



The Marines and the Future of Unmanned Systems

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THE UNITED STATES HAS TWO DECADES OF EXPERIENCE OPERATING UNMANNED SYSTEMS (UXS) IN post-Sept. 11, 2001, campaigns—but these deployments occurred in theaters where U.S. forces could rapidly establish uncontested air space and local maritime superiority. Current trends indicate that future conflicts will require U.S. forces to operate in contested or denied environments.

Iran's targeting of the U.S. high-altitude RQ-4A unmanned aerial system (UAS), *USS Boxer*, for destruction of an Iranian UAS within its Naval Exclusion Zone, and Houthi asymmetric UAS attacks across the Arabian Peninsula typify the range of UxS technologies in the field today. The threat of adversary UxS technology multiplies when assessing the capabilities of near-peer competitors like Russia and China.

As the nation's naval expeditionary force-in-readiness, the U.S. Marine Corps (USMC) must understand how UxS are changing the operational environment prior to entering the next engagement. Because the USMC will likely be first-to-fight, Marines must prepare for two major differences from today's environment: operating in contested domains and

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the large-scale presence of adversary UxS in all domains. Following the guidance of *Marine Corps Vision and Strategy 2025*, the USMC must align strategic imperatives with its ends, ways, and means to be prepared for conflict in the 2020s and beyond. Marines must be trained, equipped, and authorized to counter adversary UxS and employ their own integrated UxS in order to win our nation's wars.

Building on the NDS (Strategic Imperatives)

The 2018 National Defense Strategy (NDS) prioritized preparation for Great Power Competition (GPC) with near-peer competitors. As a second-tier priority, the NDS acknowledges that combating non-state actors and extremist groups will remain a constant challenge for the defense enterprise. The official *Marine Corps Vision and Strategy 2025*'s imperative of deterring major war nests perfectly within this framework. As former USMC Commandant and Director of Operations for the Joint Chiefs Gen. James T. Conway correctly stated, "We must be a two-fisted fighter—able to destroy enemy formations with our scalable air-ground-logistics teams in major contingencies, but equally able to employ our hard-earned irregular warfare skills honed over decades of conflict."

The selection of Gen. David H. Berger as the new USMC Commandant will accelerate the USMC's evolution to a 21st-century force. His experience as Deputy Commandant, Combat Development and Integration, and Commanding General of the Marine Corps Combat Development Command highlight the Pentagon's recognition that the USMC must aggressively pursue its modernization and evolution for combat in the 2020s and beyond. As outlined in the *Marine Corps Operating Concept*, 21st-century Marines must "avoid linear, sequential and phased approaches to operations and blend maneuver warfare and combined arms to generate the combat power needed for simultaneity of action in a full range of missions."

Berger's *Commandant's Planning Guidance* assigns force redesign as his top priority. Central to this redesign is developing the concept for Expeditionary Advance Base Operations (EABO), which enables forward naval operations within an adversary's intelligence, surveillance, collection, and weapons ranges. Mature EABO will be critical in the contested domains of the GPC where UxS will be ubiquitous, and the USMC must employ robust methods of certifying readiness for the necessary maneuver and combined arms employment to validate EABO performance. In order to effectively simulate adversary use of UxS at deployment-level certification exercises, the USMC must equip "Red Battalions" with multi-domain UxS and release them from typical USMC doctrine or rules of engagement (ROE). Unleashed from ROE or scripted operating boxes, eager Red Battalions will identify vulnerabilities and

develop unforeseen effects that will inspire new EABO doctrine for offense and defense. Robust and accurate adversary simulation is the only way to ensure that there is EABO resilience against both near-peer competitors like China and non-state actors like the Houthis.

Integration (Ends, Ways)

In order to achieve the vision of sustainable expeditionary operations and joint sea basing capabilities, the USMC must effectively integrate UxS within EABO and with Sister Services' doctrine. Current doctrine effectively de-conflicts UxS operations, but further growth is needed to effectively integrate the cross-domain effects achievable with UxS. To clarify, de-confliction prevents mutual interference of platforms, but can result in needless coverage gaps while assets enter and exit an area of operations. In contrast, effective integration results in force multiplying enhancements to command and control, maneuver and combined arms effects.

UxS integration requires specific attention because UxS by nature yield cross-domain effects. For example, individual UAS platforms can be used to collect intelligence, exploit the electromagnetic spectrum (EMS), launch cyber effects, and coordinate kinetic fires. Thus, even though UAS operate within the air domain, they yield effects in multiple domains. Similarly, unmanned ground and maritime systems can employ cross-domain effects. To effectively integrate UxS, the USMC must define the lowest common denominator for integration of cross-domain effects. In order that maneuver formations will be better postured for hybrid threats in complex environments, integration nodes should be defined by an echelon's certified capability rather than a specified echelon of command. As an example, any maneuver formation with an assigned Air Officer could serve as an integration node as opposed to requiring Battalion-level integration. This builds upon existing USMC efforts to increase organizational agility by supplying the Corps with many qualified UxS operators.

