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Fabrication at the Tactical Edge

Breadth or Depth in PME

AI and Military Decisionmaking

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Cover 2 images (top to bottom): Air Force Senior Airman Rachel McKinney, 509th Comptroller Squadron financial operations technician, takes selfie with Patrick Mahomes, Kansas City Chiefs quarterback, during Chiefs' training camp in St. Joseph, Missouri, August 13, 2025 (U.S. Air Force/Joshua Hastings); Reza Karamooz, 57th Wing honorary commander, takes selfie during live-fire demonstration performed by firefighters assigned to 99th Civil Engineer Squadron during honorary commander rejoin at Nellis Air Force Base, Nevada, May 30, 2025 (U.S. Air Force/Elizabeth Tan); Commander Karrie Lang, Combat Systems Officer aboard aircraft carrier USS George H.W. Bush, takes selfie with Tom Cruise during ship's visit, March 3, 2023, Adriatic Sea (U.S. Navy/Samuel Wagner)

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Cover 1 image: U.S. Navy SEAL secures deck of ship and conducts board, search, and seizure training with British Royal Marine Commandos and Ukrainian special forces in Odesa, Ukraine, June 21, 2021 (U.S. Army/Patrik Orcutt)

Joint Force Quarterly is published by the National Defense University Press for the Chairman of the Joint Chiefs of Staff. *JFQ* is the Chairman's flagship joint military and security studies journal designed to inform members of the U.S. Armed Forces, allies, and other partners on joint and integrated operations; national security policy and strategy; efforts to combat terrorism; homeland security; and developments in training and joint professional military education to transform America's military and security apparatus to meet tomorrow's challenges better while protecting freedom today. All published articles have been vetted through a peer-review process and cleared by the Defense Office of Prepublication and Security Review.

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Dr. Jeffrey D. Smotherman (left) receiving the Joint Distinguished Civilian Service Award from Dr. William T. Eliason.

Executive Summary

While not all readers of this journal read my Executive Summary, they do read the results of my team's work. From acquisition to publication and distribution, the authors' efforts are transformed from simple files of words and occasional graphics into the journal you are reading. At 32 years and now 119 issues, *Joint Force Quarterly* has had over 40 people involved in making the magic happen. As great as *JFQ* has become, two significant events will undoubtably change how this journal is produced and delivered.

Primarily because of changes in the media environment at large and the budgetary pressures across government, National Defense University (NDU) Press will be significantly reducing the available print copies of *JFQ* beginning with the next edition, *JFQ* 120, due after the New Year. A small quantity of copies will be published and provided primarily to the joint force community—specifically, the joint professional military education schoolhouses, the Joint Staff, and the Combatant Command staffs. Our budget and my proper stewardship of the limited funds available, along with

the dramatic expansion and use of digital means to disseminate content, are the key drivers for this change. For locations other than those I have mentioned, *JFQ* 119 will be the last print edition delivered, both for individual subscriptions and for bulk deliveries. Effective October 1, 2025, NDU Press will no longer accept requests for print copies of *JFQ*, except for copies of previous editions. A small number of copies will continue to be available here on NDU's North Campus at Fort McNair. Those who wish to continue receiving individual copies can do so through the Government Publishing Office's U.S. Government Bookstore for a fee.

To me personally, another significant change will also influence future editions—the retirement of our longtime Executive Editor, Dr. Jeffrey Smotherman. Jeff has served at NDU Press for over 25 years and has done so brilliantly. Every page, every word, and even the very style of the current *JFQ* has his personal touch, dating back to *JFQ* 35 in the fall of 2000. Jeff was involved with some 84 of the now 119 editions, totaling some 1,732 articles from at least 2,400 authors and nearly 11,000 pages of the Chairman's Journal. No other member of the NDU Press team past or present has served as long or as well for this special mission as Jeff.

In addition to his work on *JFQ*, Jeff has stewarded NDU Press's production of 20 major books—always his preferred work assignment—and hundreds of research monographs and case studies. He has been the first person called upon when a document for NDU leadership use needed a perfectionist's eye. Warriors talk of having a teammate to get them through the good times and the trials of combat. While Jeff Smotherman has not served in the military, he has been every bit a battle buddy to his NDU teammates and especially me. We wish Jeff a healthy, happy, and well-deserved retirement.

In Forum this time, we have four very current and significant articles on deterrence, support to the force, decision support from artificial intelligence (AI), and current U.S. munitions production. Robert Hinck continues our long discussion on integrated deterrence with his suggestions on how a network strategy can help the U.S. influence friend and foe alike. Every unit will want to consider Aubry Eaton and Dustin Thomas's suggestions on how to build combat capability on the front lines. None of us can stop talking about AI, but Michael Silver, Kellen Sick, Matthew Snyder, and Justin Farnell offer us ways to use it for organizational design and decisionmaking in warfighting. Another hot topic is the U.S. defense industrial base, and Bryce Loidolt—my teammate from NDU's Institute for National Strategic Studies—will bring you up to speed on the issues involved in getting the right materiel to the front lines of Ukraine.

Our JPME Today section returns with two important discussions, one old and another very new. Often it seems everyone has a good idea on how to reshape professional military education (PME), but serious change comes from just understanding this enterprise we are involved in. Ryan Wadle and Heather Venable offer their views on the right balance between breadth and depth of the content and courses in PME, as well as outlining the battle lines inside the halls of our colleges and higher headquarters. *JFQ* alum Kevin D. Stringer and his research partner, Taisiia Vivdych, bring us their insights on how the Ukrainian special forces are achieving success.

Commentary from two new *JFQ* voices helps extend the discussions we have had in recent issues on two key topics: cyber and nuclear weapons. Jorge Kravetz wades into the debate over the use of cyber for deterrence through intelligence special operations. Michaela Dodge brings us her Larry D. Welch Award–winning essay on the value of intercontinental ballistic missiles—an enduring part of our nuclear triad, despite calls not too long ago to abandon them.

One can easily see the strategic connections between the three articles we have for you in Features this time. Alexander Goodno discusses his ideas on how to combat Chinese influence and China's illegal fishing in the waters of South America. Seeing an opportunity to learn lessons from past combat support efforts, Jonathan Pederson describes how the joint force might improve casualty evacuation in large-scale combat operations. Addressing what many believe is the next big theater of operations, Samuel Krakower and Troy Bouffard suggest how the United States can best position our military to fight when needed in the Bering Region of the Arctic.

Closing out this edition of *JFQ*, we have three excellent book reviews and in our Recall section, Bryan Leese offers his Cold War–era approach to educating us on integrated deterrence, providing a nice bookend to Robert Hinck's earlier article in this edition.

To my teammate who was a constant companion to us here at NDU, who has suffered through all my stories and never-ending tortured analogies, I wish Jeff Smotherman fair winds and following seas, with a reminder to always check your six! **JFQ**

—William T. Eliason,
Editor in Chief

Air Force B-1B Lancer aircraft flies in formation alongside NATO Allied fighter jets over Monument of Freedom in Riga, Latvia, during Bomber Task Force Europe exercise, August 19, 2025 (NATO)

Influence by Design

A Network Strategy for Integrated Deterrence

By Robert S. Hinck

The 2022 U.S. National Defense Strategy (NDS) and National Security Strategy place integrated deterrence as the centerpiece of U.S. strategy. *Integrated deterrence*—which "entails working seamlessly across warfighting domains, theaters, the spectrum of conflict, all instruments of U.S. national power, and [America's] network of Alliances and partnerships"—is to be tailored to specific circumstances and applies a coordinated, multifaceted approach to reducing competitors' perceptions of the net benefits of aggression relative to restraint.[1] As this lengthy description suggests, integrated deterrence draws on multiple approaches to deterrence to create a holistic strategy in pursuit of American national interests.[2] It represents a far broader view than previous U.S. approaches to deterrence—one that can succeed if made actionable.

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While the strategic vision laid out in the NDS is praiseworthy in its scope and direction, criticisms remain.[3] First, operational concerns include the apparent tasking of the Department of Defense (DOD)—now the Department of War (DOW)—with the execution of integrated deterrence. This tasking is problematic given the stated intent to align *all* instruments of national power, not just the military. It also leads to doubt as to whether the interagency community is capable of coordinating a unity of effort.[4] Second, critics challenge whether tailored deterrence is even possible, given both the complexity of dealing with two or more potential adversaries and the risk that tailoring messages to multiple audiences might weaken the clarity of deterrence signaling.[5] Most condemning are assessments that integrated deterrence is a poor strategy. In this vein, criticisms include that deterrence is self-limiting as it aims only to prevent unwanted behavior; treats only the symptoms of aggression, not its causes; and is backed by a dubious historical record in which deterrence fails as often as it succeeds.[6] Finally, whether integrated deterrence is even a strategy is contested with opponents claiming that, as laid out in the NDS, integrated deterrence lacks clear ends outside the absence of war and little detail into what means are to be employed.[7]

In the case of the NDS and its pursuit of integrated deterrence, the devil is in the details. Good strategy requires a clear theory of success, one that not only explains how the desired effects are achieved but also inspires others to support it.[8] While many of the critiques of integrated deterrence are valid, pursuing integrated deterrence is possible with further strategic clarification. What follows is a strategic framework to achieve integrated deterrence, drawn from Manuel Castells's theory of communication power, followed by discussion of its application to the U.S. strategy of integrated deterrence.[9]

Communication Power as Strategy Concept

Strategies are theories that explain how desired effects are achieved through causal linkages of ends, ways, and means.[10] Like academic theories, strategies (both national and military) set forth to identify the primary variables that explain how a desired outcome is achieved. Unlike academic theories, however, war offers little opportunity for hypothesis testing.[11] Merging academic theory with strategy can help mitigate this challenge. Incorporating Castells's theory of communication power as a framework for integrated deterrence offers a tangible, parsimonious strategy that encompasses dissuasion, coercion, and persuasion and can be applied to both the interagency community and U.S. allies, partners, and adversaries across the spectrum of competition.

From Concept to Theory

As it stands currently, integrated deterrence is more a concept than a theory. It calls for integrating U.S. national power, but there "remains no clear idea of how or why more seamless integration produces stronger deterrence, apart from an assumption that better synergies would make the United States and its partners more effective."[12] It also leaves "significant uncertainty around the most critical aspect of deterrence . . . the effect of one's actions on the perceptions of the potential aggressor."[13] Resolving these issues is possible, but the breadth of action within the idea of integrated deterrence requires an equally ranging strategic theory of how influence is exercised—one that encompasses all instruments of national power across the spectrum of competition. Integrated deterrence should anchor itself in a theory of power, not some subcategory of influence. Coercion and persuasion—hard and soft power—are ever at play in defining and upholding the global system, which is the stated purpose of the NDS move toward integrated deterrence.

Castells's theory uniquely does this by describing how power relationships are created and contested in our globally interconnected environment through the logic of networks. As historian Neil Ferguson documents in *The Square and the Tower*, political actors have successfully exerted power through horizontal networks to challenge established hierarchies throughout history.[14] For Castells, advances in digital communication technologies have ended the historical superiority of vertical/hierarchical organizations over horizontal networks. In this sense, Castells's account follows other prominent sociologists describing the advent of the network society—a society whereby social and media networks become the prime mode of organization to shape the most important structures of social life at the individual, organizational, and societal level.[15] His approach distinguishes itself, however, with its focus on *how* power operates within these networks and *by whom* at a global level.

The importance of networks has not been lost on DOD/DOW. Vice Admiral Arthur K. Cebrowski and John Garstka, among others, developed concepts of network-centric warfare in the 1990s and 2000s along similar assumptions as Castells.[16] These concepts hold true today, as changes in the character of warfare center around networked operations that demand more comprehensive integration for credible combat effectiveness.[17] Yet efforts to increase combat capabilities alone neglect the purpose of integrated deterrence—improving synergies across all instruments of national power with allies and partners. In this regard, the DOW pursuit of networked operations falls more on the military/technical effects of networks, rather than sociological, leaving a gap in approaching integrated deterrence. As Castells states, "coercion, and the capacity to exercise it . . . is an essential source of power. But coercion alone cannot stabilize domination. The ability to build consent, or at least to instill fear and resignation vis-à-vis the existing order, is essential to enforce the rules that govern the institutions and organizations of society."[18]

From Theory to Strategy

According to Frank Hoffman, the essence of strategy formation is the creation of a strategic concept and logic that represents an untested hypothesis that promises to attain policy ends

Guided missile destroyer USS *Paul Ignatius* arrives in Narvik, Norway, following its participation in Steadfast Defender, largest NATO exercise since World War II, March 15, 2024 (U.S. Navy)

within their allotted means and situational constraints. This is especially important for national strategies like integrated deterrence in that "their purpose is rarely to defeat an adversary but instead . . . develop institutional muscle and apply statecraft to desire[d] strategic ends."[19] The establishment of an if/then hypothesis is therefore central to the development of strategy. Castells's theory offers two such hypotheses—one regarding the fundamental importance of power in society and the other regarding how power operates in our current era of global interconnectivity.

Castells's first hypothesis is that the most fundamental form of power lies in the ability to shape the human mind. He defines *power* as "the relational capacity that enables certain social actors to asymmetrically influence the decisions of other actors in ways that favor the empowered actors' will, interests, and values."[20] Power is exercised in two ways: through the means of coercion—including both the threat of violence and its actual application—and through the control over the construction of meaning through which social actors come to perceive possible action (discursive power). Power then is both a social construct and a material condition. The ability to not only create and enforce laws or international norms but also generate perceptions of legitimacy by which individuals accept them exemplifies how power operates, whether at the local, national, or international level. Notably, power is never absolute. Power remains dependent on a "certain degree of compliance and acceptance by those subjected to it."[21] Hence, resistance to power is always present, and when resistance becomes significantly stronger than compliance, power relationships change.

Castells's second hypothesis is that in today's globally interconnected world, the deployment of power no longer falls solely to the purview of nation-states but disperses itself into the hands of networks. Historically, nation-states wielded

power by asserting their sovereignty within a territorial boundary through the monopoly of violence and institutional control over societal discourse. Today, however, territorial boundaries no longer hold the same priority, as global networks of all sizes increasingly extend across national borders. International supply chains, transnational corporations, and supranational governing bodies, among others, illustrate the distributed nature of power spanning across areas of economics, technology, legal regulations, social values, security, and politics.[22] Consequently, global networks now hold the capability to reconfigure the societal rules that were once the prerogative of national governments, allowing for new avenues of competition. Nation-states, nonetheless, remain influential. Rather than withering away, states adapt and transform, turning into nodes—albeit powerful ones—within larger overlapping networks of political, institutional, and military relations. States then continue to maximize their national interests in this system but do so by either becoming *imperial powers*—stretching their territorial boundaries to exert control—or *networked powers*—extending their influence transnationally through increasingly intensified relations across various planes of activities (for example, mediated, societal, financial, and militarized).[23]

Castells concludes that if power resides in networks, then networks become the site for global competition with power and counterpower reliant on network creation and disruption via network strategies of offense and defense. Networks are "complex structures of communication constructed around a set of goals that simultaneously ensure unity of purpose and flexibility of execution by their adaptability to the operating environment."[24] They are composed of nodes that interact based on a set of communication protocols, including both technical and cultural codes of interaction. Inclusion within a network requires participants to conform to the network's communication protocols, which, over time, enculturates them into the network's values and purpose. Finally, networks are defined by their programs, which set forth the network's goal and rules, including the performance criteria by which success and value is determined.[25]

In the global system, multiple overlapping networks exist to coordinate and regulate human interaction. These networks may compete or cooperate with others to form larger integrated macro systems. Network cooperation depends on the interoperability of networks' programs. This includes shared goals and communication protocols that enable coordination as well as access to connecting points linking strategic networks together (switches). Competition, on the other hand, occurs between networks and adjudicates itself based on the ability of networks to outperform others, either through superior efficiency in performance or through greater cooperative capacity (that is, more participation). Network competition takes two forms: constructive or destructive. *Constructive competition* involves internal improvement within a network that results in its superior performance (efficiency or cooperative capacity) vis-à-vis its competitors. In contrast, *destructive competition* is externally targeting and takes the form of either disrupting competitor networks' access points and/or interfering with others' communication protocols to reduce competitor networks' performance.[26]

Castells argues that taken together, networks dictate the flow of social interaction and define the ends that individuals work toward, influencing their values, beliefs, and motivations for behavior. Those in the position to program networks shape the values by which people interact, which come to form deeply held assumptions regarding what is deemed to hold value in society (prosperity, security, freedom, privacy). In this sense, *discursive power* is achieved by setting the protocols or rules of interaction within a network, while *coercive power* is achieved through the ability to exclude others in networks and/or apply force to degrade or destroy competing networks. Consequently, when viewed through the lens of the global system, the hierarchy of networks provides those at the top with the ability to determine "the rule in the entire grid of networks organizing/dominating the planet."[27] Yet in the context of integrated deterrence, nation-states remain best positioned as the primary agents with sufficient resources to exercise deterrence activities shaping the behaviors of state and nonstate actors.

Operationalizing Network Power

Currently, the United States sits atop the hierarchy of global networks. Since the Reagan administration, the protocols of free trade and intellectual property rights, combined with the strength of the U.S. economy, have defined the overarching network of global interaction.[28] Backed by the strength of the U.S. military, the United States has so

far been able to protect this network. While terrorist organizations have, at times, attacked specific nodes and switches within them, it is with the rise of China that the potential for resistance has substantially grown. Nevertheless, such resistance can be managed through cooperative and competitive means via the operationalization of six components of network power.

The first component of network power is the attractiveness of the network. Participants join networks to gain access to the aggregate benefits they provide (both quantitative and qualitative). In this sense, the larger the network, the more attractive it becomes as members have access to greater resources.[29] The World Trade Organization is one example, with political actors motivated to join the organization to gain access to the global economy. To secure participation, networks must be perceived as valuable or achieve relative attractiveness vis-à-vis competing networks. Failure to do so results in dwindling access to aggregate resources as potential participants choose alternative networks seen as more beneficial to their interests.

The second component is the ability to exclude others from a network. Networks exercise gatekeeping strategies to bar access to those who do not add value or jeopardize the interests of the network. In this case, adding more participants does not always increase the network's power or influence.[30] North Atlantic Treaty Organization (NATO) enlargement exemplifies this, as the addition of nations closer to Russia's border may threaten the Alliance's network goal of member security or entangle its members in regional conflicts ill-serving their national interest. Other more common usage of exclusion includes reducing adversarial nations' access to strategic resources, technology, or expertise, like sanctions on Iran or North Korea and Chinese trade restrictions on high-end computer chips.

The third component is standard-setting. Networks require protocols (rules) for coordinating behavior. Once set, these rules become compelling for all nodes in the network and favor the interests of the actors who established them. Over time, these standards come to influence the participants' values and expectations regarding appropriate, routine behavior.[31] The European Union illustrates the power of standard-setting by requiring member states to adopt domestic reforms, including the existence of democratic institutions, the rule of law, and human rights. The intent of these standards is to socialize other political communities such that European values become embedded into their sociopolitical culture.

The fourth component is positional influence within a network. Not all nodes within a network are created equal. The hierarchical relationships within a network—whether based on prestige, density of contact with others, or resources—grant greater agenda-setting capabilities to some than to others. Such agenda-setting functions within a network's protocols but plays important roles in mobilizing resources and defining specific problem sets.[32] U.S. leadership in NATO and voting shares in the World Bank are examples of U.S. prominence in security and finance networks. China too recognizes the importance of positional influence, seeking not only greater voice in global institutions but also preferring bilateral engagements with other nations to bolster its relative bargaining power outside of organizations in which it has less influence.

The fifth component is the capability to constitute networks. Constituting networks requires an actor to have access to other influential power brokers and the persuasive ability to link these actors together toward some goal. Linking together different actors (or networks) reflects *switching power*—turning on access points that allow cooperative potential—while the capability to define the goal of a network reflects one's *programming power*.[33] U.S. efforts to engage countries in the Asia-Pacific region and develop partnerships to reduce Chinese influence are examples of this. The formation of AUKUS (a trilateral security partnership among Australia, the United Kingdom, and the United States) demonstrates the ease by which a network can be created when actors share similar values and threat perceptions. In contrast, U.S. engagement with the Association of Southeast Asian Nations (ASEAN) proves more difficult, partly due to differences in U.S. and ASEAN cultural protocols and network goals but also because of China's prominence as a counternetwork in the region.

The final component is the ability to destroy and disrupt networks. Networks can be disconnected through physical attacks on key switches, like cutting communication cables or destroying logistical hubs. They can also be targeted through nonphysical attacks; a network's communication protocols can be sufficiently disrupted such that its interoperability is denied or degraded. Gray zone operations and disinformation activities exemplify both, especially in the case of preventing coalitional efforts by the international community or allied nations to stop aggression from occurring.[34]

From Networks to Integrated Deterrence: Connecting Ends, Ways, and Means

The "big idea" or "guiding policy" presented in the adaptation of Castells's theory is the pursuit of U.S. influence through networks. In this regard, the *means* are networks, as this is where resources are aggregated and values and rules are formed. The *ends* are U.S. eminence in global networks, including the capability of creating and (re)programming them. The *ways* include:

- applying network competition and cooperation by making U.S. networks attractive and adversarial networks unattractive
- practicing inclusion and exclusion to maintain U.S. networks' performance capabilities while inhibiting deleterious capabilities from adversaries
- setting standards conducive to U.S. values in conjunction with augmenting interoperability of networks with allies and partners to facilitate coordinated efforts
- pursuing U.S. centrality within strategically important networks in support of American leadership

Air Force F-22 Raptors fly alongside B-52H Stratofortress above Arabian Gulf, March 29, 2022 (U.S. Air Force/Jerreht Harris)

- continually creating and adapting networks to meet evolving threats and challenges through the linkage of relevant actors
- disrupting or destroying adversarial networks through the targeting of key nodes/switches and protocols of interaction.

As a strategy, Castells's theory aligns with and adds further specification to the ends, ways, and means by which integrated deterrence in the NDS could be enacted. First, it supports the overarching NDS objective to maintain a stable and open international system that expands economic prosperity and opportunity while helping realize and defend the values at the heart of the American way of life.[35] In this sense, the international system is best understood as a macro-network within which U.S. values are embedded, integrating others and shaping their beliefs and behaviors along the lines of economics, politics, information, and security. U.S. strategy should ensure that American values continue to define the rules of this network, protect the network's physical and legal infrastructure, and maintain the network's normative attractiveness such that other societies desire to be included within it.[36]

Second, approaching integrated deterrence through the framework of network competition describes how all instruments of power and coordination with the interagency community and U.S. partners and allies is to occur. Because global networks stretch across diplomatic, informational, military, and economic domains, each U.S. Government department would pursue analysis of networks within its respective area of responsibility and mission set, share such information among them to create a more comprehensive picture of global networks, and combine the information for the purpose of collective action toward unified goals seeking to:

- fend off strategically relevant adversarial network structures
- defend existing network structures serving U.S. strategic interests
- reprogram, or disconnect, foreign networks to align with U.S. goals
- create new networks bolstering capacity for coordinated action toward U.S. interests.

In this regard, approaching integrated deterrence through Castells's theory of communication power can be understood as its own network-making project intended to join the interagency community together through common protocols of communication toward a common goal. This same process would apply to allies and partners with the intent to create interoperable network structures aligning economic, diplomatic, informational, and military capabilities at various levels of social interaction.

Third, the NDS objective of reducing competitors' perceptions of the net benefits of aggression relative to restraint comes from elements of network competition and cooperation. Integrated deterrence requires the ability to reassure potential aggressors of the benefits of the status quo.[37] Strategically increasing

Army Corporal Aaron Hough aims M240B machine gun during exercise African Lion 25, largest U.S.-led military exercise on African continent, at Cap Draa, Tan-Tan, Morocco, May 16, 2025 (U.S. Army/Blake A. Essex)

integration between U.S. and adversarial nations widens the space for reassurances to be made while simultaneously raising the costs of exclusion from these networks. As networks differ in strategic importance, integration of adversarial nations into U.S. and ally networks would be tailored to specific conditions. Identification of adversaries' networked vulnerabilities and strengths would enable a clearer understanding of the potential costs of exclusion from these networks, with the construction of networks integrating adversaries into their areas of vulnerability providing greater asymmetric advantage for the United States and its partners and thereby supporting efforts of general deterrence.

