts for this?

First, Germany presented an existential threat, and it was "primarily the Army that waged and won the war against Germany and Italy." Also, Americans were very familiar with European geography and knew where London, Paris, and Rome were located. Prior to World War II, most Americans were not familiar with Guam, an American Territory, let alone aware that places such as Guadalcanal, Tarawa, and Iwo Jima even existed.

Second, amphibious assaults, while "extraordinarily difficult to organize" and execute, "were relatively simple in conception and required little tactical finesse to conduct." To put it another way: "the logistical, training, and planning skills that Marine officers >Maj Crawley is a former Infantry Officer who served during Operation Desert Shield/Desert Storm. He is currently the Central Regional Network Coordinator for the Marine for Life Network.

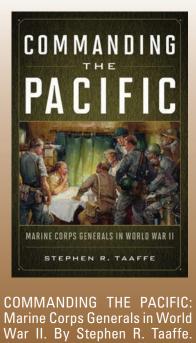
needed to make them successful were not sufficiently glamorous to attract kudos from those interested in tactics and strategy."

In Commanding the Pacific, Taaffe not only goes a long way toward rectifying this oversight but also provides an excellent overview of the Marine Corp's major battles in the Pacific and touches on institutional problems the Marine Corps faced as it fought the Japanese.

Marine Corps Generals¹

Gen Alexander A. Vandegrift. Gen Vandergrift is the most well-known Marine general of World War II as commander of the 1st MarDiv on Guadalcanal, the first American offensive and amphibious operation of World War II: "a campaign much different from the eleven other major Marine Corps operations in the Pacific War." Unlike other operations, there was "nothing certain or inevitable about the [successful] outcome." "Vandergrift's serenity and quiet competence under the desperate circumstances," and his key role in the ultimate victory propelled Vandergrift to the commandancy.

Vandergrift's record as Commandant was generally positive. He successfully worked with the mercurial and "irascible" Ernest King, Commander-in-Chief of the U.S. Fleet/



War II. By Stephen R. Taaffe. Annapolis, Maryland: Naval Institute Press, 2021. ISBN: 978-1682477083, 248 pp.

Chief of Naval Operations, convincing him to approve two additional Marine Corps divisions; additionally, he maintained excellent relations with Congress. When there was a public outcry concerning the heavy losses incurred taking Tarawa, Vandergrift, to his credit, did not

> try to downplay Marine losses or reassure concerned citizens that Tarawa was an anomaly unlikely to reoccur. As Vandergrift saw things, war required such sacrifices, and the public had to accept this harsh reality if it wanted to defeat Japan.

LtGen Holland M. "Howlin' Mad" Smith. LtGen Smith was "[T]he most prominent and divisive high-ranking Marine Corps combat general in World War II." He was in overall command of the landing forces for the first part of the Central Pacific Offensive, from the Gilbert Islands (Tarawa, Makin) to the Mariana Islands (Guam, Saipan, Tinian). Smith is best known for the infamous "Smith versus Smith" controversy, where he relieved MG Ralph C. Smith, Commanding

General of the Army's 27th Infantry Division during the Saipan campaign. Taaffe has an interesting take on

"Smith versus Smith":

Smith *liked* the division's commander, Ralph Smith, personally and respected his professionalism, but he had also concluded that Ralph Smith was not pushing his men hard enough. Smith felt that Ralph Smith's lethargy was jeopardizing the operation and costing Marine lives. On the afternoon of 23 June, Smith consulted Gen. Sanderford Jarman, the Army officer slated to run Saipan once it was secured. After hearing Smith's concerns, Jarman volunteered to talk to Ralph Smith and light a fire under him. Ralph Smith admitted to Jarman that he too was unsatisfied with his division's performance and promised it would do better the next day. In fact, Jarman later stated that Ralph Smith had said that he should be relieved if he failed to deliver on his *pledge*. [Italics added by the reviewer.]

And,

Holland Smith was correct in assessing the 27th Division as a problematic unit. It was one of only two National Guard divisions that the Army had failed to overhaul and purge of the cliques and favoritism that infested such outfits before the war.