In order to successfully evolve from de-confliction to integration, the USMC must first lead joint, multinational, and interagency activities in the refinement of operations orders (OPORDs). Specifically, tasking and coordinating instructions to UxS units in OPORDs must be consistent with the given Concept of Operations (CONOPS). Because of the cross-domain nature of UxS, if planners fail to clarify tasking statements or coordinating instructions, combat teams will be less able to use UxS to the full potential. All echelons of command within the USMC can take the initiative to coordinate effects. But coordinating across domains from remote positions in contested environments likely will exceed the difficulty of meeting the objective by more traditional though less efficient and higher-risk means. Moreover, USMC doctrine must effectively define the role

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of UxS in maneuver warfare and combined arms scenarios. Sound doctrine will enable improved execution of OPORDs despite the fog, friction, and uncertainty of contested environments. These two areas of improvement must be addressed in the USMC redesign or the UxS are unlikely to be integrated to full capability.

In addition to refining its own doctrine, the USMC must collaborate with the other military Services and with the U.S. interagency and coalition partners to ensure the interoperability of expeditionary operations. For example, the USMC must ensure its doctrine integrates with U.S. Navy (USN) organizations like Commander Submarine Development Squadron-5 (COMSUBDEVRON-5), which serves as the tactical development authority for the Navy's unmanned underwater systems. While the USMC and COMSUBDEVRON-5 have different UxS fleets, there will be significant mission overlap in GPC scenarios that require amphibious forces in littoral seas. Once the Sea Services effectively integrate their UxS fleets, this model can serve as a template for joint, interagency, and combined activities.

Beyond OPORD development, the USMC and other Services must coordinate UxS policy with domestic regulatory bodies like the Federal Aviation Administration and equivalent agencies. EMS use must be coordinated with the Federal Communications Commission, National Telecommunications and Information Administration, and host-nation equivalents. Effective coordination will be critical in ensuring the safe conduct of civilian air traffic and avoiding interference with nonmilitary portions of the EMS. While this coordination must occur at very senior levels of government, leadership in this arena offers the USMC an opportunity to contribute to homeland defense-in-depth and increase cooperative relationships with international partners.

Acquisitions (Ways, Means)

All Services within the Joint Force are aggressively pursuing UxS. The Assistant Secretary of the Navy for Research, Development and Acquisition (ASN RDA) works across the USN and USMC Program Executive Offices (PEOs) to promote the development and integration of UxS into the distributed force of the future. Because of the USMC's naval expeditionary function and the cross-domain nature of UxS, it is imperative that all classes of UxS operate within a common policy framework and architecture. A

common policy framework and architecture will allow effective integration with the existing U.S. conventional power and restore the full margin of overmatch. ASN RDA should define an architecture that is a government off-the-shelf (GOTS) solution with tiered requirements for equipment interface for the different classes of UxS. By defining a GOTS architecture and common interface requirements, ASN RDA will align the efforts of the significant number of PEOs providing UxS and yield better buying power for the Sea Services. Moreover, GOTS architecture and common interfaces will better enable holistic integration of cross-domain UxS into maneuver formation tasking and coordination instructions.

UxS technology continues to advance rapidly, but it is important to realize the technology for most conceivable maneuver or combined arms scenarios already exists in some form. The Pentagon employs the Joint Capabilities Integration Development System (JCIDS) to prioritize and effectively integrate acquisitions for the Joint Force. On UxS, the key JCIDS challenge for the ASN RDA and the USMC acquisition workforce is to ensure that the doctrine, organization, training, materiel, leadership, education, personnel, and facilities (DOTmLPEF) framework evolves as fast as the acquisition workforce is providing the needed tools.

UAS use cases clearly expose the tension between existing policy, technological capability, and unit potential. As an example, current policy and host-nation regulations require UAS operators certified via the Basic Unmanned Qualification (BUQ) program to maintain tactical control of UAS during deployment. While robust certification programs are essential, the BUQ program is nested within a policy framework modeled after the manned aviation safety concepts. The well validated air safety concepts are critical for safeguarding high-value platforms that protect the intakes of jet aircraft, but significantly limit the lethality of small maneuver formations. From a capability perspective, Lockheed Martin's Stalker XE UAS illustrates this point. The Stalker advertises a range of up to 200 kilometers (km). Within a platoon-size formation, a junior Marine could meet the BUQ requirements to be the primary operator of this technology and raise the combat efficiency of the unit. However, the capability provided by the Stalker enables the junior Marine to far exceed the cross-domain effects delegated in the past to any Warfighter of comparable rank. As a result, operational control of such UxS assets

typically are retained at organization levels consistent with legacy DOTmLPF versus devolving responsibility to the lowest effective level. In order to achieve the devolution of responsibility necessary for EABO, the USMC's policy, technology, and planning coordination bodies must identify new methods to metabolize this risk in a way that does not unnecessarily restrict the capabilities of maneuver formations equipped with UxS.