Additional efforts to create networks that integrate allies and partners along shared goals and norms (rules) would constrain U.S. adversaries to act according to shared regional norms and even induce U.S. adversaries to join or risk losing access to the network's benefits. Even if such constraints fail, violation of these norms would signal hostility and set the information space in ways more conducive for U.S. influence, further facilitating ties between the United States and its regional partners.

Influencing adversaries' perceptions of their security environment would further entail outcompeting their areas of network strength. Ensuring the superior efficiency of U.S. networks would, over time, shape adversaries' perceptions that their own network programs (goals and values) are less effective in achieving prosperity and security while also demonstrating to neutral nations the relative benefits of participating in U.S. networks over others (that is, Chinese or Russian networks). Historical examples of this include the U.S. victory over the Soviet Union and the subsequent appeal of the Washington Consensus during the 1990s as well as the cautionary tale of the emergence of the Beijing Consensus following the 2008 global financial crisis.[38]

Fourth, usage of networks provides a clearer means of competing across the spectrum of conflict. Peacetime initiatives include network cooperation and constructive forms of network competition, like those described above. Additional peacetime initiatives would include efforts to invest and create alternative networks capable of replacing those of strength for U.S. adversaries, like the creation of natural gas networks between the United States and Europe that reduced Moscow's network power vis-à-vis its energy pipelines to Europe.[39]

Within the diplomatic and information space, narrative competition highlighting the desirability of U.S.-supportive networks and the undesirability of adversarial networks should be pursued. U.S. adversaries already do this actively, like China's use of the Israel-Hamas conflict to reduce U.S. support in the

Middle East and the developing world and Russia's strategic narrative campaign diminishing NATO cohesion leading up to the 2014 Russia-Ukraine conflict.[40] In both cases, the purported values and rules of the international system were challenged, which—following Castells's theory—reflect attempts to disrupt the communication protocols that facilitate cooperative action to occur while undermining positional U.S. authority within the global system. Hence, protecting one's network and diminishing the attractiveness of competing networks requires concerted diplomatic and informational efforts to engage with foreign publics. Stories describing the global system and its future prospects are not only at the heart of competition and perception management but also comprise a critical component of military strategy.[41] As an example, a recent study on Chinese public opinion regarding Russia's war in Ukraine found increased support for using military force against Taiwan, but information about Western countermeasures curbed the effect.[42] In this regard, integrating military policy with communication efforts can reduce acceptance of and motivation for war, specifically in the Taiwan Strait.

Fifth, during periods of increasing hostilities, including those leading up to armed conflict, approaching integrated deterrence through network competition offers a wider range of options for linking behaviors and responses. Reactions to aggressive activities can be met either through expelling aggressors from networks of various importance—depending on the level of aggression and the domain in which the act occurred—or through disruption of the offender's networks. In the latter case, the United States and its allies could target low-level switches within an aggressor's network or create minor disruptions in the communication protocols that enable the aggressive action to occur. Such activities would demonstrate both resolve and some level of capability while ensuring that hostilities are kept to a minimum. This would further help address challenges posed by aggressors conducting "salami slicing" activities—actions intentionally designed as low-level acts of aggression to which deterring parties are unable to respond in every instance. Because networks cut across areas of diplomacy, security, economics, and information and operate at various levels of coordination, the number of potential targets for signaling increases, which allows for more tailored, measured responses across the escalation ladder.

The same logic can be applied when aggression edges toward conflict. Mobilization of forces and deployment of capabilities require coordination. Temporary nonkinetic attacks targeting the switch points from which this coordination occurs would demonstrate capabilities and resolve while reducing aggressor's confidence in their capabilities, even raising doubts among their ranks or public if such coordination is shown to be chaotic. All of this would transpire without the escalatory nature of physical attacks or movement of one's own forces, which could be used to inflame tensions. Furthermore, this approach to conflict management would align with Chinese understanding of deterrence, both its belief in deterrence as comprising offensive and defensive operations and China's approach to modern warfare.[43] In the case of the latter, People's Liberation Army writings describe warfare as a confrontation between operational systems with victory achieved through the targeting of critical linkages and nodes that hold an adversary's operational system together.[44] Taking actions that signal and inhibit China's operational system while also building resiliency in U.S., ally, and partner nations' systems would support NDS goals of tailored, resilient deterrence.

Finally, the NDS description of integrated deterrence calls for the backing of credible combat forces. Through the lens of Castells's theory, the credibility of one's force falls not only to the lethality of its weaponry but also to the efficiency of its operational system in coordinating joint action in contested environments. Credible combat capabilities are therefore defined through one's ability to target adversaries' strategic switches—from which capabilities are integrated and projected—and disrupt their protocols for coordinating joint efforts. This includes the ability to defend one's own switches and protocols as well as the capability of activating additional resources where needed. Conflict then becomes a test of competing network performance. In this light, establishing resilient, interoperable networks within and across theaters is crucial to one's deterrent strength, including the opportunities to link in regional allies and partners.

Conclusion and Recommendations

Approaching integrated deterrence through the Castells's theory of communication power addresses the challenges of interagency collaboration, concerns over signaling within tailored deterrence, limits of dissuasion through incorporation of both persuasion and coercion, and the direction in which interoperability among U.S., ally, and partner nations should occur. It further supports the NDS goal of deterrence by resilience and engagement with allies and partners across the spectrum of competition, in addition to tailored efforts of practicing deterrence aligned with Chinese perceptions of strategy. While lofty in its goals, integrated deterrence can succeed as a strategy if the joint force and interagency community are able to align themselves in common purpose and organizational will. Although the concept is associated with one set of national security strategies, its points of emphasis will remain.[45] Future challenges in the security environment will continue to evolve, with the garnering of global support and the development of shared perceptions and goals increasingly important. Approaching these challenges through the concept of network competition can accomplish both, contributing to and resulting in not only the maintenance but also the growth of the enduring advantages the United States holds vis-à-vis its competitors.

Adopting a network approach to integrated deterrence will take time and concerted effort. Turning Castells's theory into a strategic concept is the first step. The next is building support, training, and understanding of it across the joint,

U.S. Navy and NATO Allied ships participate in steam formation during exercise Baltic Operations 2025 in Baltic Sea, June 5, 2025 (U.S. Marine Corps/John Allen)

interagency, intergovernmental, and multinational (JIIM) environment. As William Davis, Jr., notes, too often do JIIM leaders fail because of their reliance on leadership techniques developed working in hierarchical, mission-oriented organizations. Leaders must be adaptable and flexible in their interfacing with other entities, as there is "no hierarchy within the JIIIM" and "no such thing as tasking or ordering another entity to do anything."[46]

Developing a network mindset is therefore necessary, including greater cross-organizational training and exposure to the interagency, intergovernmental, and multinational partners, as JIIM activities must be capable of quickly forming and dissolving combined joint task forces across a broad range of mission sets.[47] Changes in joint targeting practices can support such efforts by aligning themselves more along lethal and nonlethal activities based on desired endstates through various lines of efforts. Doing so engenders greater synchronization in planning and execution processes in ways realizing comprehensive effects.[48] However, such efforts will need to consider the nested strategic environments that U.S. allies and partners face and the resulting variation in threat perceptions.[49] Hence, identifying strategically relevant stakeholders, aligning mission sets along shared lines of effort, and clarifying the roles they and U.S. Government assets are to play are all required for integrated deterrence to succeed. Fortunately, the characteristics of network organization—their speed, flexibility, and potential for self-configuration—support such processes. As shared protocols and commonly identified network goals emerge, the capacity for additional cooperative networking arises. **JFQ**

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Noah Benton, Titan Dynamics chief technology officer, prepares 3D-printed unmanned aerial system for flight during demonstration, April 25, 2024, at Eglin Air Force Base, Florida (U.S. Air Force/Samuel King, Jr.)

Fabrication at the Tactical Edge

By Aubry J. Eaton and Dustin T. Thomas

In 1945, General Henry "Hap" Arnold observed that in the future, "science and research will have the same relative importance as pilot training."[1] Recent conflicts, such as the Russian invasion of Ukraine, confirm this insight as combatants rapidly adapt weapons and tactics to dynamic battlefield conditions. Today, technological advances combining additive manufacturing (AM) and artificial intelligence (AI) make it possible to execute an acquisition observe, orient, decide, act (OODA) loop within 24 hours. If production is colocated with warfighters, the joint force can now design, produce, and deploy equipment as an integral part of operations. Mastery of managed innovation, alongside managed violence, will be critical to deterring and defeating aggression in this era. These devel-

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opments have profound implications for both near-term deterrence and strategic competition with the People's Republic of China (PRC).

The Department of Defense—now the Department of War (DOW)—has traditionally relied on centralized procurement and manufacturing to supply and equip warfighters. While this model has historically served the United States extraordinarily well, it is mismatched to the demands of rapid-reaction warfare. Current requirements, resourcing, and acquisition processes were simply never intended to manage the production of expendable end items in the field. A new paradigm of Fabrication at the Tactical Edge (FATE) is needed to decentralize production by leveraging AM and AI to enable battlefield manufacturing. This paradigm shift could revolutionize operations by counteracting PRC anti-access/area-denial (A2/AD) capabilities by making U.S. forces unpredictable. Locating larger versions of FATE in allied and partner-nation territory contributes to a strategy of binding antihegemonic coalition members together. Most critically, the capability of FATE to generate mass prevents the PRC from seizing and holding the key territories of U.S. allies in what now–Under Secretary of War for Policy Elbridge Colby has termed a denial defense strategy.[2]

Blunting the Assassin's Mace

Existing acquisition decision support systems were optimized for managing high-cost programs with long service lives and exquisite technical requirements. They are ill-suited for dynamic, tactical-level adaptation—the near future of modern warfare. For example, a requirement for small unmanned aerial systems (sUASs) for Army Brigade Combat Teams that was approved in June 2023 resulted in a contract in September 2024.[3] While this instance was rightly considered a rapid acquisition by legacy standards, such a timeline is too slow for dynamic battlefield needs.

Reforms are already underway to streamline and accelerate capability acquisition. For instance, the Joint Capabilities Integration and Development System is being disestablished. In its place, the Joint Staff will publish an annual prioritized list of Key Operational Problems (KOPs), and DOW will align requirements and funding decisions through a new Requirements and Resourcing Alignment Board and Joint Acceleration Reserve.[4] These reforms shift the focus of management attention from document-heavy, front-loaded requirements to problem-driven, experimentation-led solutions with dedicated funding. The outcome is a viable policy framework to deploy rapidly iterating edge-driven capabilities like battlefield fabrication. Organizations such as the new Mission Engineering and Integration Activity will provide a formal venue to iterate FATE nodes against KOPs and accelerate fielding.

The urgency of these reforms is underscored by the PRC's People's Liberation Army (PLA) *shashoujian* ["assassin's mace"] strategy that seeks to exploit surprise and asymmetric advantages to neutralize the technological superiority of adversaries like the United States. Deeply rooted in Chinese views of history and culture, this approach leverages decisive unanticipated weapons or tactics to achieve a strategic breakthrough against a stronger opponent.[5] The sudden appearance of an assassin's mace on the battlefield, such as antisatellite weapons or swarm drones, could pose a severe threat to the joint force by targeting critical vulnerabilities in U.S. operations. Alongside the development of such asymmetric capabilities, the PLA has set a milestone to modernize the military of the PRC by 2027 in the areas of mechanization, information, and intelligence.[6] In contrast, key U.S. defense modernization programs are set to culminate in 2030 and beyond.[7] This disparity suggests a finite period of localized tactical PLA superiority against the United States and its allies. International relations scholars have hypothesized that a limited window of opportunity poses an especially dangerous threat of military conflict because of a perceived incentive to strike before the favorable military advantage is lost forever.[8] This dynamic significantly elevates the threat of military escalation in the Indo-Pacific region.

To mitigate this risk, U.S. defense planners must carefully balance limited investment funds to maintain deterrence within this window while modernizing major systems for the long term. Under the current acquisition construct, the United States must largely rely on existing systems or those currently in production during this window of time. Given the long lead times for exquisite systems in the development phase, it is unlikely that they will be ready for combat in time to meet the elevated risk of this critical period. However, rapid and adaptable manufacturing methods are poised to fill this gap. By enabling battlefield improvisation, U.S. forces can rapidly counter unanticipated threats and blunt their impact.

A New Paradigm

Additive manufacturing is defined by the International Organization for Standardization as the "process of joining materials to make parts from 3D model data, usually layer upon layer."[9] Unlike traditional manufacturing in which material is removed, this process builds both parts and material simultaneously. AM can be used in a variety of media, including polymer, metal, ceramic, composite, electronic elements, energetics, and concrete.[10] It is an inherently digital endeavor, as it relies on 3D models to guide the process of manufacture. Concurrent growth in the capabilities of AI-enabled design tools allows operators of AM systems to quickly develop models to be printed. DOW has begun experimenting with AM in the field with initial use cases focused on enhancing sustainment. In 2022, the Marine Corps solidified a production specification for the Expeditionary Fabrication (XFab) system. It includes both polymer and metal printers as well as milling, drilling, and grinding tooling, all within an 8' x 8' x 20' standard container.[11] The USS *Somerset* has also been equipped with AM systems to conduct repairs while underway. During the 2024 Rim of the Pacific international maritime exercise, both naval and marine systems were utilized in operational conditions, resolving real-world parts failures.[12]

Through the Rapid Fabrication via Additive Manufacturing (R-FAB) program, the Army began piloting uses of AM for ground forces in the field, such as production of high-mobility multipurpose wheeled vehicle parts.[13] These use cases have demonstrated a compelling return on investment. Initial results reported by Naval Air Systems Command (NAVAIR) have demonstrated a 70-percent improvement in cost and 97-percent improvement in schedule when using AM over traditional procurement.[14]

FATE aims to decentralize production of spare parts to reduce the vulnerability arising from lengthy supply chains. The concept does require raw materials such as polymer and metal compounds to be shipped forward. However, FATE still confers a logistical advantage, since it vastly simplifies the variety of such materials. It is also more straightforward to include base materials in prepositioned stocks rather than thousands of individual spare parts. A key component of this approach is a digital library of certified and secure models.[15]

In addition to significantly improving sustainment, AM can be coupled with AI-enabled design to create entirely new end items. The Air Force has experimented with field production of new capabilities with the Black Phoenix sUAS initiative. This initiative proved out the combination of AM and AI–enabled design to go from tactical requirement to a fully operational sUAS within 24 hours while operating in mobile field conditions.[16] This capability ensures that U.S. forces can respond to evolving threats posed by PLA assassin's-mace systems with bespoke solutions, disrupting adversary expectations and maintaining operational superiority. These existing trends demonstrate the technological feasibility of the FATE paradigm of adaptable mission-specific systems produced within an operational planning cycle.

The DOW Replicator program seeks to acquire thousands of inexpensive sUASs using traditional streamlined procurement practices. FATE complements and enhances such efforts. For instance, a forward-deployed fabrication system could produce replacement parts for sUASs that are damaged during operations. It can also build sUASs that are adapted for specific missions, are designed to be expendable, and can serve to protect the sUASs acquired through Replicator. While Replicator focuses on centralized mass production of low-cost sUAS drones, FATE ensures that forces at the edge can customize, repair, or create mission-specific capabilities, providing a dual advantage in scale and adaptability.

Battlefield Production: Lessons From Ukraine

Rapid-reaction drone development in the Ukraine conflict highlights profound changes in the character of war and underscores the ability of warfighters to surge capability in less than a year. At the outset of the conflict, Ukrainian Bayraktar TB-2s served an important role, placing Ukraine's numerically superior enemy at a severe tactical disadvantage. The combat effectiveness of such an approach is revealed by data indicating that Ukrainian drones were responsible for destroying up to 57 percent of Russian armored combat vehicles.[17] However, within 4 months, Russian forces had adapted their own defenses and rendered the TB-2 obsolete as a frontline system.

In response, individual Ukrainian units began using AM to fabricate munition release mechanisms for commercial quadcopters.[18] In addition to procuring drones conventionally, Ukraine established over 200 hidden pop-up factories to decentralize production.[19] Defense companies even set up workshops in the trenches to enable rapid modification in direct response to combat results.[20] Further innovation included the use of intuitive first-person view (FPV) systems for navigation and targeting, which required little formal training.

Russian forces also adapted to the changing character of war. After Iranian-made Shahed drones were neutralized by Ukrainian defenses, the Russian industrial base pivoted to produce new designs. Within 10 months, Orlan-Lancet systems were deployed in hunter-killer pairs against Ukrainian forces.[21] By June 2024, an estimated 75 percent of battlefield drone losses were caused by electronic warfare.[22] In response, Russian forces began employing FPV drones that were controlled with fiber optics and immune from the effects of electronic warfare.[23] Such move-countermove developments in Ukraine demonstrate that rapid adaptability in battlefield production is a decisive necessity for modern battle. As one famous industrialist says, "The factory is the product." Today, this can be reformulated as "The factory is the weapon."

The Next Fight? Offsetting A2/AD

Harnessing the power of rapid adaptation holds the potential to offset the PRC's advantage of mass in the Indo-Pacific theater. The PLA's A2/AD doctrine and systems pose a significant threat due to its ability to target U.S.-enabling capabilities such as intelligence, surveillance, and reconnaissance (ISR) aircraft as well as command and control (C2) platforms. Additionally, the PLA Rocket Force seeks to target U.S. bases within the Indo-Pacific region. The dramatic expansion of the PLA Navy poses a further threat of precision strikes against U.S. maneuver forces and fixed bases.[24] By leveraging geographic advantages, such as shorter lines of communication and reduced logistics burdens, the PRC seeks to deter or prevent the United States from deploying forces to the decisive area of operations.[25]

A2/AD assumes that the PLA will have the ability to effectively find, fix, and finish the systems that enable and sustain U.S. forces. However, FATE dramatically complicates PLA targeting efforts through decentralization and distribution. Attempting to target battlefield production systems poses a significant tactical problem, since such capability may be indistinguishable from a standard shipping container, general-purpose truck, or other nondescript structure. Compared to geographically fixed-base or high-signature C2, ISR, and mobility platforms, FATE systems are inherently hard to target. Additionally, traditional models require the stockpiling of thousands of individual parts and end items.

Petty Officer 1st Class Tyler Vongphakdy of Southwest Regional Maintenance Center scrapes 3D-printed part during Joint Exercise Southern California 2025 in Coronado, California, May 8, 2025 (U.S. Navy/Antonio Gonzalez)

However, AM enables the fabrication of a thousand parts from a handful of base materials, vastly simplifying logistics.[26]

Rather than relying on the shipment of complete spare parts from the continental United States, FATE uses raw materials from prepositioned stocks, which reduces opportunities for the PLA to disrupt supply chains. While FATE systems are designed from the outset to be inexpensive and expendable, the A2/AD munitions used to defeat them are far more expensive to produce. For instance, a flight of four sUASs with C2, ISR, and homing-beacon payloads would cost a total of $30,000, based on experience with the Black Phoenix project.[27] In comparison, intercepting these sUASs with an S-300 class surface-to-air missile would likely cost approximately $1 million per shot.[28] Even if PLA forces target the FATE manufacturing systems instead of the end items, a brigade combat team–level system is projected to cost on the order of $200,000, significantly less than any munition expended against it. By employing systems at scale with an average 50x cost advantage, U.S. forces obviate a generation of investment by the PRC in A2/AD.

The PRC's reliance on state-owned enterprises and underinvestment in its professional acquisition corps limits its ability to emulate FATE.[29] FATE is designed to empower company grade officers (CGOs) and noncommissioned officers (NCOs) at the tactical level, fostering a decentralized command structure that allows for rapid decisionmaking and adaptability on the battlefield. Adversaries such as the PRC and the Russian Federation have historically resisted empowering their CGO and NCO corps to a similar degree. As acquisition professional and author Dan Ward states: "The tactical ability to rapidly deliver new capabilities is itself a strategic capability."[30] FATE offers the United States a transformative strategic advantage that will be difficult for the PRC to replicate.

The ability to "go to war with what you can build" rather than "go to war with what you have" fundamentally changes the calculus of strategic competition. By enabling U.S. forces to fabricate mission-specific capabilities at the tactical edge, FATE neutralizes decades of PRC investment in A2/AD systems. This capability not only renders A2/AD strategies less effective but also shifts the focus from preparing for a single large-scale conflict to maintaining a constant ability to innovate and adapt across a range of adversaries. The scalability of FATE ensures that its deployment remains reactive rather than escalatory. In essence,

Air ground equipment in U.S. military's war reserve materiel is stored at Warehouses Service Agency in Sanem, Luxembourg, February 8, 2024 (U.S. Air Force/Thomas Karol)

FATE allows the United States to adapt, build, and win in real time, keeping adversaries—whether the PLA or another emerging threat—on the defensive. This paradigm shift ensures that U.S. forces are not only ready to counter threats today but are also positioned to dominate the battlefields of tomorrow.

FATE at an Industrial Scale

As described in Arthur Herman's *Freedom's Forge*, General Motors established a striking historical precedent of forward-deployed production during World War II. The company discovered that a *Liberty*-class ship could transport 12 times as many trucks if they were disassembled rather than being shipped fully assembled. To realize this efficiency, GM established in-theater assembly plants at locations as far afield as Tunisia, Egypt, Burma, and Iran. These locations achieved incredible throughput and delivered a wide variety of vehicles. For instance, the plant at Andimeshk, Iran, supported Lend-Lease Program shipments to the Eastern Front. It employed 5,000 local nationals under U.S supervision and achieved a production rate of 2,500 vehicles a month.[31] This concept effectively extended the industrial reach of the United States to the tactical edge. As logistics once again become contested by the PLA, forward production reemerges as a solution for the United States and its allies.

Small-scale battlefield fabrication will focus initially on smaller-scale tactical systems, such as sUASs. The focus of these units will be on systems weighing less than 50 pounds that can be fabricated

with CONEX (container express) mobile production nodes. However, the FATE concept can scale beyond the immediate needs of the tactical battlespace. Located in theater, but not on the front lines, larger-scale fabrication hubs would produce more complex systems. These systems would be capable of providing larger UASs, loitering munitions, and unmanned undersea vehicles (UUVs).

Such larger hubs take advantage of the wide variety of base materials that modular AM platforms can provide, including concrete, metallics, and composites. Where appropriate, these systems could use host-nation personnel as operators, echoing the successful World War II approach. This two-tiered model—rapid CONEX-based battlefield production paired with larger forward-area manufacturing—provides scalable flexibility across the spectrum of conflict. It enables the United States to adapt to operational needs ranging from tactical swarming drones to operational-level autonomous systems while complicating adversary targeting and reducing logistical burdens.

One of the most powerful contributions of industrial-scale FATE is in effecting a binding strategy in the Western Pacific. Labor in this region has been driven largely by participation in global value chains with strong regional production networks.[32] By establishing forward-fabrication centers that leverage local national employees for both military and commercial production, the United States could strengthen economic and security ties simultaneously. These facilities could be rapidly retooled to manufacture UASs, UUVs, and subsurface vessels in times of conflict. During peacetime, the host nation may use the same systems to support the production of components for shipping, energy infrastructure, and disaster response.

In this way, FATE provides a military advantage as well as a mechanism to bind partner nations closer to the U.S. security architecture. Such a posture complicates PRC coercion and reinforces a resilient regional coalition well before any crisis begins. For the PLA to strike at FATE, it may be necessary to use force against otherwise neutral countries, diminishing the feasibility of a Chinese fait accompli.[33] Despite these advantages, it is important to consider how FATE would need to address barriers to a widescale deployment.

Structural and Procedural Consequences of Battlefield Fabrication

A straightforward thought experiment can provide a rough sense of the bulk lift effort required to support FATE at an industrial scale. Ukraine publicly states a loss rate of 10,000 sUASs per month during its conflict with Russia. Based on the experience of the Black Phoenix project, a standard intermodal CONEX could contain enough raw material for 500 to 1,000 unmanned mission-adaptable vehicles. A C-17 can carry a maximum of eight CONEX per sortie.[34] Assuming that a similar attrition rate would prevail in the U.S. Indo-Pacific area of responsibility during a widespread conventional conflict, FATE could be sustained by 10 to 20 dedicated C-17 loads per month. For comparison, a single Patriot battalion intertheater redeployment required 73 C-17 loads.[35] While these systems have different missions, they could provide similar impact at the operational level.