However, LtGen Smith was not blameless:

He did not recognize that Army divisions were different from their Marine counterparts ... along with personnel from a larger and less select cross-section of American society ... [m] oreover, Smith was clearly biased against the 27th Division because of what he had seen as its substandard performance at Makin and Eniwetok, which inclined him to think the worst of it ... [and] his failure to sufficiently encourage and cultivate the outfit played no small role in the controversy ... A more considerate and appreciative attitude by Holland Smith would have yielded better results.²

Interestingly enough, Smith's actual Marine Corps nickname was "Hoke." Taaffe says "Howlin' Mad" was a media invention.

LtGen Roy S. Geiger. Because Geiger Hall is the home of the Expedi-

tionary Warfare School, Geiger's name is well-known if not the man himself. Commanding General of the 1st MAW when World War II started, he commanded the so-called "Cactus Air Force" at Guadalcanal. As many Marines know, Geiger was the first (and only) Marine Corps general to command a field army. What qualified Geiger, a Marine aviator, to do so? He attended "Command and General Staff College, the Army War College and the Naval War College, making him the only Marine World War II division or corps commander"4 to do so. Having attended Command and General Staff College with him in the 1920s, Geiger got along very well with LTG Simon Buckner, the Commanding General of 10th Army, tasked with capturing Okinawa. Geiger's III Amphibious Corps was one of two corps that made up the 10th Army, with the other being the Army's XXIV Corps. Buckner thought so much of Geiger that he chose him to be his successor if he was killed. While the Army squashed that idea, it came to be when Buckner was killed shortly before the Battle of Okinawa was finished. Geiger agreed with Buckner that an amphibious assault to turn the Japanese flank of the strong defenses in the southern portion of the island was a bad idea. I found this interesting because most of Geiger's fellow Marine Corps generals, then and post-war, criticized Buckner for rejecting the idea of an "amphibious assault behind Japanese lines," intimating that all Buckner could conceive of was to continue to "grind down Japanese resistance from the north through brutal attrition."

LtGen Thomas Holcomb. The Commandant between 1936–1943, he oversaw the initial expansion of the Marine Corps from a 19,000-man force to a 300,000+ man force by 1943 and made the initial assignments of division and corps commanders. Holcomb reached "the Marine Corps' mandatory retirement age of sixty-four" in August 1943. Although Holcomb "hoped Roosevelt would reappoint him as commandant" and wanted to "see the conflict through

to its victorious conclusion," he felt "he needed to step down, or at least offer to do so." Unfortunately for Holcomb, President Franklin Roosevelt acquiesced to "Holcomb's request to step down," and he turned the Marine Corps over to Vandergrift on 1 January 1944.5

Institutional Problems

One theme running throughout *Commanding the Pacific* was the "insular" nature of the Corps' senior command structure. "Everyone knew everyone else" and this often negatively affected the Marine Corps:

When officers failed in their duties on or off the battlefield, their commanders often wanted them transferred elsewhere without careers or feelings being hurt. To do so, they resorted to unofficial letters to HQMC and refrained from putting anything negative on the record. The problem was that this enabled men found wanting to continue to rise through the Corps' hierarchy to positions of increasing responsibility. Nimitz for one commented on the large number of underperforming Marine combat officers who filled important Pearl Harbor billets. He warned that this practice, if continued, would ultimately hurt the Corps.

Vandergrift lost confidence in Col LeRoy Hunt, Commanding Officer of 5th Mar on Guadalcanal. Instead of relieving him for cause, Vandergrift sent him home under the pretense to "train and organize new units." Yet, shortly before the war ended, Vandergrift made Hunt the Commanding General of the 2nd MarDiv. One wonders about Vandergrift's thought process. If Hunt failed at the regimental level, what made Vandergrift think he would succeed at the division level?