The critical need for operational commanders, Services, and the acquisition workforce to rapidly optimize new acquisitions with the DOTmLPF framework is highlighted by the fact that adversary nations and non-state actors possess similar capabilities and act with little restraint. For example, the Iranian Revolutionary Guard Corps is supplying the Houthis in Yemen with Qasef-1 UAS that have an effective range of 160 kilometers. The Houthis are successfully employing these UAS against civilian infrastructure across the Arabian Peninsula. Similarly, Russian military operatives are embedded with Syrian regime forces and prosecuting traditional no-strike targets such as hospitals. As the USMC Red Battalion exercises simulate the conditions for EABO against adversaries that lack strict policy frameworks or concern for collateral damage, the stream of lessons learned will present an opportunity for the USMC to lead in the JCIDS process.

Beyond fielding technologies with common architectures and developing agile policy, it is essential that the USMC UxS physically nest with launching naval platforms in order to reinforce naval relationships and secure effective contribution to amphibious force levels. In order to make sure that acquisition programs integrate across the Sea Services, ASN RDA should implement a recurring UxS review similar to the Joint Requirements Oversight Council. The "UxS Requirements Oversight Council" must require that the Sea Service UxS programs define compatibility with launching naval platforms as a key measure of effectiveness. Common architecture and interface requirements will provide a sound foundation for this measure of effectiveness.

As an illustration, the USMC has fielded a number of Light Marine Air Defense Integrated System (LMADIS), manufactured by Ascent Vision Technologies (AVT). In July 2019, the LMADIS was used from the deck of an amphibious ship to provide counter-UAS capability against an Iranian drone that was violating the vessel's Naval Exclusion Zone. The LMADIS is mounted on the MRZR all-terrain vehicle, so it is physically mobile on the flight deck of a large amphibious ship. However, the MRZR will not be equally portable on other large naval combatants such as Cruisers or Destroyers. The USMC AWF should assess if the interoperability of the LMADIS and similar systems

could be improved from all physical, architectural and EMS aspects in order to increase its lethality.

Because the USMC expects to operate in a contested environment beyond the safety of the launching naval platform, it is imperative that Marines be equipped with mobile counter-UxS capabilities. These capabilities must integrate within the USMC's doctrine governing the EMS, targeting and domain awareness. In parallel with resolving the DOTmLPF challenges of UxS and counter-UxS employment, the USMC must encourage the operators, industry, and the AWF to innovate methods by which the critical assemblies within LMADIS-like technologies can be brought to bear in other EABO scenarios. For example, LMADIS uses AVT's optics package for multi-sensor imaging. In its latest product iterations, AVT decoupled the optics package from the LMADIS, and is producing variants that can be used for a range of applications from man-portable activities to protection of critical infrastructure. By encouraging production of UxS and counter-UxS capabilities, the commandant's redesign will not be a reorganization of legacy equipment and personnel but instead a rebirth into the naval expeditionary force-in-readiness that the 2020s and beyond will require.

Conclusion

In his book, *Team of Teams: New Rules of Engagement for a Complex World*, retired U.S. Army Gen. Stanley A. McChrystal recounted the reinvention of the Joint Special Operations Task Force into an agile organization that could evolve as fast as the insurgent enemy. "We had to tear down familiar organizational structures and rebuild them along completely different lines, swapping our sturdy architecture for organic fluidity, because it was the only way to confront a rising tide of complex threats," he wrote. McChrystal's principles directly apply to the USMC's integration of UxS into its preparation for 21st-century security challenges.

The Marine Corps Vision and Strategy 2025 aligns strategic imperatives with ends, ways and means, and the USMC must constantly update this guidance with the evolving realities of adversary UxS. Berger's redesign of the USMC must be able to operate in contested domains with ubiquitous adversary UxS in all domains. In order to meet the expectations as the nation's naval expeditionary force-in-readiness, the commandant's EABO framework must be able to effectively counter adversary UxS. And Marines must be trained, equipped, and authorized to employ their own integrated UxS within scalable maneuver formations. With these evolutionary leaps, the Corps will be prepared to win our nation's wars in the 2020s and beyond.

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