Realizing the benefits of industrial-scale application will require FATE to overcome numerous challenges. To overcome these barriers, the joint force should adopt a phased approach to FATE. The rapid prototyping phase is already well underway with systems such as XFab, R-FAB, NAVAIR's AM IPT, and Black Phoenix. One opportunity to garner additional early adopters during this phase is to use spare capacity at existing innovation cells within the joint force as FATE development centers. These initial experiments demonstrate the utility of developing two distinct variants of FATE: battlefield nodes and theater nodes. The smaller battlefield nodes would be optimized for field conditions to support immediate needs, while larger theater nodes are designed for enduring higher-capability needs. Each variant should be developed in parallel using existing technologies.

The next phase is rapid fielding. In this phase, training would begin in earnest, inclusive of both how to build with FATE and how to employ its end items operationally. Joint exercises are important to gather data and begin development of tactics, techniques, and procedures. Events focused on the Indo-Pacific, such as the Northern Edge or Northern Strike exercises, should be a priority for initial fielding. Additionally, this period would serve to validate functional requirements and elements of the product support strategy. Since FATE is a novel system, it is inevitable that it will encounter policy challenges. This phase

Army Private 1st Class Jimmy Roe, assigned to Bravo Company, 299th Battalion Support Brigade, Dagger Brigade, services Lulzbot Taz 2 Hard Plastic 3D Printer, part of Rapid Fabrication via Additive Manufacturing on the Battlefield, at Amberg Training Area, Amberg, Germany, May 4, 2018 (U.S. Army/Elliott Page)

of adoption provides an opportunity to resolve these bottlenecks prior to operations and sustainment.

As FATE ramps up nodes to reach its full operational capability, scalability concerns become paramount. Constraints such as unreliable power, lack of materials, and maintenance requirements are a fact of life in field expedient environments. Mitigations for these conditions include ruggedization, portable power systems, prepositioned stocks of base materials, and adequate organic maintenance training for operators. Using locally acquired material and prepositioned stocks could reduce FATE's logistical requirements. For sUAS capabilities, inexpensive plastic AM systems easily produce the required end items and can be set up within days, even in field conditions. More advanced capabilities to print metal or composite material require conditioned power and require months to establish at a theater node. However, the resulting end items provide greater capabilities.

Cybersecurity is an important concern that can be addressed by securing manufacturing systems on closed-loop networks or air-gapped systems, using encrypted design libraries to protect critical data. Keeping up with rapidly changing technologies requires integrating open architectures and modular designs into the manufacturing systems, allowing for fast upgrades and ease of maintenance by cross-trained personnel. Additionally, variable quality is a risk to the viability of delivering credible end items. Addressing doctrinal and cultural resistance to these changes will require strong advocacy from leadership across the joint force and demonstrable proofs of concept, like those achieved in the Black Phoenix project.

The Defense Logistics Agency (DLA) has made significant strides in establishing a supply chain for AM. For the first time, DLA has awarded a competitive commercial contract for AM production based on a data package including 3D drawings, print files, and quality assurance requirements.[36] Through its AM Integrated Product Team, DLA has also established a joint certification program for contractors as well as partnering with DOW organic manufacturers. While these efforts are still ongoing, they provide evidence that the logistics of FATE are manageable with modifications to current organizations and processes. These initiatives show that DOW is already beginning to lay the groundwork for integrating battlefield manufacturing.

An operationalized battlefield manufacturing capability is a profound paradigm shift for the joint force. Under the existing approach, uniformed services equip combat forces with end items in

response to requirements derived from strategic guidance and validated primarily through Military Department processes with joint validations only where required by statute, and prioritized against the Joint Staff's annually ranked KOPs. With FATE, the acquisition community equips the joint force with a capability to produce a class of expendable end items, tailored to battlefield needs and delivered within the operational planning cycle. Fundamentally, this approach considers the ability to manufacture capability on demand in the field as an inherent element of employing military force.

Although the existing Acquisition Decision Support Systems are intended to support the procurement of end items, these processes can be adapted to field FATE. For instance, conventional key performance parameters for a UAS might include threshold requirements such as required operating altitude, loiter time, and payload capacity. In contrast, the most essential attribute of a FATE system is its ability to fabricate effective military capabilities on an operationally relevant timeframe. A program of record that is itself capable of creating other systems is a revolutionary requirement. However, when reduced to its most fundamental attributes, FATE can be designed, procured, and sustained through established acquisition processes.

Cost and budget concerns can be alleviated by emphasizing long-term savings through lower production costs, as seen with systems like Black Phoenix. The potential trade-off between speed and quality in rapid manufacturing cycles is mitigated by focusing on mission-specific requirements, thus producing low-cost expendable systems that meet the immediate needs of the battlefield without requiring high durability. Operational risks such as making manufacturing systems targets for the enemy can be countered by ensuring they are mobile, easily concealed, and rugged enough to withstand harsh environments, a lesson learned from early tests at Eglin Air Force Base, Florida. While FATE poses implementation challenges, effective mitigation strategies ensure the capability remains scalable and operationally viable. When FATE is implemented across the joint force, its benefits far outweigh its costs and enable the rapid technological development as a form of maneuver, allowing the U.S. military to outpace adversaries in innovation, adaptability, and operational resilience.

Successful battlefield innovation is characterized by a well-defined combat need; a willingness to deploy immature capability; iteration; and a direct connection between developers and operators.[37] The technological developments underlying FATE enable a novel approach of empowering end users to become developers themselves. By reducing the barriers to decision and action, this approach has the potential to eliminate seams and dramatically shorten the acquisition OODA loop so significantly that technological adaptability becomes a decisive form of military maneuver. This concept, called Technology Maneuver Warfare (TMW), treats technological adaptation as a deliberate and decisive battlefield action. In TMW, capabilities are produced at the tactical edge that minimize sustainment needs and are highly adaptive to adversary developments and countermeasures. Although FATE presents numerous challenges, each comes with a feasible solution that makes battlefield manufacturing both practical and essential. Providing operators with a maneuverable manufacturing capability, in both physical and technological dimensions, represents the culmination of trends toward decentralized innovation and rapid adaptation in modern warfare.

Conclusion and Recommendations

FATE is a transformative approach to modern warfare that will significantly reduce U.S. dependence on vulnerable supply chains and fixed bases. By dispersing production capabilities across the battlefield, FATE complicates adversarial targeting, making it harder for the PRC to neutralize U.S. forces. Most critically, FATE allows for rapid adaptation to evolving tactical and operational needs, enabling U.S. forces to stay ahead of threats, iterate solutions quickly, and impose asymmetric costs on opponents. This flexibility positions the United States for success in future conflicts, ensuring battlefield dominance through innovation and speed.

The time to act is now. With current technology and sufficient resources, limited FATE capabilities can be fielded within 2 years. Between 2027 and 2030, the FATE capability could provide essential battlefield manufacturing, such as rapidly producing sUASs and mission-specific tools using 3D printing, AI-driven design, and open architectures. These mobile units at the tactical edge would enable decentralized production, thus reducing supply chain vulnerabilities and enhancing agility—critical enablers for agile combat employment in contested environments.

Beyond 2030, FATE has the potential to expand to more complex systems, such as Group 3 or Group 4 UASs and loitering munitions, as well as autonomous land and sea vehicles. With modular production technologies, FATE may fabricate autonomous vehicles, ISR platforms, and munitions, optimizing designs in real-time via AI. However, the United States must not wait to achieve these higher levels of complexity. Immediate investment in training, deployment, and field testing will ensure FATE becomes an operational capability before the critical window of 2027 to 2030 opens. **JFQ**

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Soldier fights in tandem with various robotics in Human-Machine Integrated Formations during Project Convergence Capstone 5 experiment, March 15, 2025, at Fort Irwin, California (U.S. Army/Patrick Hunter)

Cognitive Warfare and Organizational Design

Leveraging AI to Reshape Military Decisionmaking

By Michael S. Silver, Kellen D. Sick, Matthew A. Snyder, and Justin E. Farnell

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In 2002, the Oakland Athletics faced formidable challenges. With a payroll less than a third of the New York Yankees' $125.9 million and the departure of key players, the Oakland A's were projected to struggle. Yet they

won the American League West division, besting their star-studded 2001 run. Immortalized in the film inspired by Michael Lewis's book *Moneyball*, the team's 2002 season is a case study in leveraging data-driven decisionmaking to challenge and overturn a failing status quo. By prioritizing undervalued metrics, the Oakland A's constructed a team that tied the Yankees for the most wins in the league for a fraction of the cost. In 2004, the Boston Red Sox adopted this approach to break their 86-year championship drought, demonstrating the competitive edge that data-centric analysis provides in decisionmaking. Just as the 2002 Oakland A's leveraged data to challenge conventional approaches, modern warfare requires a shift from intuition-based decisionmaking to artificial intelligence/machine learning (AI/ML)–enabled decisionmaking. The joint force, like baseball two decades ago, faces an urgent challenge: integrate AI/ML or risk being outmaneuvered by more agile adversaries.

The military and economic dominance of the United States in the post-Soviet era compelled adversaries to shift their strategies away from large-scale conventional warfare. Instead, they have increasingly focused on contesting American decisionmaking through cognitive warfare, leveraging psychological, informational, and technological domains to erode strategic advantage. Unlike traditional warfare, cognitive warfare shapes how individuals and organizations perceive reality, evaluate choices, and act on information.[1] Russia's interference in the 2016 U.S. Presidential election and the United Kingdom's Brexit vote, as well as China's 2024 use of TikTok to influence Taiwan's presidential election, demonstrate the profound impact cognitive warfare has had on recent history.[2] Moreover, China is aggressively pursuing a future battlefield dominated by autonomy, outpacing adversaries with AI/ML tools that compress decisionmaking from seconds to milliseconds.[3]

The proliferation of tools such as China-based DeepSeek AI and U.S.-based ChatGPT has revolutionized private and commercial sectors by accelerating decision cycles.[4] These tools can analyze vast and complex data sets in seconds, producing insights that once required entire teams of analysts working over extended periods. For example, JPMorgan Chase uses AI tools to detect fraud and assess credit risk across millions of accounts in near-real time, while the U.S. National Weather Service employs ML models to rapidly process satellite imagery and atmospheric data, generating earlier and more accurate storm forecasts.[5] These systems reduce the human cognitive load and enable faster, higher-quality decisions at scale. In the national security domain, where the stakes far exceed those of finance or public safety, a competitive edge in the speed and accuracy of decisionmaking is more critical than ever. In this type of contest, those who can shape narratives, manipulate information, and make superior decisions faster than their competitors achieve victory.[6]

Despite widespread investment and experimentation in AI/ML, most organizations struggle to increase performance with this technology. Only one-quarter of companies experimenting with AI have generated real value, and less than 5 percent have built AI capabilities at scale.[7] Even large companies like Microsoft believe they are transforming, but they are merely using AI to speed up processes rather than fundamentally reshaping operations to optimize performance.[8] As evidenced by initiatives detailed on ai.mil, the Department of Defense—now the Department of War (DOW)—has invested billions of dollars into AI/ML capabilities. Still, mere access to this technology has proved insufficient for widescale integration.

The struggle is not only technological; it is behavioral. True AI integration requires more than technology; it requires *adoption*. Understanding why these AI challenges persist is critical to identifying viable solutions and preventing the erosion of strategic advantage. With three-quarters of all organizations yet to see tangible AI benefits, the challenge to adoption lies in amending structures, processes, and people to unlock the full potential of AI/ML.[9]

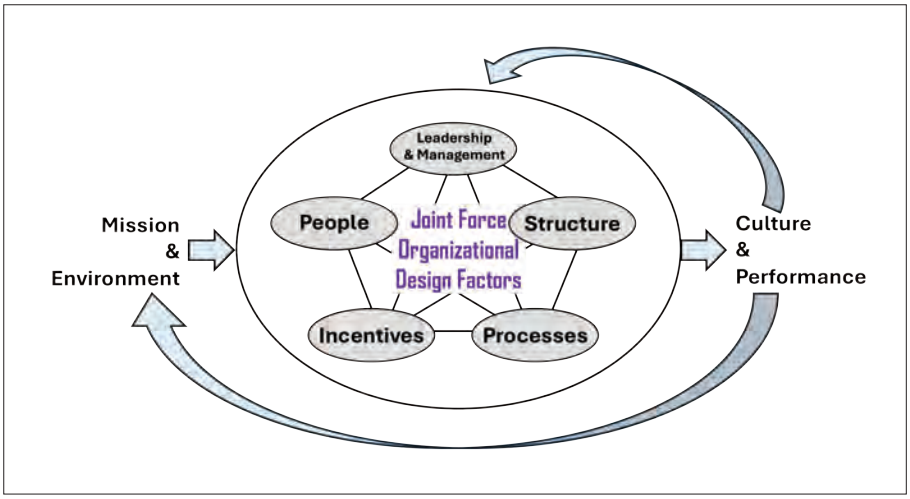
DOW must take note and move beyond the status quo, accelerating AI/ML adoption to enhance decisionmaking. At a February 2025 AI Action Summit in Paris, North Atlantic Treaty Organization (NATO) Supreme Allied Commander Transformation, Admiral Pierre Vandier, clearly articulated this imperative: "Artificial intelligence is massively accelerating military decisionmaking, and armed forces that do not keep up risk being outmatched."[10] Using the conflict in Ukraine as an example, he highlighted that the stakes of maintaining the status quo are stark: "If you do not adapt at speed and at scale, you die."[11] Admiral Vandier's mandate for AI training among officers in Allied Command Transformation underscores the critical insight that adoption, not capability, is the limiting factor for integration.

In this article, we seek to analyze organizational design factors affecting the widescale adoption of AI/ML tools into DOW decisionmaking. We do not address offensive and defensive applications of cognitive warfare; ethical considerations for using AI/ML tools; trust and transparency requirements; or vulnerabilities that using AI/ML tools might present to adversarial actors. These areas represent future research opportunities.

Approach to Analyzing Organizational Design

When an organization reaches an inflection point and assesses that the status quo will ultimately lead to its stagnation or decline, it must adapt its organizational design. Jay Galbraith's Star Model, first introduced in 1977 as a strategic approach to organizational design, provides a useful framework for such adaptation.[12] In this article, we modify Galbraith's Star Model to analyze organizational design factors affecting the widescale adoption of AI/ML tools into DOW decisionmaking. These factors can be applied across tactical, operational, and strategic organizations for warfighting, resourcing, and administrative purposes. The modified Star Model, illustrated in figure 1, includes five organizational design factors: people,

Figure 1. Modified Star Model for the Joint Force*



*Original Graphic. Derived from Jay R. Galbraith's Star Model.

structure, processes, incentives, and leadership and management.

The term *people* refers to the mindset, skill sets, and talents required of the individual workforce to achieve an organization's goals.[13] *Structure* refers to the location of decisionmaking power. It defines the shape of an organization, reflecting the hierarchy of authority and distribution of power through the lens of *what* and *where* decisions are made.[14] The term *processes* refers to the information flows that feed into decisionmaking.[15] *Incentives* are the motivational tools that drive people to exercise processes within a specified structure to achieve organizational objectives.[16] Incentives reflect a combination of extrinsic and intrinsic motivators. *Leadership and management* reflect the role that joint leaders play in establishing strategic direction and priorities for their organizations. They wield considerable influence over the other organizational design factors.[17]

These five factors operate as interdependent nodes of organizational design, reinforcing or weakening the overall strength of the organization. How these factors interact drives the organization's performance and cultural outputs. When mission or environmental changes influence one node in the modified Star Model to change, organizations should evolve and adapt to reoptimize the design factors.[18] Failure to do so risks organizational impotence or, worse, obsolescence.

Analyzing Organizational Design Factors

People. The physiology of the human brain as well as the mindset and skill set of people in an organization are critical factors affecting AI/ML adoption. Decisionmaking relies on interconnected cognitive processes shaped by experience and repetition. Over time, familiar workflows become deeply ingrained, leading individuals to rely on default patterns even when new tools become available.[19] This is evident in the joint force, where decades of Internet use have conditioned personnel to develop a "search-engine mindset."[20] This habituated approach relies on generating results through indexed, static, keyword-driven interaction. In contrast, AI/ML tools generate dynamic, context-sensitive responses that improve with iteration.

Effective AI/ML adoption necessitates a fundamental shift in human cognitive habits. Just as military planners use multiple iterations to refine initial concepts prior to execution, AI-generated outputs require a similar process to achieve optimal results. However, many users unknowingly limit the effectiveness of AI/ML by treating it as a static query system rather than an interactive tool. Reliance on traditional search-engine workflows has reinforced behaviors that are at odds with AI/ML's adaptive nature. Users approaching AI/ML with a conventional search-and-response model struggle when the technology requires a different form of interaction. Frustration grows when responses appear incomplete or contain "hallucination" errors that often prompt users to disengage from the technology.[21] As Conor Grennan, chief AI architect at New York University's Stern School of Business, notes, "It's not that our brain doesn't know how to use it—it's more nefarious than that. It's that our brain thinks it knows how to use it, but it's wrong."[22] The challenge is not simply learning a new tool; it is retraining deeply ingrained cognitive habits.

Like any weapon system, AI/ML is a purpose-built tool that complements, rather than replaces, existing capabilities. To unlock its full potential, personnel must shift away from treating AI/ML like a search engine to actively shaping AI/ML-generated outputs. For example, a Google query for "develop an operations plan for a joint force mission" yields static templates and archived operations orders (OPORDs). While useful, these resources require hours of manual adjustment to meet dynamic mission requirements. In contrast, a user iterating with a generative AI/ML model can rapidly create a fully customized OPORD tailored to mission-specific inputs. When provided with these inputs, AI/ML can analyze real-time intelligence to identify enemy force positions, vulnerabilities, and likely courses of action (COAs). It can incorporate weather forecasts to assess operational impacts and recommend troop movements, logistics, and contingencies. This iterative process has the potential to significantly accelerate the planning process, reducing planning timelines from days to hours and enabling faster, more informed decisions.

Developing new cognitive habits is only part of the challenge. Effective AI/ML adoption requires structured training to develop the requisite skills.[23] A recent study found that untrained users underperformed when applying AI beyond its intended capabilities, often because they treated it like a search engine. In contrast, trained AI users demonstrated significant gains in both productivity and quality. For individuals normally below the average

Marine Corps Lance Corporal Eric Granados, intelligence specialist with 3rd Battalion, 5th Marine Regiment, 1st Marine Division, I Marine Expeditionary Force, launches RQ-20 Puma during artificial intelligence–enabled system Dead Center as part of small unmanned aircraft system training on Marine Corps Base Camp Pendleton, California, August 20, 2025 (U.S. Marine Corps/Trent A. Henry)

performance threshold, performance increased 43 percent with effective AI augmentation. Individuals already performing above the average performance threshold still experienced a 17-percent improvement with effective AI augmentation. Additionally, trained AI users completed 12 percent more tasks and worked 25 percent faster than those without AI augmentation.[24] These findings highlight the necessity of deliberate AI/ML training to maximize operational effectiveness.

AI/ML training extends beyond technical proficiency in key skill sets such as prompt engineering, iteration and chaining, role-based interaction, and conversational engagement. It must also account for cognitive and behavioral mechanisms that drive adaptation. Training should reinforce positive feedback loops, where improved performance encourages continued use, ultimately leading to the formation of new habits. Achieving this shift requires deliberate implementation efforts to correct the lack of structured reinforcement strategies found in legacy methods. Behavioral change demands a combination of hands-on training, iterative learning, and leadership-driven adoption initiatives. While training programs are essential, adoption also depends on aligning AI/ML tools with organizational structure.

Structure. Organizational structure determines *what* decisions are made and *where* they occur, directly shaping AI/ML adoption. While mission and environment drive structural design, different structures affect the speed, efficiency, and effectiveness of using AI/ML tools for decisionmaking. Understanding the types of decisions an organization makes reveals how to use AI/ML tools. Identifying where decisions occur reveals where to apply them.

Decisions vary significantly in nature and complexity.[25] Administrative tasks like summarizing and disseminating meeting transcripts differ substantially from dynamic battlefield assessments based on emerging targeting information and force posture. Different types of decisions require different AI/ML integration models. Tasks with high variability and unpredictability require a more collaborative approach. In contrast, structured, repeatable decisions allow for greater automation. Common models include full delegation, interaction, and aggregation.[26] In full delegation, AI/ML tools make decisions without human intervention. In interaction, human and AI/ML tools sequentially make decisions such that the output of one decisionmaker provides the input to the other. Project Maven's augmentation of the targeting cycle is an example of this interaction model. The model can be further subdivided into the "Centaur" and "Cyborg" approaches. The Centaur approach drives human and AI task division based on relative strengths. The Cyborg approach fuses human-AI decisionmaking in real time, leveraging AI for continuous analysis and adaptation while maintaining human oversight for context-driven judgments.[27] In aggregation, human- and AI-based decisions are made independently, delegated based on strengths, and then aggregated into a collective decision. In this model, the AI/ML tool becomes a voting member in the decisionmaking process, often weighted based on various criteria. Each model reflects a different balance between human and AI/ML capabilities, tailored to the specific decision type.[28]

In addition to the type of decision being made, the distribution of decisionmaking power—*where* decisions occur—determines the optimal placement of AI/ML tools. Mission and environment typically drive this distribution across several structural types. Organizations emphasizing standardization tend toward professional or machine bureaucracies with centralized decisionmaking. Those requiring standardized output across semiautonomous units develop "divisionalized" structures. When project-based adaptive output is essential, organizations benefit from *adhocracies*—fluid structures with flatter decentralized authority.[29] In all cases, AI/ML tools should be integrated *where* decisionmaking occurs. Where mission and environment allow structural flexibility, decentralized decisionmaking can enhance AI's impact by enabling faster and more adaptive responses at lower levels. For example, Ukraine recently embedded Palantir engineers with AI/ML tools into its frontline units to enable rapid decisionmaking on the battlefield.[30]

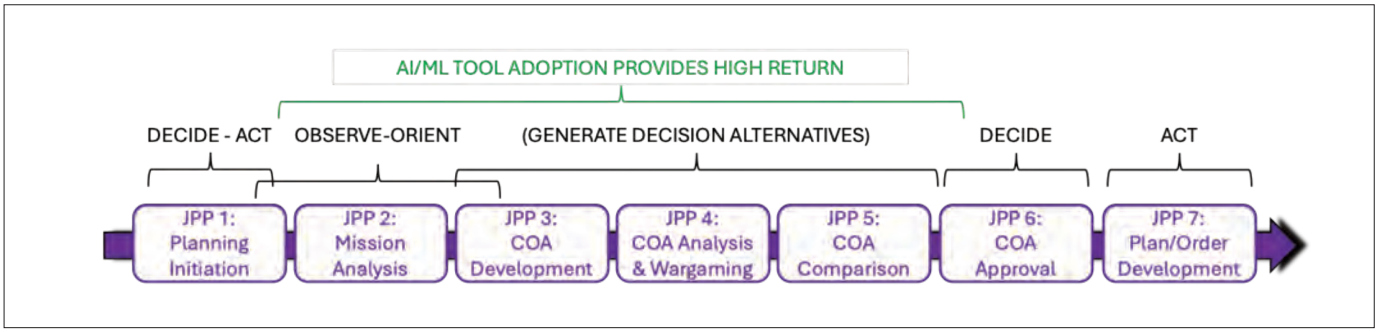
AI/ML tools perform best when accessing broad interconnected data sources. Consequently, AI/ML integration is particularly effective in rapidly composable and decomposable cross-functional teams that synthesize diverse inputs across disciplines. For example, in the convergence between electronic warfare and cyberspace, AI-enhanced threat detection becomes most effective when cybersecurity, signals intelligence, and operations personnel collaborate closely rather than operating in isolated silos.

Conversely, highly centralized structures may limit AI/ML tools to merely advisory roles instead of active components in real-time operations. Formalized hierarchies may also impede the development of the organizational competencies needed for effective adoption.[31] Even so, command-structured hierarchies like DOW can still benefit from increasing the vertical or horizontal decentralization of their decisionmaking wherever possible.