The other theme running throughout *Commanding the Pacific* is that the Marine Corps was always short of manpower. Despite peaking at "about 477,000," Taaffe theorizes that heavy losses might have forced the Marine Corps to "cannibalize one of the [six] divisions to bring the remainder up to snuff" for the invasion of Japan. I doubt Taaffe's assessment. Prior to *Commanding the Pacific*, I had never

read that the Marine Corps was contemplating such a step prior to the invasion of Japan. Every Operation OLYMPIC and Operation CORONET force-list I have ever seen has always included two full-up amphibious corps of three Marine divisions each.6 Heavy losses were not the only thing driving the manpower problem. According to Col Allan R. Millett, USMCR (Ret), author of *In Many a* Strife: General Gerald C. Thomas and the U.S. Marine Corps 1917-1956, the Marine Corps "training system, especially for technical specialists and aviation personnel, seemed bloated and designed for the convenience of base commanders, not the FMF." Furthermore, Thomas, Director, Division of Plans and Policies at HOMC under Vandergrift, "believed that the Marine Corps had too many men in specialist training (except communicators) and that some of these Marines would have to fill less exotic jobs (e.g., infantry) in the FMF." Based upon my reading of In Many a Strife a number of years ago, I sense that Vandergrift and Thomas would have found the manpower to continue to field six fullstrength Marine divisions.

Conclusion

I do have one problem with *Commanding the Pacific*. Inexplicably for someone who wrote an otherwise excellent book about the Marine Corps in the Pacific in World War II; Taaffe repeatedly states that the Marine Corps was "part of the Navy." Taaffe paints an accurate picture of how the Marine Corps was essentially the junior service vis-a-vis the Navy during World War II, both in the Pacific and back in the United States. However, neither then nor now has the Marine Corps been part of the Navy—as all Marines are quite aware of.

Despite the above, I enjoyed reading Commanding the Pacific. Taaffe does an excellent job of providing biographical summaries of the senior Marine generals in the Pacific War and insight into who was, and who was not, given greater responsibilities and why. Highly recommended for anyone interested in Marine Corps

generalship during World War II and an inside look at how high-level personnel decisions were made in that era.

Notes

- 1. In this review, I am only discussing four of the most well-known Marine Corps generals. But Taaffe discusses all of the division and corps commanders the Marine Corps had during World War II.
- 2. Marines blamed the Army's slow capture of Makin Island—four days to capture an island where they had a large superiority of forces visa-vis the Japanese—for the sinking of the USS Liscome Bay, an escort carrier that went down with approximately 650 hands after being torpedoed by a Japanese submarine. The issue: if the Army had captured Makin Island faster—which the Marines felt they should have done—the carrier could have moved out of the area, vice being "tied down" to the beachhead and, therefore, vulnerable to Japanese submarine attack.
- 3. For a total of five days. "[T]here was no chance ... Marshall would permit a Marine to run a field army composed mostly of soldiers. He quickly appointed Gen Joseph Stilwell to head the Tenth Army."
- 4. A primary focus of Command and General Staff College was to train Army officers to fulfill any staff billet—Chief of Staff, G-1, G-2, G-3, G-4—in an infantry division. The Army War College focused on the corps and field army level.
- 5. One wonders if Holcomb inadvertently talked himself out of a job of remaining Commandant for the entire war. Admiral King needed Presidential authorization to remain on active duty past the mandatory retirement age of 64. According to Thomas B. Buell in *Master of Sea Power: A Biography of Fleet Admiral Ernest J. King*, with King's mandatory retirement at 64 approaching in November 1942, King "forced the issue" sending a "short letter to Roosevelt" calling his attention to the issue. President Roosevelt's response: "E.J.K., So what, old top? I may send you a birthday present! FDR." Note that King was one year older than Holcomb.
- 6. Operations to invade Kyushu on 1 November 1945 and Honshu on 1 March 1946, respectively.

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Index to Advertisers

Astronics Test Systems41	
BAE Systems5	,
CDET15	,
Diane Siegel16-17	7
Elbit Systems37	7
EOS Defense Systems USA23	5
ESSEye Pro67	7
GDLS/General Dynamics Land Systems 32-33	5
General Atomics Aeronautical29)
Google45	,
Innovative Reasoning35	,
Kaman Aerospace19)
KPMG89)
MARSOCCII	I
MCA 103, 119, 120)
Modern Day Marine2	2
Navy Federal Credit Union81	
Northrop Grumman	7
John Poole25	,
Rheinmetall9	
SMARTBooks115	,
Strategy & Tactics Press107-109)
Systematic51	L
Teledyne Flir39)
The MARINE Shop113	5
Trainor Writing Award99)
USAACIII	I
VIASATCIV	7



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