Organizations face a fundamental tension between maintaining internal coherence for efficiency and adapting to environmental changes. Bureaucracies often struggle with rapid adaptation despite their efficiency at standardization.[32] These organizational structures are slow to evolve, often failing to keep pace with changing environments that demand adaptation. Organizations must balance structural adaptation with internal consistency, implementing AI/ML tools according to the type of decision and aligning AI/ML tools to where they most effectively enhance speed, insight, and decision superiority.[33]

Processes. Adopting AI/ML tools into decisionmaking depends not only on *what* and *where* decisions occur, but also on *how* they are made. Processes are the interconnected activities that shape information flow up, down, and across an organization.[34] They facilitate collaboration, coordination, and organizational decisionmaking and affect how AI/ML tools enhance these information flows. Processes apply to both hierarchical and decentralized structures when any level of

Figure 2. Joint Planning Process Opportunities for AI/ML Tool Adoption*



*Original Graphic. Steps in the Joint Planning Process are derived from Joint Chiefs of Staff, Joint Publication 5-0.

collaboration between internal boundaries is required to accomplish the mission.[35] For the joint force, informal and formal processes must operate seamlessly under conditions of uncertainty, time constraints, and adversary countermeasures.

Decisionmaking, while complex, is a cycle of linked information flows.[36] John Boyd's OODA loop—observe, orient, decide, and act—provides a helpful simplification. Born out of the needs of aerial combat, the OODA loop asserts cycling faster than an opponent through this loop would produce advantages in combat. Conceptually, Boyd's ideas hold weight for using AI/ML tools in cognitive warfare. In the observe and orient steps, actors gather and perceive information and build mental models of the environment, threats, opportunities, and risks. An implied step is generating decision alternatives and comparing those alternatives before selecting one (the decide step) and then executing it (the act step).[37] Given this simplified framework, AI/ML tools are well suited for adoption in observe-orient processes and in generating and comparing decision alternatives. Using the Joint Planning Process (JPP) as a representative military decisionmaking process highlights these opportunities (see figure 2).

In its most distilled form, the JPP is a series of information flows executed across several functions to produce products and staff actions leading to commander decisions. Doctrinally, the JPP facilitates planning interactions among the commander, planning staff, and lower echelons.[38] This framework is a recursive, assessment-informed process in which issues that planners discover in later steps drive adjustments to earlier steps, and commanders have the flexibility to truncate, modify, or concurrently execute its seven steps depending on the situation or available time.[39]

To initiate planning, the commander must have a means by which to recognize, monitor, and react to changing trends in the environment. If the commander centralizes this function, he or she risks missing salient trends. However, disaggregating this function increases the requirement for processes. Previously, the larger the organization and the more disaggregated the processes, the more manpower was required to make decisions, resulting in slower decision cycles. AI/ML tools can accelerate decisionmaking processes by providing faster pattern recognition and sensing insights from a wider data set, enabling proactive rather than reactive planning.[40] For example, AI/ML tools can rapidly analyze raw intelligence data and highlight changes that exceed human-defined thresholds, reducing the need for manual data analysis and allowing humans to focus on critical and creative thinking.[41]

Once planning is initiated, AI/ML accelerates data-intensive mission analysis by fusing intelligence sources and force readiness reporting into a unified operational picture. This is critical for framing the problem and guiding COA development. Previously, these inputs were processed and visualized separately and with direct staff intervention, making it difficult for commanders to develop a comprehensive picture of the operating environment and the military problems they must solve. Instead, planners can use AI/ML tools to process terabytes of data, rapidly displaying information according to human-defined parameters. They can also use AI/ML tools to provide multiple visualization options for decisionmakers to consider.[42]

After this step, planners must develop decision alternatives for commander approval. In the JPP, this involves COA development, COA analysis and wargaming, and COA comparison. At this stage, planning shifts from critical to creative thinking. Still, planners currently generate solutions using manual methods of iteration, limited by the expertise and experience of their teams, and present the results using antiquated visualization tools like PowerPoint. AI/ML tools allow aggregation of large amounts of data across disparate functions and sources to generate multiple COAs faster and from a wider range of perspectives, reducing reliance on individual expertise and manual iteration.

Planners can use AI/ML tools to assume a unique persona when assessing potential adversary, neutral, and friendly reactions. With proper inputs, AI/ML tools can also role-play the "red team," speeding up the iterative play of war games. These tools facilitate the background analysis needed to identify a COA's strengths, weaknesses, and risks. Planners can also use AI/ML tools to assess multiple COAs based on the commander's priorities, constraints, and restraints.[43] These opportunities for AI/ML tool integration allow planners to compare, refine, and evaluate COAs, deepening the analysis supporting their COA recommendations to the commander. While AI-generated COAs are

Unmanned combat aerial vehicle YFQ-42A Collaborative Combat Aircraft, developed in partnership with General Atomics, conducts flight testing in California, August 27, 2025 (Courtesy General Atomics)

powerful, planners must resist overreliance on them and ensure that machine-generated options are filtered through human judgment, operational context, and commander's intent. As previously noted, AI/ML tools should augment, not replace, the iterative cognitive processes that underpin military decisionmaking.

Once the commander selects a COA, planners can use AI/ML tools to draft and disseminate the plan and orders on behalf of the commander. AI/ML tools can craft outputs from a wide range of inputs based on specified formats. Currently, the process of generating plans and orders involves the manually intensive task of transcribing the analysis and decisions made during planning to generate products like OPORDs.

Integrating AI/ML tools into the JPP illustrates just one of many opportunities where AI/ML-enabled processes enhance the effectiveness of information flow at machine speeds. AI/ML tools enhance a decisionmaker's ability to observe and orient and then develop a wide range of decision alternatives for refinement, comparison, and evaluation before selecting the optimal choice. For other processes, the adoption challenge lies in recognizing which information flows AI/ML tools are primed to support and then optimizing their use. Predictable and repeatable processes such as intelligence synthesis and aggregation, as well as force readiness assessment, lend themselves to more automated decisions using AI/ML tools. Ambiguous, iterative, or creative processes like mission analysis, adversary modeling, and COA development lend themselves to interaction models like the Centaur or Cyborg approaches discussed earlier. Processes related to the evaluation of decision alternatives, such as COA comparison, lend themselves to the aggregated use of AI/ML tools.

Incentives. Incentives drive behavioral change, aligning individual and organizational goals to ensure mission effectiveness. If DOW is to pursue the broadscale adoption of AI/ML tools into decisionmaking, its leaders must carefully evaluate the impact of incentives and disincentives on organizational performance, particularly regarding the acceptance of change. The status quo acts as an adversary to change, manifesting in deeply rooted organizational habits that create resistance to the changes needed for progress.[44]

Resistance can be individual or organizational. Individual resistance is either malicious or nonmalicious. Malicious resistors actively create obstacles to preserve self-value, often driven by fears of emerging technology displacing their position in the organization. Nonmalicious resistors, by contrast, may simply lack understanding of the change,

Autonomous low-profile vessel sails on Del Mar Boat Basin to test its capabilities as part of Project Convergence Capstone 4, February 23, 2024, at Camp Pendleton, California (U.S. Marine Corps/Kevin Ray J. Salvador)

making them reluctant to venture beyond familiar practices.[45]

Organizational resistance may manifest in several ways. First, social and cultural resistance may stem from generational preferences for traditional methods. This could be due to a lack of AI/ML tool literacy or misunderstandings about the technology's potential application. This resistance is more pronounced in hierarchical structures like DOW, where time-in-service promotion systems concentrate decisionmaking authority within a single generation. Second, ethical and moral criticism creates organizational resistance that centers on concerns about trustworthiness, authenticity, and potential plagiarism of using AI-generated content. "AI shaming"—the criticism of using AI/ML tools based on ethical concerns, perceptions of laziness, or trust issues—can manifest both horizontally and vertically within an organization.[46] Third, perceptions of the impact that AI/ML tools have on individual skill requirements, job security, and authority may contribute to this resistance.[47]

Within each category of resistance, there is likely a champion of the status quo whose behavior joint leaders must influence by providing appropriate incentives for change. For example, this could be the senior warrant officer preferring traditional tools, a noncommissioned officer concerned about security implications, a staff officer fearing job obsolescence, or a general officer who does not trust AI-produced products, demanding intensive staff labor no matter the impact on efficiency.

Overcoming this resistance requires a balanced approach to incentives. While structural and process changes can address tangible obstacles, overcoming entrenched habits requires careful attention to incentives. Incentives can be extrinsic (for example, compensation, promotions, and recognition) or intrinsic (job satisfaction, challenging work, and personal fulfillment).[48] While extrinsic incentives may help jump-start the early adoption of AI/ML tools, intrinsic incentives ultimately shape the organizational culture needed for long-term transformation.

Intrinsic incentives offer several opportunities for individual and organizational growth and development. For instance, AI/ML tools may enhance individual and group research efficiency across various disciplines, subsequently streamlining product-generation timelines. Additionally, human-machine collaboration allows organizations to leverage the creative and computational strengths of both, facilitating rapid data analysis and creative problem-solving. Finally, mitigating self-biases through education and training develops a growth-minded culture within the organization. This type of culture unlocks additional innovation, normalizes change, and increases intrinsic incentives that drive individuals and organizations toward aligned goals.

The combination of extrinsic and intrinsic incentives should be tailored to the type of resistance the organization experiences. However, organizations may be constrained by what incentive levers they can affect to motivate desirable behaviors. This leaves joint leaders with the challenge

of identifying the right influence tools to promote the growth and transformation within their organizations to achieve widescale adoption of AI/ML tools.

Leadership and Management. An organization's leadership and management greatly influence organizational design factors affecting the adoption of AI/ML tools into decisionmaking. However, joint leaders must first address their own AI/ML literacy before they can effectively adapt the other organizational design factors for AI/ML tool adoption. Without understanding AI/ML capabilities and limitations, leaders risk either over-relying on these tools or under-utilizing them because of skepticism.[49] For example, using AI/ML-enabled decision aids can enhance battlefield effectiveness, but only if commanders know how to interpret their suggestions and trust their outputs.

Beyond developing personal AI/ML literacy, joint leaders must articulate a compelling vision for change and a clear path to pursue it.[50] This communication is particularly important for addressing nonmalicious resistance, which often stems from a lack of understanding rather than active opposition. Leaders must recognize that resistance to AI/ML adoption will manifest differently across their organizations and tailor incentives to overcome the specific type of resistance they encounter. Leaders who create a growth-minded organizational culture create a powerful complement to more direct incentives. Such cultures become self-reinforcing as improved results demonstrate the value of AI/ML tools, normalizing their adoption.[51]

Joint leaders must systematically assess how organizational design factors affect AI/ML adoption in their units. For *people*, this means driving the training initiatives to shift mindsets from "search-engine thinking" to understanding the interactive use of AI/ML tools. It also means driving the training initiatives to develop new skill sets like prompt engineering and iteration techniques to optimize human-AI collaboration. Where mission and environment allow flexibility, joint leaders should consider structural choices that better enable AI/ML adoption to accomplish their mission through faster and wider-informed decisionmaking. This generally involves pushing decisionmaking down and to the edges of an organization, flattening the structure to facilitate cross-functional collaboration, iteration, and parallel use of AI/ML tools. To do this, joint leaders must assess *what* decisions are made in an organization and *where* decisions are made, restructuring to optimize the use of AI/ML tools. When necessary, command relationships drive hierarchical structure, and joint leaders should still identify vertical and horizontal decentralization opportunities to maximize AI/ML tool effectiveness. In *processes*, joint leaders must guide the adoption of AI/ML tools into the information flows that feed their decision cycles, identifying which flows benefit from fully automated or hybrid approaches. Ultimately, joint leaders must recognize that the adoption of AI/ML tools requires synchronized adaptation across all organizational design factors.

Leadership and management play an outsized role in shaping organizational design factors. The combination of these factors drives an organization's performance and culture. Joint leaders who fail to proactively adapt their organizations for AI/ML adoption risk leaving the joint force anchored to legacy decisionmaking models that compromise strategic advantage.

Conclusion

In modern warfare, decision dominance is highly correlated with victory. AI/ML tools are reshaping the battlespace by enhancing the speed and precision of decisions. For DOW, failure to meaningfully adopt these tools carries severe consequences, including slower operational tempo, increased cognitive overload, a higher probability of intelligence blind spots, and reduced force readiness.[52]

This analysis reveals that widescale integration of AI/ML tools hinges not only on technological capability and access but also on organizational design factors affecting the adoption of AI/ML tools. To break from a status quo deeply rooted in outdated habits of human cognition, institutional resistance, and legacy decisionmaking processes, DOW must adapt its people, structure, processes, incentives, and leadership and management.

The imperative is clear. DOW must accelerate the adoption of AI/ML tools into its decisionmaking. Failure to do so risks the joint force being outpaced by adversaries who weaponize AI/ML tools to operate more effectively. As these tools move further left in the decision continuum, they will increasingly shape how problems are framed, options generated, and actions selected. Human judgment still plays a role, and must evolve in parallel, but it must not become a brake on progress. In short, failure to adopt AI/ML at speed invites obsolescence, an untenable option for U.S. national security.[53] **JFQ**

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Marines with 1st Battalion, 3rd Marines, 3rd Marine Division fire Javelin shoulder-fired antitank missile while conducting squad attacks during Fuji Viper 22.3 at Combined Arms Training Center, Camp Fuji, Japan, February 17, 2022 (U.S. Marine Corps/Juan Carpanzano)

Ukraine, the U.S. Defense Industrial Base, and the Elusive Crisis-Era Munitions Production Surge

By Bryce Loidolt

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A growing chorus of U.S. defense analysts, lawmakers, and military officials has emphasized that the United States lacks the munitions production capacity to meet the demands of the contemporary strategic environment.[1] The results of public war games underscore this deficiency, suggesting that in the event of a conflict with China the U.S. military could

run out of munitions within weeks.[2] Although concerns over the responsiveness of the U.S. defense industrial base to strategic imperatives pre-date Russia's full-scale invasion of Ukraine, the extended drawdown of U.S. stocks to support the Ukrainian armed forces have brought these concerns into greater focus.[3] As one account describes, "One of the many lessons learned from the ongoing war in Ukraine is the inadequacy of the U.S. defense industrial base to keep pace with high-intensity conflict."[4]

Although certainly true, narratives of the U.S. defense industrial base's inadequate performance during the Ukraine crisis overlook the real—albeit still mixed—progress the United States achieved in boosting some munition production rates from 2022 to 2024.[5] During this period, the production rate of certain munitions increased while others stagnated. The reasons behind this variation could imply lessons or models the Department of War (DOW) could employ in future crises to ensure more pronounced munitions surges across the board. For their part, existing studies have tended to focus on either improvements that can be made to improve the industrial base's baseline performance in a peacetime environment or, alternatively, lessons from World War II for the future mobilization of the U.S. economy to support a protracted conflict.[6] The ability of the industrial base to *surge*—defined as the time-bound increase in production that does not entail the mobilization of the civilian economy—has received less attention.[7]

This article fills this gap by comparing four munitions that experienced diverging levels of production ramp-ups after Russia's invasion of Ukraine. It finds that although the United States was able to quickly and flexibly resource industrial base improvements and put orders on contract after 2022, post-crisis efforts were not responsible for these patterns of increase and stagnation.[8] Instead, it was pre-crisis procurement and associated investments that led to this variation. Munitions that the U.S. military Services put on contract prior to the crisis were those that experienced the most pronounced surge during the crisis.

This finding underscores the need for more urgent action on the part of DOW to conceptualize, enhance, and test munitions surge capacity "left of crisis." It points to the need for greater cross-departmental alignment on and awareness of surge methodologies and triggers, enhancement of U.S. surge instruments, the explicit inclusion of surge into mobilization exercises and war games, and a broader reconsideration of the U.S. portfolio of high-end munitions. DOW must avoid a binary distinction between peacetime "business-as-usual" defense industrial base posture and a comprehensive mobilization of the civilian economy.

This article begins with a brief overview of the U.S. military's experience with munitions shortages and associated mitigations since World War II. Among the latter is often an effort to accelerate production and deliveries to meet intense demands. It then turns to common barriers the department has encountered in trying to surge, including lack of capacity, obsolescence, long lead time materials and components, and supply chain visibility and bottlenecks. Following this discussion, it evaluates variation across four munitions, tracing this variation back to pre-crisis procurement and investments. It concludes with implications for U.S. defense policy.

Munitions Shortages and Mitigations Since World War II

Munitions shortages are not new for the U.S. military, DOW, or the U.S. defense industrial base. Concerns over the impact of contingencies on U.S. materiel readiness during major crises have indeed been a near constant since the end of World War II. With these concerns has come a push to adopt several mitigations.

At times, the daylight between projected materiel needs and the intensity of combat operations have lowered U.S. readiness levels. U.S. combat operations in Korea strained U.S. supplies of 4.2-inch mortars, hand grenades, and 155mm howitzers.[9] Operation *Allied Force* in Kosovo significantly stressed the U.S. military's missile inventory, such as conventional air-launched cruise missiles and Tomahawk Land Attack Missiles.[10] Operations *Enduring Freedom* and *Inherent Resolve* placed a similar strain on U.S. Joint Direct Attack Munition (JDAM) stocks.[11]

In other cases, the stress to U.S. stocks has not come from direct U.S. participation in combat operations but rather from drawing down U.S. inventories to support an ally or partner. During Operation *Nickel Grass* in 1973, the U.S. Air Force orchestrated the airlift of 22,305 tons of materiel to help resupply the Israeli armed forces during the Yom Kippur War.[12] Much of this materiel, featuring badly-needed F4 fighters, 105mm ammunition, and Maverick missiles, came from U.S. operational inventories.[13] Among other impacts on U.S. military readiness, these transfers left one U.S. F4 squadron without aircraft and severely limited the capacity of another.[14]

No matter the decade or cause, these shortages have frequently been met with a variety of mitigation strategies. The simplest of these strategies has been to simply direct combat units to fire fewer rounds. In 1952, the U.S. Army mandated, for example, that fielded units in Korea ration ammunition to "bridge the gap between the decreasing stockpile and new production."[15] In other instances, the military has sought to convert or alter existing capabilities to serve as substitutes for dwindling stocks of other munitions. Amid munitions shortages experienced during Operation *Allied Force*, for example, the then–Department of Defense (DOD) altered nuclear-tipped air-launched cruise missiles to meet the conflict's munition demands.[16] During Operations *Inherent Resolve* and *Enduring Freedom*, DOD also managed risk by shifting munitions across combatant commands or Services to meet pressing operational requirements.[17]

In tandem with or in lieu of these mitigations, DOD/DOW has also often attempted to ramp up production of key munitions to meet increased demand. During Operation *Enduring Freedom*, for instance, the United States sought to

Air Force Staff Sergeant Kiyanna Nichter, 56th Maintenance Group weapons load crew member, secures AIM-9X Sidewinder missile for Air Force F-35A Lightning II during third quarterly weapons load competition, October 6, 2023, at Luke Air Force Base, Arizona (U.S. Air Force/Katelynn Jackson)

triple the production rate of JDAMs.[18] Operation *Inherent Resolve* similarly led the U.S. Air Force to again temporarily boost production of these munitions as well as small-diameter bombs and air-ground munitions.[19]

Barriers to Surge

The ability of the U.S. industrial base to rapidly increase the production of munitions has long been constrained by several well-documented obstacles. A readout of Proud Saber 83, a 1982 DOD exercise designed to test existing mobilization procedures, is instructive in this regard. Following two national-level command post exercises of mobilization plans, Proud Saber 83 led DOD to conclude that a "six-month industrial surge would yield only a negligible increase in production. Surge capability is limited by the need for long-lead-time components, shortages of specialized equipment, and sole source production of pacing components by subcontractors."[20]

The post–Cold War consolidation of the U.S. defense industry only made matters worse, incentivizing industry to slash excess industrial capacity and ultimately yielding a munitions industrial base that was not fit to surge during a crisis.[21] Component obsolescence, supply chain vulnerabilities and visibility, and capacity shortages are indeed reinforced by these structural conditions.

The issue of obsolescence has long imposed a rather stringent upper bound on the speed and scale of U.S. missile production. Obsolescence occurs when the original manufacturer or supplier of an item or raw material ceases production or is no longer in business. It can also occur when those items are so outdated so as to longer be useful.[22] Microelectronics are frequently the culprit due in large part to the turn to commercial-off-the-shelf components, which have a much shorter lifespan than the average DOW system life cycle.[23] In practice, a key mitigation for U.S. munitions manufacturers has been to pursue expensive lifetime buys of soon-to-be obsolescent items or requalification and redesign efforts to manufacture a new replacement part. The former is expensive and not feasible when those items have a limited shelf life, and the latter is time-consuming and costly, making it an unattractive option when needing to surge in a crisis.

A related challenge is single or sole source suppliers for key items or materials. One study from the 2010s of 35 key munitions found that 98 percent of the critical components in the second and third tiers of these munitions' supply chain were single or sole source.[24] In some instances, these items are defense-specific, and accordingly their production

F-35A Lightning II test aircraft assigned to 31st Test Evaluation Squadron from Edwards Air Force Base, California, released AIM-120 AMRAAM and AIM-9X missiles at QF-16 targets during live-fire test over Air Force range in Gulf of America (formerly Gulf of Mexico), June 12, 2018 (U.S. Air Force/Michael Jackson)

rates are tied directly to volatile demand signals from DOW. The solid rocket motor industry, for instance, has consolidated over decades, leaving few options available to the multitude of the munitions that use them for propulsion.[25] When these single- or sole-source suppliers encounter unanticipated production challenges, no longer produce a part, or otherwise choose to restrict supply of key materials, all production lines reliant on it will grind to a halt.

Recognizing these supply chain vulnerabilities can itself be a challenge given the sheer complexity of munitions production and the reliance on subtier suppliers. Defense policymakers and acquisition professionals frequently have a limited baseline visibility into munition supply chains, portions of which may reside abroad.[26] Accordingly, the department relies on deep dive assessments designed in part or in full to map and illuminate interdependencies and capacity challenges in these lower production tiers.[27]

Shortages in production capacity, exacerbated by an aging workforce and antiquated manufacturing and testing tools, further constrain the munition industrial base. Munitions production is a complex endeavor, often requiring uniquely skilled personnel and, in some cases, requiring such precise modifications that "touch," hand-on labor is the preferred approach. Employees with these specialized skills are in short supply.[28] The specialized tools and testing equipment needed to make sure munitions work properly take a long time to build and are expensive to keep ready when production is dormant.[29]

A cyclical "boom and bust" munitions procurement pattern by the U.S. military Services reinforces these challenges, rendering industry reluctant to invest in excess or even baseline production capacity without a concrete demand signal.[30] Fluctuations in defense contracts thus increase the risk that individual companies will lose production work and be unable to retain their workers on production lines or maintain and upgrade their equipment. The result is a limited ability for the munitions base to ramp up production when a crisis hits and magazine depth plummets.

These challenges imply that surging munitions production during a crisis would be a considerable undertaking. As alluded above, though, some munitions provided to Ukraine witnessed production increases while others did not.

Security Assistance to Ukraine and the Surge Imperative

Since Russia's full-scale invasion of Ukraine in 2022, U.S. security assistance to Ukraine has come through two channels. The first channel, the Ukraine Security Assistance Initiative, was authorized in 2015 to provide training, military assistance and other support to the Ukrainian armed forces. This funding stream allows the United States to procure military capabilities from the defense industry to, in turn, provide them to Ukraine. A complementary stream of support has come through Presidential Drawdown Authority (PDA), which authorizes the President to provide materiel support to a U.S. ally or partner from existing U.S. military stock.[31] Both initiatives have neces-

sitated production ramp ups, whether to more quickly meet Ukraine's operational requirements or replenish U.S. military stocks to offset any degradation in U.S. military readiness imposed by PDA transfers—or both.

Early in the crisis, DOD leaders were able to leverage preexisting and new authorities, resource streams, and processes to reduce administrative lead times and ensure ample funding for industrial base improvements. From 2022 to 2024, Congress authorized five tranches of Ukraine supplemental funding, a portion of which was dedicated to DOD procurement accounts to replenish munitions and boost production capacity.[32] The 2023 National Defense Authorization Act further authorized flexible acquisition authorities for Ukraine-related contracts, to include the use of other-than-competitive procedures, and DOD made extensive use of undefinitized contracting actions and indefinite delivery/indefinite quantity contracts to expedite acquisition timelines as well.[33] Moreover, in October 2022, the White House issued a Presidential Determination, allowing the President to directly fund the acceleration and expansion of defense production capacity to support Ukraine using Defense Production Act Title III funds.[34]

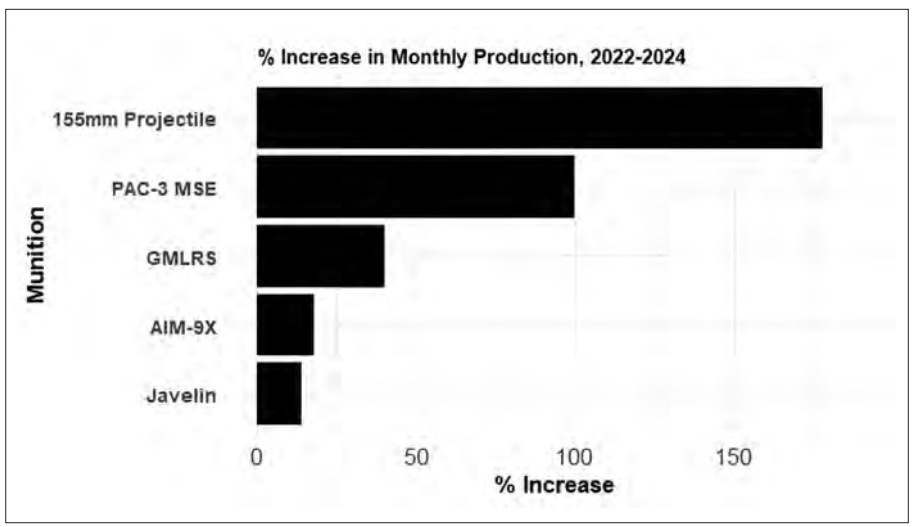
With these funds and authorities came additional organizational bodies and processes to manage them. In 2022, DOD reestablished what had previously been known as the Munitions War Rooms—now renamed the Munitions Industrial Base Deep Dive effort and eventually institutionalized as the Joint Production Acceleration Cell in March 2023—to assess production constraints and direct funds to mitigate them.[35] It also established a Senior Integration Group–Ukraine as a higher forum to quickly align requirements, contracts, and funding.[36]

The apparent results of efforts to boost production were outlined in a September 2024 DOD press release highlighting the industrial base achievements of the United States, its allies, and partners. Noting that the United States had invested $5.3 billion to "expand domestic production capacity" of several munitions, the release touted production increases across a variety of munitions. These munitions run the gamut of the relatively simple 155mm projectile as well as the more complex Patriot Advanced Capability–3 Missile Segment Enhancement (PAC-3 MSE), the Guided Multiple Launch Rocket System (GMLRS), the AIM-9X "Sidewinder," and Javelin missiles (see figure 1).[37]

By emphasizing them as "significant achievements" and juxtaposing them with crisis-era investments, the press release strongly implies that these investments and activities contributed to these impressive increases in production. Yet even if this were the case, the patterns reflected in figure 1 are neither intuitive nor complete. For one, the rate increases do not readily correlate with munition complexity. The robust boost in the production of the unguided World War II–era 155mm projectile may be an unsurprising if challenging milestone. What is surprising, though, is the doubling of the much more modern (and chip-laden) (PAC-3 MSE) air defense munition production rate. And the production of Javelin missiles, which are less advanced than the PAC-3, witnessed far more modest increases.

Just as important is the need to consider munitions where DOW may have attempted to surge but where production stagnated. Such cases, of course, would naturally be absent from a public-facing press release. But including these cases in a broader analysis is necessary to make credible claims about the sources of surge success and failure during the crisis, and, in turn, to help DOW improve surge capacity during future contingencies.

Figure 1. Munitions Production Increases, 2022–2024



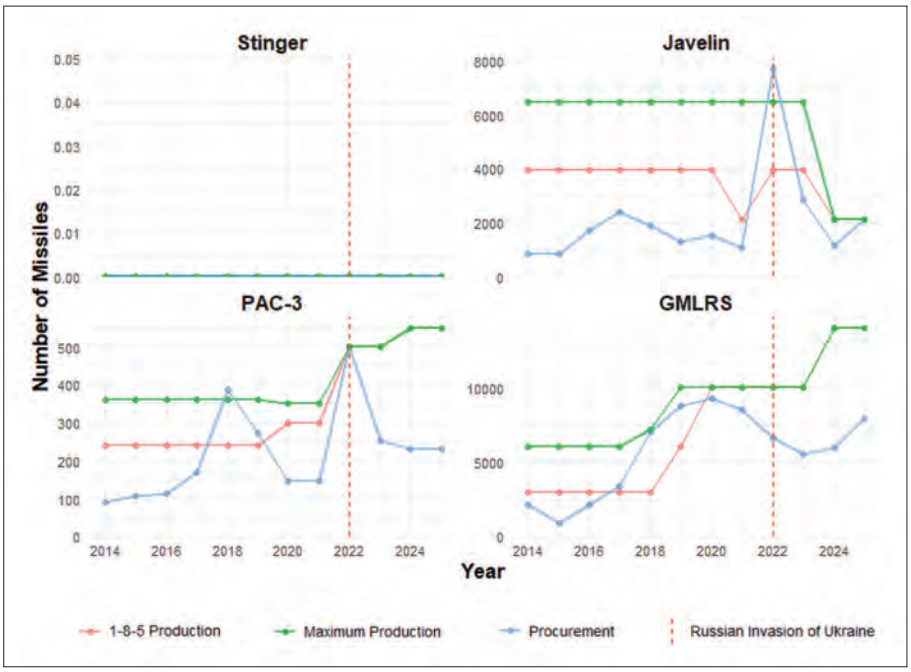
Source: Adapted from "Fact Sheet on Efforts of Ukraine Defense Contact Group—National Armaments Directors," Department of Defense, March 6, 2024.

Case Study Analysis

This study seeks to uncover why some U.S. munitions witnessed more dramatic production increases than others during the Ukraine crisis. Its central thesis is that pre-crisis procurement decisions were largely responsible for post-crisis surges. The decision to procure munitions can come with investments in production capacity. So, too, procurement can help keep supply chains flowing and, with effective program management, help illuminate and circumvent bottlenecks and anticipate obsolescence.

To evaluate this explanation, the case study examines procurement patterns and production rates of a cross-section of munitions provided to Ukraine since Russia's full-scale invasion. These munitions include Stinger, Javelin, GMLRS, and PAC-3 MSE. Each is a guided munition provided to Ukraine prior to 2024. For each munition, U.S. policymakers or defense manufacturers also referenced a desire to accelerate production. These

Figure 2. Procurement Quantity and Production Rates



munitions are also managed by the U.S. Army, holding that potential confounding variable constant. Still, the munitions examined in this study are not a random sample and are not perfectly comparable.

Drawing on U.S. Army budgetary and procurement data, figure 2 provides additional clarity and context to claims of post-crisis production increases. It depicts 2002–2024 fluctuations in procurement and production for each munition examined in this study. With respect to the latter, the figure illustrates the maximum production rate, which is the highest production rate possible with current facilities and capacity, and the 1-8-5 Production rate, which is the number of missiles the manufacturer could produce with current capacity working one 8-hour shift, 5 days a week.[38] These data imply support for the claim that pre-crisis production patterns were an important determinant of post-crisis surge. Yet additional confidence in this claim requires a more fulsome discussion of each munition, which the subsequent sections provide.

Stinger. First fielded in 1981, the Stinger missile is a man-portable air defense system suitable for targeting low-flying manned and unmanned aircraft. Since announcing the first shipment in early 2022, the United States has provided over 3,000 of these missiles to the Ukrainian armed forces. These missiles allow Ukrainian forces to shoot down low-flying Russian planes, helicopters, and other airborne threats.[39]

Buoyed by the flexible acquisition authorities referenced above, U.S. contracting personnel moved remarkably fast to procure replacement Stinger missiles to replenish U.S. Army stocks.[40] After receiving supplemental funding on May 1, 2022, the department issued an undefinitized contract order to replenish U.S. stocks within 20 days.[41] Accordingly, by the end of May 2022, the department had awarded the manufacturer a $624 million contract.[42]

At the onset of Russia's invasion, though, the United States had not purchased a Stinger missile in 18 years.[43] U.S. stocks were full and maintained through a service life extension program, and the Army was pursuing a modernized replacement.[44] The program itself had been started (and stopped) seven times prior to the Ukraine replenishment to fulfill foreign military sales orders.[45] Many of the rare and dated components required for this limited production were provided by the foreign customer itself rather than the manufacturer and its subtier suppliers.

The "cold" production line had consequences when trying to ramp production to replenish U.S. stocks in a timely fashion in 2022. A lack of procurement created a situation where a number of missile components in the seeker head were "no longer commercially available" and, accordingly, had to be redesigned before production could resume.[46] These obsolescence challenges were compounded by the fact that the workforce with the requisite skills to assemble the missile, which is done by hand, had largely retired.[47] Beyond the seeker components, Stinger production was also hampered by limitations in solid rocket motor production.[48] As a result, DOD and the manufacturer alike estimated that missiles ordered in May 2022 will not be delivered until at least mid-2026, despite an original estimation that production could resume in 2023.[49]

Javelin. A man-portable fire and forget antiarmor missile fielded in 1996, Javelin was provided to the Ukrainian armed forces prior to and after Russia's 2022 invasion. Dubbed "Saint Javelin" by some of its operators, the Javelin was credited at one point in the conflict as boasting a 93-percent kill rate against Russian tanks.[50] Claims of effectiveness aside, since 2022 the United States has provided over 10,000 Javelin missiles to Ukraine through PDA transfers.[51] Much like Stinger, pre-crisis production inactivity rendered any rapid increase in production particularly difficult. From 2022 to 2024, Javelin production increased by only 14 percent.

The provision of Javelin missiles from U.S. stocks necessitated boosting production to replenish them. Indeed, early in the crisis, the United States was estimated as having donated around one-third of its stock of Javelin missiles to Ukraine, which under the current production rate would take roughly 5 years to replenish.[52] In early 2022, the manufacturer thus laid out its objective of doubling Javelin production, noting "it will take a number of months, maybe even a couple years to get there."[53]

Much like Stinger, DOD was able to move quickly to obligate funds to meet this objective. Throughout May, the U.S.

Army procured over 2,000 Javelin missiles, utilizing both Army and Ukraine supplemental funds.[54] Additional procurement of replenishment Javelins followed, consisting of $311 million for 1,800 Javelins in September 2022 and a 2023 3-year procurement of up to $7 billion worth of Javelin missiles.[55] From 2022 to 2024 the United States also invested $78 million of supplemental funding for industrial base improvements to increase production.[56]

Prior to the Ukraine crisis, Javelin production lines were only minimally active. As the program executive office described in 2022, "Javelin relies on the combined United States Army, other services, and FMS procurements to reach Minimum Sustaining Rate."[57] Javelin's propulsion system, specifically solid rocket motors, posed a major difficulty. Unlike many other munitions' components, solid rocket motors lack a broader commercial customer base and are uniquely tied to the demands of defense programs, missiles in particular. The supply chains for solid rocket motors are complex—by one estimate spanning 1,000 lower-tier suppliers for the motors' raw materials and subcomponents.[58] When the maker for Javelin's propulsion system faced supply chain challenges, it struggled to deliver propulsion systems to meet the accelerated production timeline.[59] Javelin further encountered labor shortages and required additional investments in tooling and test equipment, further inhibiting a more meaningful production increase.[60] U.S. Army data reflect these challenges. The maximum production rate of Javelin dropped after Russia's invasion in 2022.

GMLRS. First fired in 2005, GMLRS are indirect precision fires munitions provided to Ukraine in the summer of 2022.[61] With their approximately 70km range, GMLRS allowed Ukrainian forces to strike beyond the front lines, accurately engaging Russian materiel storage sites and missile launch locations from standoff ranges.[62] Unlike Stingers and Javelin, from 2022 to 2024, GMLRS production witnessed a marked—if still constrained—increase, reaching 14,000/month by 2024, a 40-percent increase from pre-conflict levels.

Specific numbers of GMLRS provided to Ukraine are not publicly available, but similar to both Javelin and Stinger, the United States moved quickly to award contracts to replenish military stocks after announcing the transfers. Congress approved several tranches of Ukraine supplemental funds dedicated to replacing donated GMLRS rockets and expediting production by purchasing long-lead parts.[63] The U.S. Army subsequently awarded contract options to replenish U.S. inventories in October and November 2022, and a subsequent 2024 multiyear procurement award gave way to the more ambitious goal of eventually doubling GMLRS production.[64]

A 40-percent increase in GMLRS production did materialize by 2024. But that boost draws its sources back to pre-conflict procurement. Although demonstrative of the boom-and-bust procurement patterns that often preclude more robust industrial base investments, the U.S. Army and foreign partners had made significant purchases of GMLRS—over 26,000 rockets in total—from 2017 to 2021.[65]

This pre-crisis procurement likely paved the way for the 2024 production ramp up by allowing program managers and the manufacturer to identify and, where possible, mitigate production and supply chain challenges before they emerged during the crisis. Such mitigations entailed lifetime buys for application-specific integrated circuit chips, which were critical for GMLRS guidance sets, as well as the manufacture of a new modular pod for its propulsion system.[66] By 2021, the manufacturer had established and begun building the capacity of a second source solid rocket motor supplier, and the Army acknowledged "known issues that must be resolved [including] obsolescence of certain components within the safe arm fuze, proximity sensor, guidance set, and motor material."[67]

Collectively, these initiatives, which stemmed not from crisis-era investments or activities but rather pre-crisis procurement, facilitated the production ramp up in 2024. Even so, achieving the production boost and associated deliveries still encountered unanticipated challenges. Key among these challenges were shortages in solid rocket motors, described earlier, which kicked off what the manufacturer described as a "broad" and "campaign-like" effort to add another solid rocket motor supplier.[68] Indeed, at the end of 2023, the U.S. Army also needed to resume launch pod container production and to refresh the guidance set due to obsolescence.[69] And limits on tooling and testing equipment, labor, and shared suppliers persist and will continue to complicate achieving more ambitious production goals in the future.[70]

PAC-3 MSE. First delivered to the U.S. Army in 2015, the PAC-3 MSE interceptor is the most advanced variant of the Patriot air defense munitions that Ukraine uses to counter Russian aircraft, cruise missiles, and ballistic missile attacks.[71] Although the timing and volume of PAC-3 MSE transfers to Ukraine are not publicly available, DOD first announced the transfer of a Patriot battery and "munitions" in December 2022 through PDA and later acknowledged "resequencing hundreds of Patriot and AMRAAM [advanced medium-range air-to-air missile] air defense interceptors" to prioritize transfers to Ukraine.[72] Since then and in the context of support to Ukraine, DOD touted an over 100-percent production increase in PAC-3 MSE missiles from 2022 to 2024, implying that at least a portion of Patriot interceptors provided to Ukraine were the MSE variant.[73]

As was the case with the other munitions examined in this study, DOD was able to quickly obligate funding and exercise contract options. From June to November 2022, the U.S. Army received supplemental funding and exercised production contract options to procure a total of nearly 300 PAC-3 MSE missiles and associated tooling.[74] In total, DOD acknowledged spending a total of $755 million in Ukraine supplemental and replenishment funding for PAC-3 MSE–related investments.[75]

Prior to Russia's invasion of Ukraine, the U.S. military had been actively procuring PAC-3 interceptors. The Army purchased over 1,000 of the MSE variant in particular from 2015 to 2021.[76] Ample procurement aside, the

Stinger crew from 5th Battalion, 4th Air Defense Artillery fires Stinger missile during live-fire engagement as part of Formidable Shield 25, May 9, 2025, in Andøya, Norway (U.S. Army/Alexander Watkins)

Marine Corps Corporal Cole Strain, High Mobility Artillery Rocket System launcher chief with HIMARS platoon, Marine Rotational Force–Darwin, loads Guided Multiple Launch Rocket System into launcher before emergency fire mission during exercise Koolendong at Bradshaw Field Training Area, Northern Territory, Australia, August 29, 2021 (U.S. Marine Corps/Colton K. Garrett)

program office also adopted a comparatively proactive approach to managing obsolescence, establishing a "product road map" to control the timing of missile redesigns and insert obsolescence risks as a consideration when choosing parts and components.[77] Procurement also came with a greater investment in production capacity, such as a 2019 production facility expansion that was completed in late 2022.[78]

These investments facilitated the impressive production surge after 2022. The manufacturer had planned to increase the annual production rate to 500 missiles a year prior to Russia's full-scale invasion in 2022.[79] And after 2022, the PAC-3 production rate continued to climb, reaching 550 missiles earlier than originally projected.[80] This milestone was still hard-earned, requiring synchronization across the supply chain, to include rapidly expanding seeker production to meet surging demand and working through rocket motor production issues.[81]

Implications: Setting the Conditions for Surge Success

The variation in munition production from 2022 to 2024 draws its roots not back to crisis-era policy instruments, resources, or authorities but rather to patterns of procurement and program management that preceded the crisis. This finding is not to say that crisis-era investments will not yield results in the future but that the U.S. munitions industrial base's performance during the crisis underscores the inability to quickly and uniformly boost production. It also does not suggest that procurement will in and of itself be sufficient for surge success. Nevertheless, the analysis implies four sets of actions and initiatives that DOW should pursue to better prepare the munitions industrial base to surge.

First, DOW needs to develop a common lexicon and methodology—a playbook—to align its munitions surge efforts. An important if seemingly mundane initial step would be establishing an agreed-on definition of what exactly constitutes a production surge. From this definition, DOW should then develop a common understanding of surge instruments and levers that it can use directly, or indirectly encourage industry to use, to boost production.[82] DOW and the broader U.S. Government must then come to an agreement on the conditions that should trigger these instruments' use. This effort should consist of identifying specific indicators and warnings, tripwires, and triggers to make requisite "left of crisis" preparations to facilitate a subsequent production surge.

Second, DOW must work to enhance the collection of authorities, contracting actions, resources, and organizations at its disposal to boost production of key munitions during times of crisis. The reestablishment of a munitions war room, the codification of the Joint Production Acceleration Cell's roles and responsibilities, advocacy for Congress to renew and fund the Defense Production Act, and

Secretary of War Pete Hegseth's prioritization of revitalizing the defense industrial base are important steps in this regard.[83] So, too, are efforts to solidify DOW's munitions demand signal to industry, including authorization for multiyear munitions procurement and investments in new manufacturing technologies to increase production efficiency and continued scrutiny to ensure the Services do not forego munitions purchases. In conjunction with these efforts, the Secretary of War should direct the inclusion of surge clauses in procurement contracts for select munitions that will be critical to deterring and, if necessary, prevailing in a Taiwan contingency.[84] DOW should also seek more flexible authorities for advance procurement of long lead items early to need and in the absence of the related end item.

Third, developing the tools to execute a production surge will be insufficient; DOW must also practice employing these instruments through tabletop exercises and war games that include (and pay for) industry representatives.[85] DOW and U.S. Government–wide planning and exercises must pay direct attention to exercising surge capacity both as a stand-alone response to an acute crisis and as a bridge to a full-scale mobilization of the civilian economy. Put simply, tabletop exercises must avoid a binary distinction between peacetime defense industrial behavior and full-scale mobilization of the civilian economy and instead view the two as occurring on opposite ends of a continuum.

Fourth and last, DOW must consider scalable and modular alternatives to supplement, temporarily supplant, and perhaps even replace more exquisite U.S. munitions. Such munitions may certainly have a quality of their own.[86] Yet they can also serve as a convenient stopgap for high-end munitions as production ramps up.

The Ukraine crisis has demonstrated that absent pre-crisis preparation, a swift post-crisis surge in U.S. munitions production cannot be guaranteed. The impressive production increases achieved for some munitions were indeed a function of procurement and investment decisions made prior to Russia's full-scale invasion of Ukraine. Mobilization planning will not be sufficient. Senior defense and military leaders must begin preparing for the next crisis now by setting the conditions for pronounced production surges in the future. **JFQ**

Notes

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Breadth or Depth

The Ongoing Battle in Professional Military Education

By Ryan Wadle and Heather Venable

> The subject of military history as taught in the U.S. Army's school system is much in the air of late."

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So the editors of *Parameters* chose in 1981 to reintroduce Michael Howard's timeless article on military education writ large.[1] Such an introduction could serve just as well some 40 years later, when the state of joint professional military education (JPME) remains a heated source of debate. Howard—a combat veteran of the Italian Campaign in 1943 to 1945, in addition to being an esteemed military historian—urged that the military professional needed to study history in width, depth, and context, in that order.

Even as JPME considers new issues such as how to integrate new technology—for example, artificial intelligence chatbots—the central issue remains how best to study war in width, depth, and context. With this being the case,

Students from Air War College participate in war game designed around Pacific conflict, Maxwell Air Force Base, Alabama, December 21, 2023 (U.S. Air Force/Billy Blankenship)

this article provides some insights into the evolving curriculum of the Air War College to consider how balanced its approach has been amid some critique that JPME has sacrificed depth for breadth, with some contending that "war" has been removed from the war college.[2] This criticism comes amid the implementation of the new emphasis on outcomes-based education, which calls for ensuring that each student achieves the program-defined learning outcomes across professional military education (PME) and which will more frequently assess whether schools meet these outcomes by measuring how well graduates were prepared for their next assignments. These new standards mandate little in the way of specific curriculum content. Rather, they provide sound overarching guidance, such as the need to provide students with "diverse and often conflicting perspectives" to arrive at "evidence-based conclusion(s)."[3]

An appropriate focus on war in the context of JPME should include instruction on war theory, national security, planning, and the various capabilities and limitations of each domain to foster greater joint-mindedness. Grounded in a sound study of history, JPME institutions should also help students consider emerging challenges from a host of perspectives, including technological, economic, political, changing threats, and the like. War consists of military operations, but

those maneuvers cannot be isolated from the larger context in which wars are fought. There should also be a central focus on instilling critical thinking into students that reflects General Dwight D. Eisenhower's vision for the National War College. As he explained, one of that college's roles "should be to develop doctrine rather than to accept and follow prescribed doctrine. . . . The War College approach to any problem should not be bound by any rules or accepted teaching. If this is not done, the War College loses one of its most valuable and essential assets."[4] War-gaming and other simulations are also essential parts of any PME curriculum, but these should be balanced with instruction to allow students to apply the knowledge they have acquired during their school years.[5]

Approaching the study of war and strategy from several perspectives instills breadth into the system. Depth, however, comes from the multilayered JPME system that considers the staff colleges maintained by each of the Services and focused more explicitly on the operational level of war. Although not every officer who attends a staff college is guaranteed to be selected to attend a war college, this is immaterial as staff and war colleges should be viewed holistically. This is not a new approach; at least as far back as the report of the Knox–King–Pye Board of 1920, intermediate- and senior-level programs have been viewed as distinct stops on a career of learning for well-rounded officers.[6]

The Russian invasion of Ukraine highlights the need for a broad study of warfare. Despite a tendency for casual commenters to fixate on drones destroying tanks, the "war" ranges widely off the traditional battlefield to involve every facet of society. The Black Sea front, for example, has seen economic warfare as Russia sought to stymie Ukrainian wheat exports. Similarly, the appreciation for logistics and the industrial base that underpins it has thankfully soared once the war turned into a highly attritional conflict. Furthermore, there is no aspect of Russian or Ukrainian society that has not been affected in some way by this war. Perhaps more than ever as the reach of both kinetic and nonkinetic weapons increases, the traditional battlefield morphs and expands. For JPME to take an approach focused primarily on the military does not properly prepare officers for the broad range of challenges they must account for in successfully planning and waging warfare.

The danger is that a poor understanding of how military education works may be used to design narrow curricula built excessively around planning and doctrine that could miss many of the critical lessons from the conflict in Ukraine and elsewhere. The notion that war is somehow not studied at U.S. staff and war colleges has gained traction since the withdrawal from Afghanistan in August 2021. Senator Tom Cotton (R-AR), for example, commissioned a study on naval warfighting culture in 2021. Among its eight main recommendations, the study suggested removing "all political and sociological topics from professional military education and replac[ing] them with essential warfighting courseware."[7] An article by Thomas Bruscino and Mitchell Klingenberg with a similar argument added fuel to this fire.[8] In December 2021, Cotton cited Bruscino and Klingenberg's piece during the confirmation hearings for Admiral Christopher W. Grady to be Vice Chairman of the Joint Chiefs of Staff, requesting that he follow up on their claims that implementation of the May 2020 guidance issued by the Chairman of the Joint Chiefs of Staff had been "lost in a maze of bureaucracy."[9]

Given that the Military Education Coordination Council, a body that advises the director of joint force development, continues to meet and receive directions from the Joint Chiefs of Staff, these criticisms may ripple across the entirety of officer military education. In this vein, it is important to note that war colleges do, in fact, teach war and warfighting and have not strayed from their mandate. This can be seen most clearly by tracing the history of curriculum at Air War College. The composition and content of courses has changed over time, but the study of war has been the core of PME.

The single most important contribution that military education can make to ensure that it serves as a force multiplier is, as MacGregor Knox and Williamson Murray have argued, to help officers "make correct decisions at the political and strategic level." They further explain that "mistakes in operations and tactics can be corrected, but strategic mistakes live forever."[10] A wide range of opinions on PME exists, but we believe that graduates of staff and war colleges must be both creative problem-solvers while always remaining conscious of how to link operational objectives to strategic and policy goals. Balancing those objectives

helps to explain how military education has evolved, and narrowing curricula to focus even more on warfighting could have dire consequences.

How, then, to build depth into the system? It has already been designed that way in a building-block approach. For example, Air Force students attend a 6-week course at the Squadron Officer School as captains, to which those selected for intermediate-level resident education build on with a yearlong course followed by another yearlong course of senior-level resident education, sometimes further supplemented by online education.

The Basics of JPME

It is useful to understand the ranks at which various levels of PME operate. Senior-level education takes place at war colleges and involves lieutenant colonels (or the equivalent), who generally have about 20 years of military service. By contrast, intermediate-level education takes place at command and staff colleges and targets majors (and the equivalent), who typically have about 13 years of military service. Currently, there are 5 intermediate and 11 senior programs in addition to the Space Force intermediate and senior programs operated in conjunction with John Hopkins University's School of Advanced International Studies in Washington, DC.[11]

The greatest difference between the senior and intermediate level of military education is that the former focuses primarily on the strategic level of war, whereas the latter concentrates on the operational level of war, best understood as the waging of military campaigns. This point importantly reflects the fact that education at a war college will be more political in scope by its very nature or focusing first and foremost on how military force can help achieve one's desired political objectives.

Misfired Rounds

Regarding arguments alleging that PME is to blame for America's many failures in Afghanistan, the most significant logical flaw should be obvious: one simply cannot provide causal evidence to link the two. Rarely do monocausal explanations have explanatory value, especially in such complex cases. Likewise, the contention that a greater concentration on warfighting might have turned the tide in Afghanistan is impossible to establish.

That military education has been singled out as a causal factor is not surprising, however. Dating back to the founding of the Naval War College in 1884 and the birth of PME in the United States, there has been no shortage of opinions on what this education should look like, who should teach it, and who should receive it.[12]

Others debate its value to previous conflicts. Some historical studies argue that PME made a measurable contribution to American victory in World War II by instilling the "applicatory system" and decisionmaking processes through the heavy use of war games.[13] Others have taken a dim view of interwar military education, arguing that it produced doctrinaire ideas and "school solutions" and rehashed the battles of the past without looking to the future.[14] The divergence of opinions from learned scholars on JPME's effect in past wars demonstrates that its effect on military performance is not easily measured.

New Guidance

Measuring the "outcomes" of PME is part of the Joint Chiefs of Staff's 2020 and 2022 guidance.[15] The tenor of some scathing critiques might suggest that this guidance has dictated sweeping reforms in addition to the new assessment methodology.[16] But the 2020 document's "Summary of Changes" highlights practical aspects of assessment, talent management, and other related matters rather than mandating significant curriculum reform. Indeed, the sole directive regarding academic curriculum requires programs to use the Joint Staff's continually updated Joint Learning Areas—hardly a new development—yet leaves the door open for initiative on the part of individual institutions, explaining that programs should use the document's guidance to "develop mission-unique program learning objectives."[17] In other words, the Joint Chiefs of Staff's 2020 guidance encourages jointness while eschewing a cookie-cutter curriculum. The 2022 guidance follows in the same vein, only expanding to 142 pages to provide educational administration with the necessary guidance on procedures to demonstrate outcomes-based learning.

The 2020 document exhorts PME to produce "historically informed, strategically minded, skilled joint warfighters." How to interpret this wording is the subject of some debate. Bruscino and Klingenberg take a narrow interpretation of this guidance. In this case, it is useful to consider the six joint learning areas that govern PME.[18] These strike a balance between developing an officer's "advanced cognitive and communications skills employing critical, creative, and systematic thought" with an understanding of warfare in the past and present, the global security environment, and the formation and execution of strategic and operational plans. If there is not enough "war" in our war colleges, then the issue lies with the standards set by the Joint Chiefs of Staff, who have embraced a broad understanding of what should be taught to officers yet prescribe areas that still focus on how to wage war.

Change and Continuity

The curricula of war and staff colleges typically focus on four main areas: military history and theory, international relations, leadership and command studies, and joint planning. The balance among these elements differs somewhat depending on the level of education of the individual school. At the intermediate level, for instance, the Army's Command and General Staff College primarily focuses on developing the operational planning process with history providing context for decisionmaking, with only a smattering of international relations.[19] Meanwhile, the Air Command and Staff College devotes about five-eighths of its required curriculum to war, with the remaining three-eighths of the curriculum focused on leadership and international studies.[20] It added a 5-day war game to the curriculum

Army Colonel Phillip Cuccia, Army War College academic engagement director, highlights opening actions of Battle of Gettysburg to Air Force field grade officers at Gettysburg National Military Park, Pennsylvania, April 18, 2019 (U.S. Air Force/Michael B. Keller)

for the 2023 academic year as well as a 10-day joint air operations planning course. A greater proportion of the College of Naval Command and Staff curriculum—approximately one-quarter—focuses on international relations through the Theater Security Decision Making course, although a new Perspectives on Modern War course began during the 2024–25 academic year.[21]

The curriculum at the senior programs likewise provides little evidence that the core curricula has devolved into a postmodern pastiche that instills in military officers the notion that "[p]rofessional military education prepare[s] graduates to avoid armed conflict, not prevail in it" as Bruscino and Klingenberg assert. The standards for these schools call for education in national security strategy; theater strategy and campaigning; joint planning processes and systems; and joint, interagency, and multinational capabilities and the integration of those capabilities.[22] As with the variations noted among the intermediate schools, the senior schools accomplish these goals in similar ways, albeit with some noticeable differences. The four legacy Service schools are all built around the four core curriculum elements outlined above, often including capstone exercises that allow students to apply all the elements learned in the core curriculum. Some schools, such as the Army and Air War Colleges, also include core courses on regional and cultural studies intended to foster knowledge and connections with partner countries.[23] The Army War College also offers a course on economics and defense management to give officers a greater understanding of war's fiscal and organizational underpinnings.[24] Even with these variations, the overwhelming majority of graduates of senior-level programs will have gone through curricula where a majority of the content focuses explicitly on military history, theory, and military planning—that is, the study of war.

A Historical Snapshot of the Air War College Curriculum

Critically, a longitudinal analysis of curricula can help practitioners understand how these institutions have evolved. Some institutions are wary of sharing curriculum information, but the Air War College has valuable data dating back to its founding. The Air War College's first curriculum, from around 1952, included a core course in international relations. Indeed, international relations and global strategy constituted one-half of the course work, with air warfare the other half.

By the late 1960s, the Air War College curriculum placed a greater

emphasis on warfighting as demonstrated by the increased instruction on military capabilities. Still, it is important to note that the Air Force temporarily began sending fewer of its students to the college because of the Vietnam War.[25] This reality helps point out that a deep understanding of PME's trajectory cannot be reduced to a formulaic accounting of curriculum.

During the 1970s, independent study came to dominate the curriculum, albeit still undergirded by an emphasis on military strategy and capabilities. Interestingly, this approach aligns with the French model, which one expert has described as very creative and advanced.[26] Still, one commission found that the curriculum contained too much management. As a result, the 1975 Department of Defense Committee on Excellence in Education advocated devoting 33 percent of the Air War College curriculum to aerospace warfare. But, just as Bruscino and Klingenberg cannot establish any causal linkage between PME and the loss of Afghanistan, it would be equally difficult to demonstrate that the increased study of airpower necessarily resulted in the United States winning its only major war since World War II: the Gulf War, in 1991.

The curriculum has continued to evolve since the Cold War's end. After 9/11, the college added a global security core course to assess how changes in the international system affect national security. Most recently, the college has shifted toward an intensified focus on warfighting to support Great Power competition. However, that warfighting emphasis has been characterized by stressing the "intellectual weapons of critical, creative, and strategic thinking over merely regurgitating an argument envisioned by an author or the professor." Meanwhile, the current curriculum has a broad range of areas of interest, including the school's culminating event, the Global Challenge war game, which requires students to "prioritiz[e] threats, develo[p] a comprehensive global strategy, and desig[n] an operational approach that responds to a military threat."[27] This wargame speaks to the broad nature of preparing for future warfare, as highlighted by multiple authors including Sean McFate, who cautions that we cannot expect the neat battlefields of the past.[28]

Change Is Constant

Like every complex structure, PME is the product of a series of tradeoffs. Setting aside many of the other hot-button issues that surround it, what is taught and how it is taught at these schools requires constant give and take. Would it make officers more effective leaders to focus more on warfighting at the expense of the leadership and management courses that have become more common in military education in recent decades? Would limiting curricula's coverage of international relations and regional studies—both of which allow officers to better understand geopolitics and the U.S. roles and responsibilities in various regions—detract from American and allied security? Wargaming from the interwar period may be showered with praise today, but this conclusion assumes that one is designing the right war games to solve the right problems.[29]

Furthermore, no less a luminary warfighter than Admiral Raymond Spruance, who had taught at the Naval War College during the interwar period and assumed the presidency of the Naval War College in 1946, broadened the curriculum to consider the increasing uncertainty of the Navy's place in the postwar period. Critically, Spruance wanted officers who could fight but also were "strategical types" and creative thinkers. As he described the goal of the college, "If imagination, tempered and guided by common sense and reason is the scarce and valuable quality which I believe it to be, it behooves us to recognize the individuals who possess this disciplined imagination and make full use of them."[30]

Over four decades ago, a former officer who had survived 2 years of grueling warfare enjoined JPME to first study in width, then in depth, then in context. The study of war in its entirety is alive and well at the Nation's staff and war colleges, and the Joint Chief of Staff's most recent guidance allows the Services largely to develop curriculum as they see fit, within the confines of broadly focused joint learning objectives. One need only look at the war in Ukraine to see how an interconnected and informationalized world can significantly enhance and even add to the capabilities beyond those traditionally employed on a battlefield. War college students have spent most of their careers employing military capabilities at the operational and tactical levels of war, which is precisely why war colleges concentrate the fulcrum of their efforts at the point where military strategy intersects with political objectives. Tasking PME to double down on teaching "warfighting" that already constitutes the bulk of curricula is likely only to increase the disconnect between using the means to meet the important ends our students may need to apply in the toughest classroom of all: war. **JFQ**

Notes

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Ukrainian special forces exit truck before UH-60 Blackhawk helicopter flight during exercise Combined Resolve 14 at Hohenfels, Germany, September 24, 2020 (U.S. Army/Patrik Orcutt)

A Primer on Ukrainian Special Forces

Beyond Joint

By Kevin D. Stringer and Taisiia Vivdych

Special operations forces (SOF) are significant contributors to joint warfighting. In Ukraine, this truism is on display through headlines like "Ukraine's Special Operations Forces Destroy Russian Buk-M3 Surface-to-Air Missile System Worth US$45 Million" and "Ukraine's Special Operations Forces Kill 21 and Injure 40 North Korean Soldiers in Fierce Battle in Russia's Kursk Oblast."[1] Yet the literature on Ukrainian SOF in the West is minimal, and a greater understanding of their different formations and characteristics might yield insights

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for enhanced SOF security force assistance (SFA) approaches toward Ukraine as well as offer examples of unique types of Ukrainian special forces units for potential application within Western SOF force structures.

In the United States, SOF are joint military formations under the overall combatant command of U.S. Special Operations Command (USSOCOM) within the U.S. Department of War.[2] In contrast, in Ukraine, SOF, as defined from a Ukrainian perspective, are beyond joint and dispersed across the Ukrainian interministerial landscape, including the Ministry of Defence of Ukraine, intelligence services, law enforcement agencies, and security organizations. This distribution makes coordination and integration more complex and contrasts with the centralized SOF command typically found in North Atlantic Treaty Organization (NATO) countries. This difference, and the resulting misperceptions from Western policymakers due to potential mirror-imaging, has implications for SOF SFA provision for Ukraine, while simultaneously offering opportunities for Ukraine with partner assistance to increase the effectiveness and efficiency of its entire interagency special forces portfolio.

While the bulk of the existing literature and reporting on Ukrainian SOF has focused on the Ukrainian Special Operations Forces Command (USOFCOM) under the General Staff of Armed Forces of Ukraine,[3] most accounts ignore the other special forces in the Ukrainian universe or conflate them with USOFCOM.[4] This mixing or oversight illustrates the pitfalls when Western scholars and practitioners apply a NATO or U.S. SOF organizational template to a country with a different SOF tradition and culture. Hence, a more nuanced understanding of the Ukrainian special forces landscape by U.S. and coalition partners could lead to better collaboration and outcomes with the various Ukrainian special forces formations in supporting their war against Russia.

This primer aims to provide an understanding of the development and current state of Ukrainian SOF, beginning with their historical Soviet *spetsnaz* (that is, special purpose) heritage, followed by their subsequent evolution after Ukrainian independence in 1991. It describes the current ecosphere of Ukrainian special forces units across governmental ministries, including their contribution to Ukrainian national security. It then provides a glimpse of wartime Ukrainian special operations and missions in the current context of the full-scale Russian invasion. While not fully comprehensive given often limited and incomplete open-source information on the germane organizations, the overview offers broad insights into the main Ukrainian special forces formations based on the authors' access to Ukrainian-language sources and SOF personnel as well as a coauthor's SOF expertise. The conclusion provides recommendations for NATO SOF SFA endeavors to Ukraine as well as thoughts for the construction of SOF formations from nonstandard recruitment pools. Foremost, Western SOF partners should acknowledge the heterogenous nature of Ukrainian SOF and coordinate and align SOF SFA efforts with the whole of the Ukrainian SOF universe in mind. Second, the creation of units like the Kraken Regiment, a volunteer special operations unit established in 2022, should be evaluated by U.S. and allied militaries for future SOF force structure considerations.

Ukrainian Special Forces: The Soviet Legacy

As a former Soviet republic, Ukraine derives its SOF legacy from the Cold War spetsnaz units that emerged from the Soviet experiences of World War II. In that conflict, the Soviet Union created partisan groups to fight against German occupiers. These groups conducted sabotage missions, gathered intelligence, and organized resistance behind enemy lines.[5] With the advent of the Cold War, the Soviet Union formalized this concept. On October 1950, Minister of Defense Aleksandr Vasilevsky, with the concurrence of Chief of the General Staff General Sergei Shtemenko and General Matvei Zakharov, the head of the General Staff of the Main Intelligence Directorate (GRU) of the Soviet Union, signed a directive ordering the creation of special reconnaissance units, spetsnaz, which were controlled by the GRU.[6] This authorization marked the official establishment of Soviet spetsnaz, which soon became an important element of the country's overall military strategy. Catalyzed by the introduction of U.S. tactical nuclear weapons into Europe, spetsnaz units, which were called "separate brigades of special designation," trained for reconnaissance and sabotage operations deep in enemy territory. These self-sufficient brigades could operate independently. Their structure included reconnaissance battalions, special designation companies, and support units.[7] According to author Tor Bukkvoll, "Their mission remained the destruction of U.S. nuclear weapons throughout the Cold War."[8] These were the special forces adversaries to their Cold War NATO counterparts such as Great Britain's Special Air Service, U.S. Army Special Forces, Belgium's Eléments Spéciaux de Recherche, and others.

The name *spetsnaz* comes from the Russian term *spetsialnoe naznachenie* for "special designation" or "special purpose," and unlike Western SOF equivalents that emphasize the specialness of the operator, the spetsnaz designation reflects the unique roles assigned to these troops.[9] In fact, contrary to the NATO SOF concept, it was the unique skills and higher-end capabilities, rather than the mission set, that determined whether a particular unit was included in the Soviet special-purpose forces community.[10] As Lester Grau and Chuck Bartles explain:

> *The word "special"* [in spetsnaz] *is used in a very broad way that can indicate that the unit has a very narrow area of specialization, such as signals intelligence, engineering, reconnaissance, etc.; or the unit is experimental or temporary in nature; or the unit conducts tasks of special importance such as sensitive political or clandestine operations. This broad usage of the term means that "spetsnaz" cannot be thought of as* [directly] *equating to the Western concept of* [SOF].[11]

An important feature of Soviet spetsnaz was its decentralized existence in the bureaucracy, which reflected a type of political warlordism as different military directorates, intelligence services, and security agencies competed for power and prestige within the communist system by establishing such organizations.[12] Spetsnaz units under the GRU, Committee for State Security (KGB), Ministry of Internal Affairs (MVD), and border troops had different missions and responsibilities. For example, while GRU spetsnaz focused on large-scale operations behind enemy lines, KGB spetsnaz, especially "Vympel," specialized in secret missions abroad, with MVD and border spetsnaz providing security inside the country.[13]

This genetic pattern continues in the Russian Federation today, where there is greater diversity among spetsnaz units than within the Western SOF community. Unlike in the United States and most NATO countries, where special operations units are generally limited to departments of war/defense, in Russia they proliferate into the Ministry of Internal Affairs, Federal Security Service, Federal Protection Service, Federal Penal Service, and other divisions concerned with intelligence collection and diplomatic security.[14] Equally, when the Soviet Union collapsed, some of the spetsnaz formations were absorbed by the successor states, and although the units evolved, the spetsnaz legacy remained strong in the cultural DNA of successor-state SOF, including a dispersion of special forces units across the national interagency landscape. Ukraine was no exception to this inheritance.

Ukrainian Special Forces: Post-Independence

After the dissolution of the Soviet Union in 1991, independent Ukraine inherited four GRU spetsnaz brigades, and these units remained subordinated to the new Ukrainian Main Intelligence Directorate (GUR) of the Ukrainian General Staff within the Ministry of Defence.[15] The current SOF of the armed forces descend from this lineage. There was also a KGB unit that evolved into the State Security Service of Ukraine (SBU)'s Special Operations Center Alfa (SOCA).[16] Finally, there existed an array of Interior Ministry special purpose troops that ultimately the National Guard of Ukraine, established in 2015, amalgamated and acquired.[17] This heritage has produced a heterogeneous mix of SOF formations, elite forces, and special weapons and tactics groups in the current Ukrainian context.

In the early years, Ukrainian special units continued to follow Soviet procedures because of limited resources and capabilities. However, with the introduction of international norms and standards within the Ukrainian security sector, a significant transformation began. With U.S. assistance, Ukraine undertook efforts to modernize its military SOF in the early 2000s, but by 2009 the project was halted because of a lack of Ukrainian political support. As early as 2008, the General Staff and Ministry of Defence had attempted to develop a consolidated and independent SOF service within the Ukrainian armed forces, but the government rejected this initiative. From 2008 to 2015, a special operations directorate operated within the General Staff as a coordination and advising element, with special forces dispersed across different military services and branches of the Ukrainian armed forces and mostly misused as "elite" infantry.[18]

Catalyzed by the Russian occupation of the Crimea and the invasion of Donbas in 2014, Ukrainian political leadership initiated several reforms for the rapid modernization and improvement of SOF, including a streamlining of the command structure of Ukrainian special units. For the military SOF, the first public announcement occurred on June 18, 2014.[19] In 2015, the General Staff and Ministry of Defence developed and signed a concept for the formation and development of the SOF and simultaneously established USOFCOM.[20] Later in 2015, a presidential decree finalized the creation of the Special Operations Forces of the Armed Forces of Ukraine (SOF AFU), with complete operational, administrative, and logistical responsibilities.[21] Subsequently, in 2016, an amendment to the law of Ukraine defined a special operation as

> *a set of coordinated and interrelated in purpose, task, place and time, special actions of units of the* [SOF AFU]*, aimed at creating conditions for achieving strategic (operational) goals, which are carried out according to a single plan independently or in cooperation with other units of the Armed Forces of Ukraine, law enforcement agencies of Ukraine, and other components of the defense forces.*[22]

Finally, in July 2016, President Petro Poroshenko signed Law 4795 officially establishing the SOF AFU as a separate and fully independent service, with the appropriate consolidation of existing military special forces units and delineating its main tasks as countering terrorism, ensuring security at strategic sites, and performing special missions in the conflict zone in Donbas.[23]

Yet as a SOF scholar-practitioner noted, "Two enduring institution-specific challenges remained during this period: the dispersion of SOF capabilities and responsibilities across several military, intelligence, and internal security organizations, and the cultural residue of the spetsnaz legacy."[24] Indeed, the consolidating 2016 law did not include the following special operations units found in other governmental organizations:

- SOCA of the SBU
- 10th Separate Operational Response Unit (DOZOR) of the State Border Guard Service of Ukraine
- Rapid Response Corps (KORD) of the National Police of Ukraine
- the opaque special operations elements within the Foreign Intelligence Service of Ukraine (SZR).

The next section overviews this diverse SOF landscape, including the consolidated Ministry of Defence formations under the Special Operations Command of the Ukrainian Armed Forces as well as the separate Ukrainian Main Intelligence Directorate formations, highlighting the Kraken Regiment as an example. Although the National

President of Ukraine Volodymyr Zelensky thanks Security Service of Ukraine warriors for Operation *Spiderweb* and presents them with state awards, June 4, 2025 (Courtesy President of Ukraine)

Guard of Ukraine, established in 2015, has a multitude of special purpose units inherited from the amalgamation and acquisition of various Interior Ministry units, they will not be covered for reasons of scope.[25]

Ukrainian Special Forces Ecosphere

State Security Service of Ukraine's Special Operations Center Alfa. The officer-only SBU SOCA is one of the most important components in Ukraine's counterterrorism and special operations system.[26] In June 1994, President of Ukraine Leonid Kravchuk by decree No. 335/94 created this formation, and it became the successor to the Soviet KGB special services. Its main tasks were to combat terrorism, ensure security, and coordinate special operations. Over time, the unit has undergone significant changes to effectively respond to contemporary threats and challenges, necessitating ongoing improvements to its structure and functions. In July 1996, SBU Directorate A was renamed the SBU Department for Combating Terrorism and Protection of Participants in Criminal Proceedings and Law Enforcement Officers.[27] In July 1998, the directorate was reorganized into the Counter-Terrorism Directorate, expanding its powers and functions. The structure of the renamed Special Operations Center A includes several key components, each performing specialized tasks. Operational groups specialize in counterterrorism operations, hostage rescue, and assault actions. Additionally, SOCA ensures the safety of participants in criminal proceedings, including witnesses and other court process participants. Most of the operators have combat experience in the antiterrorist operations in Eastern Ukraine, Afghanistan, and Iraq.[28]

Since 2022, the unit has been actively engaged in combat operations. SOCA operatives defended Kharkiv and participated in the liberation of Kupiansk during the Kharkiv counteroffensive. During liberation operations to reclaim Ukrainian territories, SOCA conducted

reconnaissance, adjusted artillery fire on enemy targets, and engaged the enemy using mortars, antitank weapons, and sniper fire.[29] In 2022, the unit also participated in assault operations in populated areas, supporting Ukrainian forces in their fight to liberate occupied territories. Today, SOCA remains a vital part of Ukraine's security system. Its responsibilities encompass not only the original counterterrorism role but also specialized combat operations against and within Russia.

KORD. Established in 2016, the Rapid Response Corps is the special operations unit of the National Police of Ukraine.[30] At its inception, the Prime Minister of Ukraine, Volodymyr Groysman, emphasized that the creation of this special force unit was part of an integral reform of the law enforcement system, designed to provide effective response to all contemporary criminal challenges, with a special emphasis on organized crime.[31] KORD's main task is to conduct police special operations against organized crime, gangs, heavily armed criminals, and any perpetrators that threaten the use of armed force. This role also includes hostage situations, personal protection, and specified counterterrorist actions.

In contrast to seemingly similar U.S. law enforcement special weapons and tactics units, KORD, in cooperation with the Armed Forces of Ukraine, the National Guard of Ukraine, the State Border Guard Service of Ukraine, and the State Security Service of Ukraine, has the mission to contribute to the territorial defense of Ukraine, repel armed aggression against Ukrainian sovereignty, fight against sabotage and reconnaissance forces of aggressor paramilitary or armed formations, and ensure public order during emergencies or wartime conditions.[32] KORD has two main types of units: Type A (assault) and Type B (support). Assault units conduct operations in high-risk criminal situations, including counterterrorism, and participate in specialized combat operations. For example, from the first days of the 2022 full-scale invasion, KORD participated in combat missions in Kharkiv, Donetsk region, Kyiv region, Kherson region, and Zaporizhzhia.[33] In 2024, in the context of the Russo-Ukrainian war, KORD operatives conducted 25 special police operations and took part in almost 1,700 special actions.[34]

DOZOR. The 10th Separate Operational Response Unit is a SOF unit within the State Border Guard Service of Ukraine.[35] Established in 2014, its primary mission is to address the most complex challenges related to Ukrainian border security. DOZOR operates in regions with high levels of illicit activity such as illegal migration, arms smuggling, and potential cross-border terrorist threats. To ensure effective operations, the unit is strategically located in cities such as Kharkiv, Zhytomyr, Lviv, Kherson, and Odesa, allowing for rapid responses to emerging threats. The DOZOR mandate includes providing security for high-profile individuals such as the President of Ukraine and other senior officials; engaging in counterterrorism activities; and combating illegal migration, human trafficking, and drug trafficking. The unit also participates in special operations and surveillance missions to gather intelligence and assess threats. Participation in countersabotage activities and combat operational tasks is an integral part of the unit's work, underscoring its significance in ensuring national security and the integrity of Ukraine's borders.

The structure of DOZOR comprises a headquarters responsible for strategic planning and overall leadership, with an information protection service that ensures the confidentiality of sensitive data and operational security. Additionally, DOZOR includes specialized departments, such as its canine unit, which assists in detecting contraband and tracking suspects, and the special equipment unit, which handles the maintenance and application of modern technological resources. Through its specialized training and rapid response capabilities, DOZOR contributes to the overall effectiveness of Ukraine's border protection efforts, enhancing the country's ability to respond to various security challenges to its sovereignty.

SZR, Operational Intelligence Units. The Foreign Intelligence Service of Ukraine, established in 2004, is an essential component of Ukraine's national security system. Its primary task is to provide the state with intelligence information about threats from outside the country. The SZR closely collaborates with other intelligence agencies, such as the Ukrainian Main Intelligence Directorate and national intelligence. The existence of special operations units within the SZR is opaque, with no direct open-source references, but indirect sources point to their existence. For example, the SZR structure refers to operational intelligence units carrying out special tasks and operations, including monitoring terrorist threats, economic espionage, and military activities. Official resources note that the SZR participates in activities to gather information on terrorist threats as well as counterintelligence measures to neutralize espionage networks. A law titled "On the Foreign Intelligence Service of Ukraine" defines the structure of the Foreign Intelligence Service of Ukraine to include human intelligence units, special technical units, and internal security units.[36] Finally, the official SZR website mentions that the leadership of the Foreign Intelligence Service of Ukraine accentuates the work of its Foreign Countermeasures Department, mainly countering terrorism, international organized crime activity, illegal drugs smuggling, illegal ammunition trade, and illegal migration, all tasks that imply a special operations capability or unit.[37] Consequently, given the spetsnaz legacy within the Ukrainian intelligence community, there is a high likelihood that SZR, as a Soviet legacy intelligence agency, possesses its own SOF elements.

Ukrainian Main Intelligence Directorate, Kraken Regiment. The GUR acts as the overarching authority for all military intelligence assets within the Armed Forces of Ukraine.[38] Founded in 1994, the GUR began establishing SOF within its organization at its inception. Within the GUR, the 4th Special Intelligence Service controls the multitude of Ukrainian special operations

Ukraine special operations forces members assigned to 3rd Regiment prepare to conduct fast rope insertion and extraction system training with U.S. Air Force CV-22 Osprey during exercise Fiction Urchin near Yavoriv, Ukraine, September 19, 2020 (U.S. Air Force/Mackenzie Mendez)

intelligence units. Moreover, the GUR maintains operational oversight for certain special forces units that are organic to the Ukrainian Armed Forces and National Guard.[39] For illustrative purposes, this section spotlights the Kraken Regiment, a volunteer special operations unit established in 2022.

Created in the early days of the full-scale Russian invasion of Ukraine, this originally conventional unit quickly became one of the most powerful and effective elements of the Ukrainian defense. From the start of the war, Kraken has been actively involved in fighting Russian troops, especially in northeastern Ukraine. One of its first serious battles took place on February 27, 2024, when Kraken fought against the 2nd Guards Spetsnaz Brigade (GRU). This operation to repel Russian special forces was one of the unit's early major victories, and Kraken showed a high level of organization and combat readiness, effectively using modern communication tools like Starlink to coordinate battlefield effects. Later, Kraken distinguished itself by liberating Vilkhivka, a village east of Kharkiv. The successful assault on Vilkhivka by the Kraken volunteers—Azov veterans, patriots, football fans, information technology specialists, civil servants, and Anti-Terrorist Operation zone (Donbas) veterans impressed the GUR, which decided to create a new special operations unit based on those volunteers who demonstrated prowess in the defense of Kharkiv and the Vilkhivka liberation.[40]

Although converting a volunteer conventional combat organization into a special forces unit under the auspices of a military intelligence directorate is not

Ukrainian special operations forces and U.S. Army Special Forces Soldiers assigned to 10th Special Forces Group (Airborne) move across objective during exercise Combined Resolve XI at the Joint Multinational Readiness Center in Hohenfels, Germany, December 10, 2018 (U.S. Army/Benjamin Haulenbeek)

a typical Western approach, this transformation demonstrates the need for a better understanding of the Ukrainian national security culture's approach to special forces and evaluating these unconventional organizations for possible adaptation into the NATO SOF force structure. Conceptually, Kraken can be considered as an elite partisan unit, Ranger-like in some respects, but not SOF in the U.S. or NATO sense.[41] Architecturally, Kraken is composed of assault groups, reconnaissance sections, and support units. The unit's fighters have high levels of training and specialization, allowing them to perform complex and dangerous tasks to include a wide range of special operations, counterterrorism actions, critical infrastructure protection, and special reconnaissance missions. The unit actively interacts with other Ukrainian security forces, including the armed forces and rapid response departments.

Ministry of Defense of Ukraine, USOFCOM. As noted, the USOFCOM was established in 2015 to consolidate several army and naval special operations regiments and two training centers. With an unconfirmed strength of approximately 2,000 to 4,000 members, USOFCOM has been the face of Ukrainian SOF to the West, and since its inception, USOFCOM has emphasized its development as a Western force with equipment and practices aligned with NATO SOF tactics, techniques, and procedures.[42] Consisting of land, maritime, and air elements, USOFCOM is a joint force that conducts all the primary NATO SOF missions—military assistance, special reconnaissance, direct action, and psychological operations.

Current Operations and Command Structure

All Ukrainian special forces units, military and otherwise, discussed in this article have been involved in combat operations since February 2022. They have conducted a wide array of operations ranging from special reconnaissance for precision strikes on high-value targets in Russia to unconventional warfare activities in conjunction with partisan forces in the occupied territories. They have also been misused as assault troops by conventional force commanders in various offensive and defensive actions. Although source material for many classified operations is difficult to find, the August 2024 Kursk offensive showcased Ukrainian SOF's conduct of more traditional missions, where small units operated behind enemy lines to sabotage critical infrastructure such as railways, fuel depots, and communication lines, while attacking installations and troop concentrations deep within Russian territory.[43] For command and control purposes, while USOFCOM has unity of command over the military's joint special operations forces, the other formations fall outside of its remit. According to a senior Lithuanian officer and advisor with extensive Ukrainian SOF interactions, "This is an old problem with the [Ukrainian] culture of jointness and interministerial cooperation, which doesn't really exist, but was tried unsuccessfully before the war. Coordination only happens when [special forces] commanders meet because the management culture is hierarchical."[44]

Conclusions

The varied nature and dispersed governmental placement of Ukrainian special forces raises themes concerning U.S. and NATO SOF SFA effectively reaching the totality of these formations. Equally, do U.S. and NATO SOF organizations fully understand the complete universe of Ukrainian special forces? For the first point on SFA, there exists a murkiness in evaluating what formations should be included under the Ukrainian SOF aegis. For example, Ukrainian law enforcement services are heavily armed, with military-like structures and equal military ranks, and are equipped similarly to light infantry soldiers. Thus, some units could be recognized as the equivalent of NATO states' armed forces SOF units, while others are nothing more than their parent organization's elite force or local police special weapons and tactics teams.[45] The division of Ukrainian special forces across multiple agencies automatically creates a siloing effect on the U.S. side, with different agencies taking responsibility for the institutional relationships based on national government mirror-imaging.

For illustration, the United States possesses specialized law enforcement units in the U.S. Border Patrol, the Drug Enforcement Administration (DEA), and the Federal Bureau of Investigation that mirror and match their respective Ukrainian counterparts for SFA. In fact, earlier training programs for the Ministry of Internal Affairs special forces units—DOZOR and KORD—were implemented with the assistance of experts from DEA's Foreign-Deployed Advisory and Support Teams and the U.S. Border Patrol's special operations Border Patrol Tactical Unit.[46] The limitations with this approach are that U.S. law enforcement special operations units are not foreseen for participation in the large-scale combat operations that confront all Ukrainian special units, and SFA delivered by these organizations would need to be well coordinated with USSOCOM and allied SOF military commands to avoid duplication or inefficiencies in efforts. In large-scale combat operations, for example, the State Security Service's SOCA, originally a classical SOF counterterrorism unit, has been forced to adapt its tactics, techniques, and procedures to incorporate deep operations and the use of towed artillery to deal with the current wartime environment.[47]

Current literature suggests that NATO and U.S. special operations institution-building and force assistance measures have been primarily directed at USOFCOM, which strongly reflects the U.S. arrangement for joint SOF. Given that Ukrainian special forces are unlike U.S. and most NATO special forces—and distributed across the armed forces, intelligence services, law enforcement agencies, and other governmental organizations—an initial recommendation is to centralize the SFA approach and have U.S. Special Operations Command Europe, the responsible joint theater headquarters for Ukraine, or NATO Allied Special Operations Forces

Command assess the entire Ukrainian special forces ecosphere for a greater understanding of capabilities and competencies with the goal of improving and coordinating a unity of effort in SFA activities to these formations. This step would ensure that allied SOF training, equipment, and capacity building brings targeted value across the entire Ukrainian SOF landscape.

Additionally, there is a significant cultural difference in how Ukraine defines its special forces compared to its U.S. and NATO counterparts. The success of Kraken and similar units suggests that the Ukrainian SOF combat experience may hold lessons for U.S. and allied militaries. A deeper organizational analysis could address the question of whether SOF formations like Kraken are generalizable to the United States and other states for both SOF recruitment and force generation.

Overall, the Ukrainian SOF arrangement, based on its unique military culture legacy, creates risks for its partners in applying well-meaning security force assistance since there can be a tendency to mirror-image the Western template onto Ukraine and therefore miss opportunities. Despite organizational and cultural differences, cooperation between Ukrainian special forces and NATO special forces is extremely important given the current war. A greater understanding of Ukrainian SOF will enhance NATO and U.S. support to improve the overall capability and readiness of all Ukrainian special forces. **JFQ**

Notes

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Unarmed Minuteman III intercontinental ballistic missile launches during operational test, May 21, 2025, at Vandenberg Space Force Base, California (U.S. Air Force/Jack Rodriguez Escamilla)

Political Objectives, Nuclear Forces, and the Enduring Value of U.S. Intercontinental-Range Ballistic Missiles

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Intercontinental-range ballistic missiles (ICBMs), or missiles that fly over 5,500 kilometers (approximately 3,400 miles), have been a key component of the U.S. nuclear triad since the 1960s. (The other two components of the triad are submarine-launched ballistic missiles and strategic bombers.) The Minuteman III system is the only ICBM in the U.S. arsenal today. But

the system is old and challenges to its sustainability mount. The United States is planning on replacing the system in the next several decades with the Sentinel ICBM. The program will have to compete for attention and resources with other Department of War modernization priorities in the context of budgets that for years have not been commensurate with the threat that the United States and allies are facing. Despite some prominent calls for the elimination of the ICBM leg of the triad, the system is more important than ever because of threat developments and decreases in the flexibility and diversity of the U.S. nuclear arsenal since the end of the Cold War.[1] ICBMs continue to make a critical contribution to U.S. national security strategy—and will continue to do so for years to come.

Growing Threat

Threats facing the United States have played a major consideration in the development and deployment of ICBMs. Much has been written on the emergence of the tripolar nuclear environment, in which China is rapidly approaching U.S. and Russian nuclear capabilities. In 2022, then Commander of U.S. Strategic Command Admiral Charles Richard called China's nuclear expansion "breathtaking."[2] He stated that China "can do any plausible nuclear employment strategy regionally. This will backstop their conventional capability and will potentially constrain our options—that is, we will be the ones that are getting deterred if I don't have the capability to similarly deter them."[3]

Russia has been using its nuclear forces coercively to achieve its current strategic objectives, including subjugation of Ukraine; maintains an active nuclear modernization program; and has, by some unclassified estimates, a 10-to-1 advantage in nonstrategic nuclear forces.4 In June 2023, Vladimir Putin noted: "We have more such nuclear weapons than NATO [North Atlantic Treaty Organization] countries. They know about it and never stop trying to persuade us to start nuclear reduction talks. Like hell we will, right? A popular phrase. Because, putting it in the dry language of economic essays, it is our competitive advantage."[5]

Russia and China are now strategic partners. Russia would not be able to prosecute its ongoing war against Ukraine at the current scale without China's support. Both countries share an objective of replacing the U.S.-led world order. Such a replacement would be to the detriment of the United States and its allies. While it may be the case that a genuine strategic alliance is beyond the interests of both countries, their alliance needs to last only long enough to diminish U.S. capabilities and influence in the Indo-Pacific region and in Europe.

North Korea is a nuclear-armed regional challenger. Pyongyang's strategic cooperation with Russia could significantly improve its missiles and nuclear warheads.[6] Iran could have enough material for a nuclear weapon in days, although the recent Israeli and U.S. strikes may have altered the timeline for producing a deliverable nuclear weapon.[7] These countries are particularly worrisome to U.S. allies in their respective regions. In this context, it bears mentioning that U.S. security guarantees, including nuclear guarantees, have been one of the most successful, if not the most successful, tools of U.S. nonproliferation policy. When allies can rely on the United States coming to their defense, they are less likely to develop their own independent nuclear capabilities.

U.S. adversaries are revisionist powers that use nuclear forces to advance their regional and global interests that are contrary to those of the United States. The situation is unlike the problems the United States faced during the Cold War. Then the focus was on deterring the Soviet Union, a single nuclear-armed adversary, with an underlying assumption that if Moscow were deterred, Beijing—with a much smaller nuclear arsenal—would also be.[8] The triad continues to be necessary to give the Nation the flexibility and adaptability to respond to new developments.

Nuclear Forces Support Political Objectives

The U.S. nuclear triad is sometimes presented as redundant and owing its existence only to parochial fights among the Army, Navy, and Air Force, but that would be a significant mischaracterization of how the United States arrived at the current posture. Today, the Navy "owns" the seabased leg of the nuclear triad, and the Air Force owns the air- and the ground-based legs. The National Nuclear Security Administration owns the warheads. While bureaucratic infighting played a role in the development of the nuclear triad (and other nuclear forces), it is useful to discuss political goals that nuclear forces help to achieve. Requirements generated by these goals have shaped the size and attributes of U.S. nuclear forces over time and will continue to do so.

The first and foremost political goal is to deter a large-scale attack, nuclear or conventional, against the U.S. homeland.[9] More than 40 years ago, the Scowcroft Commission noted: "Deterrence is not, and cannot be, bluff. For deterrence to be effective we must not merely have weapons, we must be perceived to be able, and prepared, if necessary, to use them effectively against the key elements of [an enemy's] power."[10]

U.S. adversaries demonstrably do not share the same values as the United States: appreciation for human life and emphasis on economic prosperity for the citizenry (rather than for the select few of the regime). Contrary to the popular belief, the United States does not deliberately target cities to maximize casualties.[11] Since the mid-1970s, U.S. leaders have understood that a deliberate threat against populations lacks credibility and desired deterrence effect, let alone being completely against U.S. values and Just War principles. ICBMs enable the United States to hold at risk credibly and promptly what the adversaries value most—their tools of external aggression and internal oppression.

Because ICBMs are dispersed over five U.S. states, there is no simple way for an adversary to destroy them. An attack on U.S. ICBM fields would be a clear

declaration of war against the United States. An adversary would have to use many of its own warheads against U.S. ICBM fields, thus minimizing the relative damage to the rest of the country. The difference in casualties could be in the millions by some accounts.[12] A hypothetical nuclear exchange between Russia and the United States could result in 75 million casualties.[13] Should the ICBM leg be eliminated, the number could rise to 125 million, according to some calculations.[14] ICBMs create an extremely high barrier to a first-strike attack, not only because of the other legs of the triad but also because ICBMs are designed to withstand such an attack and be available for retaliation, if needed.

Air Force and Northrop Grumman conduct full-scale qualification static fire test of Sentinel intercontinental ballistic missile stage-one solid rocket motor at Northrop Grumman's facility in Promontory, Utah, March 6, 2025 (U.S. Air Force/Nial Bradshaw)

The second important political objective is assurance of U.S. allies. Even here, ICBMs have played an ever more important role because of reductions in U.S. forward-deployed nuclear forces since the end of the Cold War. Strong strategic deterrence means the United States is more likely to intervene on behalf of an ally facing a nuclear-armed adversary. Reductions in U.S. nuclear forces since the end of the Cold War, combined with vulnerability of the U.S. homeland to long-range missiles, have resulted in a situation in which U.S. assurances are likely perceived as less credible.[15]

The third important political goal is achieving U.S. objectives should deterrence fail. The authoritarian nature of

U.S. adversaries means they value tools of internal oppression to keep the current elites in power. Their desire to change the international status quo means they prize tools of external attack, including their conventional and nuclear forces. Of these, nuclear forces are particularly important because of their destructive potential. Holding promptly and reliably at risk the key targets that adversaries value generally requires nuclear weapons. Doing so quickly and precisely demands ICBMs. These weapons played a unique role in this mission throughout most of the Cold War because it was not until the 1980s that U.S. sea-launched missiles acquired a similar precision (and therefore capability against hardened targets) to that of the ICBM force.

ICBMs remain the most responsive leg of the nuclear triad and can reach any target in the world in less than 30 minutes. They are always on alert and can be launched within minutes of a Presidential decision to do so. This degree of responsiveness currently does not occur in the bomber leg of the triad and may not always be present right when the U.S. President needs it in the submarine leg of the triad.[16] Some opponents argue that this "hair trigger" alert is more likely to involve the United States in an accidental war, but the United States maintains a robust redundant command and control network.[17] This network needs to be modernized along with the new delivery systems.

An ICBM can be launched only "upon receipt of an authenticated, encrypted, and securely transmitted order from the President of the United States."[18] The risk of an accidental launch is minimal, and in any event, U.S. ICBMs are targeted on open ocean areas, not at other countries. The usual proposed solution to this not-real problem is *de-alerting*—making them less than launch-ready. This would strip ICBMs of responsiveness, one of their most important attributes, which is why all administrations have rejected the idea. Moreover, because ICBMs are always on alert, there is no need for potentially destabilizing posture changes during times of heightened tensions.

The fourth important political objective is contributing to the capacity to hedge against an uncertain future. ICBMs force adversaries to disperse their efforts to counter U.S. strategic systems. If this leg of the nuclear triad were to be eliminated, an adversary could apply all its resources to defeating the triad's seabased leg, which would be its next difficult problem to solve. Bombers are not on alert anymore, so the United States effectively has a dyad for day-to-day operations. As General Larry D. Welch stated, "Neither effort is worth the cost and risk for the adversary so long as the ICBM force is constantly ready."[19] ICBMs can also carry up to three warheads each, and this upload capability becomes more important in light of Russia's and China's modernization and force increases and the U.S. inability to produce new nuclear warheads in the near term.[20] It is also worth mentioning that if the United States unilaterally reduces its ICBM leg of the triad, or any nuclear forces for that matter, any potential future equitable arms control will be more difficult to achieve.[21]

Evolution of the Program

ICBMs were primarily conceived of as a cheaper way to deliver destruction relative to bombers. They are still the cheapest leg of the nuclear triad to operate. They are also a testament to the fact that the United States can go fast, if needed. Only 4 years passed between the setup of the Western Development Division—the Air Force's management group created to develop an ICBM—and the launch of the first U.S. ICBM. The second and third generations of the system were developed within 3 years after that.[22] It took prioritization on the part of the Department of Defense and the White House, and "reporting access to the Pentagon's senior leadership on all decisions related to the overall direction of the program"[23] The current program manager for the Sentinel system must be green with envy. The Sentinel's first developmental flight test has been delayed from 2023 to 2026, and in 2024 the program triggered the Nunn–McCurdy Act review for critically breaching its cost projections.[24]

The survivability of the nuclear force is a key requirement for deterrence. One of the rationales for the development of ICBMs in the 1950s was the vulnerability of bombers to a Soviet nuclear attack, since the Strategic Air Command parked them in the open. Ukraine's recent attack on Russia's strategic bombers illustrates not only this continued vulnerability but also the difficulties in responding to a significant portion of a nuclear triad's air-based leg being destroyed by (fairly cheap) conventional means.[25]

ICBMs and sea-launched ballistic missiles continue to have an unquestionable advantage over bombers in this regard, particularly because bombers no longer carry nuclear weapons during day-to-day operations and because of the development in adversary air defense capabilities. Bombers cannot always penetrate defenses, and ensuring they do is too costly given their other mission demands. Moreover, unlike ICBMs, bombers and submarines can be destroyed by conventional weapons, thus generating possible ambiguity about an adversary's intentions.

The decline of the U.S. nuclear enterprise will one day make an excellent case study in strategic shortsightedness. The Minuteman III system was designed for 10 years of service life and entered the force in 1970. It is currently deployed with the W78 and W87 warheads.[26] The 1970s and 1980s debates regarding basing of a follow-on missile that eventually became the MX Peacekeeper indicated concerns over the Minuteman's survivability, yet the United States is still deploying it 40 years later. The system has been upgraded and its service life extended, but it is still the same system. Some argue the United States should continue to extend its life, just long enough for national security conditions to improve so Washington can get rid of it.[27] Yet Admiral Richard was clear that further extending the Minuteman III system is not cost-effective and is, in fact, quickly becoming impossible because "in some cases, the drawings don't exist anymore, or where we have drawings, they're like six generations behind the industry standard."[28] Counting on future national security conditions to improve is

Airman 1st Class Aiden Williams, 90th Missile Maintenance Squadron boardman, climbs onto maintenance platform to enter launch tube during guided missile maintenance platform installation at F.E. Warren Air Force Base, Wyoming, July 9, 2025 (U.S. Air Force/Michael A. Richmond)

imprudent, particularly when recent trends suggest the exact opposite.

The United States scaled back and then stopped nuclear weapons modernization after the end of the Cold War in expectations of a benign national security environment. This assumed

that Washington could depend on international organizations to help it confront major challenges and that "global governance" would emerge with the help of American leadership. . . . That view presumed that since other countries were progressing inexorably toward liberal democracy, they would share many of Washington's goals and would play by Washington's rules.[29]

The expectation was false, and now the United States finds itself with a much smaller, less diverse, and increasingly aged nuclear weapons systems and an infrastructure that cannot respond to unanticipated developments in any sort of flexible and resilient manner.

Enduring Value

If the United States eliminated the ICBM leg of the nuclear triad, the number of warheads required to attack nuclear weapons–related infrastructure and military bases on the U.S. homeland shrinks from hundreds to a handful. That knowledge could embolden our adversaries not just in strategic scenarios but also in regional conflicts. In conflicts between nuclear-armed adversaries, states with larger arsenals are generally more successful in achieving their objectives during high-stakes crises.[30]

The Sentinel program's challenges are not a commentary on futility of the ICBM leg of the triad; rather, they are a commentary on a nation that became too comfortable with its post–Cold War status. The feeling of safety, and its accompanying lack of urgency, prevails against reason. The post–Cold War optimism was a baseline for recommending that the United States (yet again) extend the life of the Minuteman III system rather than replace it altogether and then work with Russia on arms control

measures to eliminate the ICBM leg of the triad.[31] These arguments ring hollow after Russia's aggressions, most recently against Ukraine; its extensive nuclear modernization; its arms control violations; and China's nuclear buildup and revisionist global agenda.

The Sentinel program is currently behind schedule and over budget and is undergoing a review.[32] The Air Force is planning on 400 deployed Sentinel missiles, but this requirement could change since it rests on a rather optimistic assessment of the national security environment during the time when the New Strategic Arms Reduction Treaty was negotiated.[33] After all, the system is supposed to be in service at least until 2080. That would be like the difference between about 1970 and today. Considering that time frame, one can easily perceive how different conditions can be under which a system must remain effective in the future.

Why Does the United States Maintain a Triad?

While each of the nuclear triad legs are complementary, more important is that the triad compels an adversary to disperse its investments, preparation, and attention.[34] For example, investments into antisubmarine warfare would become much more interesting and have potentially higher payoff if ICBMs were eliminated. Bombers are vulnerable already, and the United States cannot currently be on continuous air alert without breaking the force within a few months. A more diverse set of forces would be inherently more stable than a diminished one.

The U.S. nuclear triad is the crown jewel of U.S. forces in strategic terms—and will continue to be so in the future. It is a visible demonstration that can help to influence an adversary's calculus and deter actions against U.S. strategic interests. It is also an essential enabler for U.S. conventional forces. Admiral Richard stated: "Every operational plan in the Department of Defense, and every other capability we have in DOD, rests on the assumption that strategic deterrence, and in particular nuclear deterrence . . . is holding right."[35]

The current U.S. nuclear force posture reflects the optimism of the early 1990s. Yet forces the United States considered sufficient in the 1990s and early 2000s are unlikely to suffice now or in the future, given that its adversaries are modernizing. As Admiral Richard argued:

We have a triad . . . in part because of the flexibility it provides, the ability to hedge inside of it . . . [W]*hat it also enables you to do is address the threat or the risks you didn't see coming. We always built margin into our strategic forces to make sure that we could account for the unknown risks that may be out there alongside the risk that we could reasonably see.*[36]

More broadly, eliminating a leg of a nuclear triad now when adversaries are doubling down on modernization would send a signal that the United States is ceding the competition in this area to them. That would likely mean more aggression against U.S. and allied interests, more global instability, and consequently less economic prosperity.

As the United States is planning its force posture modernization, it must consider adversary forces and goals and what the President can threaten with U.S. nuclear forces to frustrate them. The decrease in the diversity and number of U.S. nuclear forces is a problem—and a difficult path lies ahead in trying to repair it. It begins with the recapitalization of the U.S. nuclear enterprise, including the laboratories, so they can build new nuclear warheads and be more flexible and agile in the face of dangerous national security trends.

Eight former commanders of U.S. Strategic Command wrote in 2017 that the "combined capabilities of the triad provide the [P]resident with the mixture of systems and weapons necessary to hold an adversary's most valuable targets at risk, with the credibility of an assured response if needed—the essence of deterrence."[37] The United States simply must maintain its strategic nuclear triad into the future. There is no substitute for ICBMs within that force, and reducing the ICBM leg of the nuclear triad will leave the United States and its allies less safe. **JFQ**

Notes

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Senior Airman Chase Anderson, 168th Cyberspace Operations Squadron cyber warfare operator, Iowa Air National Guard, works on network defense during International Cyber Defense Competition, February 22, 2025, at Iowa State University in Ames, Iowa (U.S. Air National Guard/Michael J. Kelly)

The Cyber Deterrence Dilemma

Parallels Between Cyber and Intelligence Special Operations

By Jorge R. Kravetz

In December 2020, the United States experienced one of the most sophisticated cyber espionage attacks in its history: the SolarWinds supply chain breach. Information technology (IT) management software from the company SolarWinds was compromised by the introduction of malware through its network performance monitoring platform. The attackers, identified as being from the Russian Foreign Intelligence Service, accessed the infrastructure of numerous organizations, including U.S. Government agencies and private-sector

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companies, compromising sensitive data. The prolonged infiltration of critical systems revealed notable deficiencies in existing deterrence strategies.[1]

This incident parallels other historical espionage cases, such as Operation *Ivy Bells* during the Cold War, in which U.S. intelligence operatives covertly intercepted Soviet underwater communications cables for years without detection.[2] These examples illustrate a recurring challenge: both cyber and traditional intelligence special operations frequently evade conventional deterrence measures. The question that motivates this research is how the deterrent effects of cyber operations and their potential failures relate to the deterrent effects of traditional intelligence special operations.

These activities exhibit similarities both in execution and impact. Like special operations, cyber activities often rely on espionage, sabotage, and subversion to destabilize adversaries without escalating to large-scale conflict. In this article, *subversion* denotes a deliberate attempt to undermine the authority, integrity, and constitution of an established order, without the need for violence or overthrow, such as through propaganda and disinformation campaigns.[3] Retaliatory measures in both cases are generally tacit, based on implicit understandings of acceptable behaviors and exceptionally pre-agreed or normed, which complicate the establishment of clear boundaries. This raises the question of whether current deterrence frameworks can adequately address the evolving nature of these covert threats.

From a different perspective, this article examines a key issue in security studies: the possible causes of the failures of current deterrence strategies in cyberspace, focusing on their similarity to traditional intelligence special operations that were characteristic of the Cold War but continue to exist today. These operations may occur during periods of peace, tension, or competition, where they are employed to destabilize adversaries without escalating into armed conflict, or during times of war, where these tactics are adapted to support broader military campaigns. Despite countermeasures, both cyber and covert operations persistently evade state defenses, achieving tactical objectives that often challenge traditional understandings of deterrence. This study aims to contribute to the practice of cyber deterrence and security policy by demonstrating how these historical lessons can inform contemporary strategies.

Theoretical Foundations of Deterrence

According to Thomas Schelling, the aim of deterrence is to prevent or discourage an opponent from acting through fear or doubt. It involves diverting action through the fear of consequences.[4] For Paul Huth and Bruce Russett, deterrence is a strategic interaction where a rational actor weighs costs and benefits based on expected adversary behavior. Deterrence is effective when a potential aggressor concludes that the costs of attack outweigh the benefits, making restraint the more advantageous option.[5]

During the Cold War, Henry Kissinger argued that deterrence is a combination of power, the willingness to use it, and the aggressor's perception of these factors. This relationship can be summarized as follows:

$$D = Pc * Wr * Pb$$

where *D* represents deterrence, *Pc* refers to power or the instrumental capability to retaliate, *Wr* is the will and resolve of the deterrer to act, and *Pb* is the aggressor's perception and belief regarding the deterrer's commitment to act. If any factor is zero, deterrence fails. Strength is ineffective without the will to apply it, and it fails if the aggressor doubts the credibility of the threat.[6] Kissinger also suggests that retaliation should focus on not only destroying military capabilities but also affecting the adversary's social substance.[7]

Additionally, Schelling describes how the effectiveness of threats depends on their credibility and severity. He emphasizes that responses must be severe enough to deter the adversary.[8] He also introduces the role of "tacit agreements," which are implicit understandings between conflicting parties about acceptable behavior. These agreements establish unspoken boundaries that can prevent unnecessary escalation by clarifying expectations for conduct.[9]

The concept of tacit agreements underscores the importance of clarity and proportionality in responses, which are vital for maintaining stability. An excessively severe retaliation without a clear connection to the initial act of aggression may provoke further conflict. This reflects a central dilemma in deterrence theory: the challenge of balancing severity with credibility to ensure deterrence without triggering escalation.

The evolution of U.S. nuclear deterrence policy—from massive retaliation, where any act of aggression would be met with an overwhelming nuclear response, to Mutual Assured Destruction (MAD), where both parties face annihilation in a nuclear attack—illustrates strategic shifts in deterrence. The later introduction of tailored deterrence emphasizes the need to adjust responses based on the adversary's specific capabilities and behavior, ensuring a proportional and credible response. This highlights the critical role of proportionality in avoiding unnecessary escalation.[10]

Deterrence theory has evolved to address the complexities of modern hybrid threats. It combines traditional military strategies with new forms of influence, such as cyber operations, information warfare, and economic coercion, emphasizing the importance of diplomatic efforts, economic sanctions, technological superiority, credible military threats, and strategic communication. This holistic approach aims to establish a robust deterrent posture, ensuring credible and effective responses to a diverse range of threats in an increasingly interconnected conflict environment.[11]

Special Operations and Deterrence

Special operations refer to state activities that differ from both diplomacy and conventional military actions, conducted as a "third option" between inaction and direct military engagement.[12] For the United States, these covert actions aim to influence political, economic, or military conditions abroad

Technical Sergeant Andres Coronado, Space Delta 6, Detachment 1, cyber operator, from Schriever Space Force Base, Colorado, participates in Cyber Kauai Innovative Readiness Training mission in County of Kauai's Emergency Operations Center, May 21, 2025 (U.S. Air Force/Rachelle Morris)

while concealing government involvement.[13] This work specifically considers special operations as those involving espionage, sabotage, and subversion—activities that have clear parallels in cyberspace—and is typically linked to strategic or military intelligence efforts and often executed by specialized agencies. Generally, these operations, whether conducted in peacetime or during conflict, fall into two main categories: those that require covert infrastructure for secure command and control by intelligence services, and short-term tactical operations planned by special forces and coordinated through military command structures and procedures.[14]

Despite the significant role of special operations in conflict dynamics, academic research exploring their deterrent impact remains limited. While it is not the purpose of this article to systematically investigate the reasons behind the lack of academic interest in this question—which undoubtedly deserves deeper analysis in the future—we can speculate that this lack of attention might be due to the classified nature of these missions, which restricts data access and minimizes the publicity of results; a possible tendency to focus on diplomacy and conventional military strategies; or the secrecy and possible lack of visible impact of covert operations, as is characteristic of military actions.

However, a recent study explores how special operations can serve as forms of "strategic disruption" that fall short of open warfare to deter escalation.[15] These operations, conducted within indirect or low-intensity conflicts among major powers and their proxies, are reminiscent of Cold War dynamics and suggest a promising area for future research into the deterrent capabilities of special operations.

While this article focuses primarily on the military's role in strategic disruption, it also highlights the potential of nonmilitary instruments within national power to contribute to these efforts. The study draws on extensive analysis of historical cases of special operations

conducted by diverse nation-state military and intelligence organizations, suggesting insights applicable to activities involving espionage, sabotage, and subversion, which are planned and/or conducted by strategic or military intelligence agencies. These operations are significantly important in achieving favorable strategic outcomes without escalating to war.

Disruption campaigns aim to create strategic opportunities, impeding adversaries from achieving objectives and safeguarding national interests in diplomacy, information, military, and economic realms. This aligns with integrated deterrence, where military and nonmilitary instruments work together to sustain strategic advantage in competitive contexts. It explains that these disruptive campaigns do not need to produce strategic effects in and of themselves and highlights their unique potential to frustrate adversarial competitive objectives, particularly in situations where conventional deterrence alone proves insufficient to achieve similar outcomes. Consequently, strategic disruption campaigns, whether conducted by military or nonmilitary forces, seek to obstruct adversarial strategies and decisionmaking, imposing costs, creating dilemmas, and maintaining competitive advantage without resorting to armed conflict.

Similarly, special operations involving espionage, sabotage, or subversion conducted by strategic or military intelligence agencies could create favorable conditions for strategic influence, thereby supporting traditional deterrence efforts.

Understanding the repercussions of uncovered intelligence operations and the likely responses of targeted states is crucial for assessing their deterrent effect. Historical precedents suggest that espionage rarely leads to armed conflict. Such operations can lead to diplomatic protests, expulsions, eventual executions, persona non grata declarations, and the loss or turning of assets.[16] Furthermore, these situations may result in trials, detentions, or imprisonment. Likewise, declassified cases indicate that sabotage and subversion rarely escalate into full conflict.

One example is the 1982 Farewell Dossier, where a U.S. strategic intelligence operation exploited Soviet efforts to acquire Western technology. The dossier, provided by a KGB defector codenamed "Farewell," detailed Soviet intelligence's extensive industrial espionage activities. In response, the Central Intelligence Agency (CIA) launched a counterintelligence operation, planting flawed technology—which would eventually trigger malfunctions—within equipment that the Soviet Union sought to acquire for its infrastructure. The incident caused a catastrophic explosion on a Siberian gas pipeline. This explosion led to significant economic setbacks for the Soviet Union without triggering a direct military confrontation. This case shows how strategic sabotage, when carefully calibrated, can inflict considerable harm without escalating into outright war.[17]

Similarly, the Soviet Union's Cold War "active measures" campaign sought to manipulate public opinion, influence politics, and destabilize rival states through disinformation, clandestine media operations, and forged documents. Tactics included spreading false narratives about Western leaders, inciting social tensions, and planting doubt about U.S. intentions. These measures aimed to exploit societal divisions, undermining trust in democratic institutions and weakening alliances. While they fueled political turmoil in various countries, including in the United States, these operations remained largely below the threshold of direct military engagement, illustrating how calculated subversive efforts could exert significant influence without escalating into major conflict.[18]

These cases suggest that sabotage and subversion were integral to broader strategic competition, illustrating their effectiveness in undermining adversaries without resorting to overt war. The limited repercussions observed may stem from tacit agreements on acceptable boundaries and reprisals, which influence state decisions regarding covert operations. As discussed, when states anticipate minimal consequences, they are less deterred from conducting such operations and may use them to complement their overall deterrence strategy. Conversely, when targeted states understand that responses will be limited by these tacit agreements, their ability to deter further operations may be restricted.

Cyber Operations and Deterrence Framework

While special operations and deterrence remain less explored, cyber deterrence has garnered substantial attention, likely due to early-21st-century fears of a "Cyber Pearl Harbor."[19] This perceived threat involved catastrophic impacts on critical infrastructures, such as power grids, financial systems, and even military or social networks. Consequently, the concept of cyberwar as a unique form of warfare within cyberspace gained prominence, fueling further academic interest in cyber deterrence strategies.[20]

This analysis defines *cyber operations* as including cyberattacks, disinformation, and propaganda campaigns in cyberspace. A cyberattack deliberately targets a computer system's integrity, availability, or confidentiality through malicious software, deceptive tactics, or vulnerabilities in software, hardware, or network configurations. The aim is to gain access, damage or steal information, and/or degrade, disrupt, or block the functioning of such systems. This definition excludes electromagnetic warfare techniques, which exploit the electromagnetic spectrum, and hybrid warfare activities, which could combine cyber operations with kinetic force.[21]

Martin Libicki highlights unique challenges in cyber deterrence, particularly in attributing cyberattacks, a task that becomes more complex when proxies are involved. He suggests a combination of retaliation threats, active defense, and regulation to deter the usage of cyber weapons. The distinction is made between *strategic* cyberwarfare—operating solely in cyberspace, avoiding violence, and remaining sub rosa—and *operational* cyberwarfare, where cyberattacks support military actions. Questions such as "Do we know who did it?" "Can we hold their assets at risk?" and

"Can we do it repeatedly?" illustrate the complexities of cyber deterrence. Libicki also highlights that, unlike conventional shows of force, real cyberattacks are often needed to demonstrate deterrent capacity, introducing added uncertainty.[22]

More recently, Libicki highlights the uncertain effects of cyberattacks resulting from their unpredictable outcomes in comparison to traditional weapons. He states that cyberattacks aimed at espionage, sabotage, and subversion can harm adversaries but argues that cyber deterrence is most effective when integrated with other methods, such as kinetic deterrence. He notes that reliance solely on cyber operations for deterrence is limited because of their unpredictable impact.[23]

Joseph Nye sees cyber deterrence as uniquely challenging compared to conventional and nuclear deterrence and emphasizes the difficulties of attribution. In addition to punishment and denial through defense to deter aggression, two political factors play a crucial role: *entanglement*, where economic interdependence raises potential costs for attackers, and *normative taboos*, which involve ethical and reputational considerations that deter aggression. Consequently, effective deterrence here depends on various factors, including the method of implementation (threats of punishment, defense, entanglement, or norms), the nature of the adversary (state or nonstate), and the type of action being deterred (for example, use of force or economic sanctions). While this multidimensional approach aligns with the broader concept of hybrid deterrence mentioned earlier, Nye's framework remains circumscribed to cyberspace, describing how hybrid deterrence strategies can also be applied specifically within this domain.[24]

Nye also argues that cyber weapons have thus far proved more effective for signaling or creating confusion than for causing physical destruction. He suggests that we may be looking in the wrong direction, as the real danger lies in the *gray zone* of hostility—conflict below the threshold of conventional war—where rapid and inexpensive digital disinformation can confuse and divide adversaries, making cyberattacks the perfect weapon for warfare below the level of armed conflict.[25]

Additionally, the concept of *strategic disruption* in cyberspace should be highlighted. These capabilities are not only used to gather intelligence and influence adversary movements but also enable strategic disruption by creating opportunities for special operations forces in hostile environments. As technology rapidly advances, these cyber capabilities are expected to increasingly impact special operations forces' ability to conduct disruption campaigns.[26]

The initial focus on cyber deterrence was shaped by perceptions of the severe consequences of cyberattacks, drawing parallels with classical deterrence theories and emphasizing attribution issues. However, this view is shifting; the anticipated severity has not materialized, and cyber operations are increasingly regarded as effective support for kinetic operations. Moreover, cyber operations are seen as tools for espionage, sabotage, and subversion within the gray zone of hostilities. This aligns with the concept of *strategic disruption*, as these activities create opportunities by hindering adversaries from achieving their objectives while remaining below the threshold of conventional warfare.

Continuities Between Special and Cyber Operations

Thomas Rid notes that cyberwar—as a potentially lethal, instrumental, and political act of force conducted through malicious code—has not happened in the past, does not take place in the present, and is unlikely to occur in the future. He argues that politically motivated cyberattacks can be considered as manifestations of espionage, sabotage, and subversion, reflecting old conflict tactics adapted to a digital domain. He concludes that despite their technical sophistication, cyberattacks pursue the same strategic objectives as traditional intelligence operations. Additionally, he suggests that while these activities can certainly support military operations and have been used for that purpose for centuries, it remains uncertain whether they will evolve into stand-alone acts of cyberwar.[27]

Building on Rid's framework, an additional study compares state-sponsored special operations with modern cyber counterparts from the 20th and 21st centuries. This study reveals parallels in motivations, objectives, results, impacts on foreign relations, and the role of strategic or military intelligence agencies in planning and execution. Moreover, it situates these cyber operations within the realm of cyber intelligence, positioning them as strategic intelligence activities conducted "in and from" cyberspace toward other domains, illustrating the evolution of traditional covert intelligence activities into the cyber realm.[28]

Examples and Impacts. Notably, 20th-century state-sponsored intelligence operations in espionage, sabotage, and subversion often lacked immediate visible strategic impacts on individuals, assets, institutions, or social cohesion within targeted states. While they could yield favorable tactical results, these actions rarely resulted in significant lasting shifts in social or power structures as well as in the adversary's global policies.

For instance, in 1957, Soviet spy Rudolf Abel was arrested in the United States while engaged in stealing atomic secrets and gathering top-secret intelligence from the United Nations and U.S. military installations. He was convicted of conspiracy and espionage and sentenced to 45 years in prison. Later, he was exchanged for an American pilot in a spy swap between the United States and the Soviet Union. Despite the diplomatic repercussions of this incident, Cold War activities between the two nations continued largely unchanged.

In 1960, Francis Gary Powers, a pilot of a U-2 spy plane operated by the CIA, was shot down while conducting reconnaissance over Soviet territory. This incident occurred as both nations intensified their espionage efforts. After his capture, the Soviet government portrayed Powers as a spy, leading to international controversy and a diplomatic crisis. He was tried in Moscow

National Guard and Reserve cyber professionals participate in Cyber Shield 2025 at Virginia National Guard State Military Reservation in Virginia Beach, Virginia, June 6, 2025 (U.S. Air National Guard/Yonette Martin)

and sentenced to 10 years, although he served only 4 before being exchanged for Abel in 1962. Both cases sparked diplomatic tensions but ultimately did not escalate into wider conflicts, illustrating the typical or tacit consequences of revealed intelligence activities.[29]

The Farewell Dossier exemplifies a significant act of sabotage by the United States that did not lead to immediate shifts in the Soviet Union's power dynamics or global policies. Although it disrupted Soviet gas pipelines, affected technological logistics, and caused economic losses, its impact was not substantial enough to undermine internal social cohesion, shift political power, or alter the country's foreign policy. Nor did it escalate into a full-scale armed conflict or change the overall dynamics of the Cold War.

In the late 1970s, the Soviet Union conducted an "active measures" campaign aimed at distancing Egypt from its alliance with the United States, undermining the 1978 Camp David Accords, and escalating tensions in the Middle East. Through disinformation, propaganda, and document forgery, Soviet efforts spread rumors to discredit both Egyptian and American presidents. While these actions introduced tensions and internal pressures in Egypt, they ultimately failed to break the U.S.-Egypt alliance or undermine the Camp David agreement. As a result of these subversion campaigns, the report by the Bureau of Public Affairs of the U.S. Department of State noted that the general responses of countries that discovered Soviet active measures included well-publicized expulsions of diplomats, journalists, and others involved in these activities, with no escalations, and the Cold War continued as usual. [30]

During 2024, in the cyber realm, seven Chinese intelligence officers linked to China's Ministry of State

Francis Gary Powers (right) with U-2 designer Kelly Johnson in 1966 (U.S. Air Force)

Security were indicted for hacking into the systems of U.S. companies, politicians, governmental institutions, and officials since 2010, including those in the defense industry, critical infrastructure sectors, and individual dissidents worldwide. While this led to legal actions by the U.S. Department of Justice and sanctions imposed by the Department of the Treasury against the individuals and companies involved, it did not prompt any escalation, reflecting the application of tacit agreements concerning discovered intelligence operations.[31]

In 2015, Ukraine's power grid suffered an attack attributed to Russian nation-state cyber actors, marking the first cyberattack to cause a large-scale blackout. This sabotage was carried out by a hacking group that used destructive malware to compromise the industrial control systems of electrical substations. The attack significantly impacted the country's critical infrastructure, leaving 225,000 users without electricity for several hours. However, the system managed to recover, and aside from the protests, no significant escalations occurred, with the conflict between Russia and Ukraine remaining unchanged because of this incident.[32]

During the 2017 French presidential election, a foreign entity linked to Russian military intelligence interfered in the voting process through a disinformation campaign against candidate Emmanuel Macron. This subversion campaign included spreading rumors on social media platforms as well as leaking of data hacked from Macron's campaign team. Although these efforts aimed to sway public opinion among the electorate, they did not apparently produce significant changes in the electoral landscape.[33] However, following his election, Macron made public protests against Russian state–backed media outlets RT and Sputnik, accusing them of acting as "organs of influence and propaganda" during the campaign.[34] This reflected a deterioration in trust between the two countries, although it did not lead to a major diplomatic friction, nor did it escalate into a larger conflict between France and Russia.

All these cases illustrate that special operations—whether related to espionage, sabotage, or subversion, and whether conducted in traditional or cyber domains—may yield tactical or even limited strategic outcomes for the attacker. However, they often fail to achieve significant strategic impacts on the target

or provoke severe or extreme retaliation. Furthermore, these retaliations tend to operate within the bounds of tacit agreements, which frequently shape the nature of the responses.

Strategic Impact. Here, *strategic impact* encompasses kinetic or nonkinetic effects so significant in terms of the costs imposed on the adversary—whether immediate or gradually consolidating—that they hinder a short-term return to the previous strategic situation across four main areas:

- Social cohesion: Disruptions in social stability, including displacements, humanitarian crises, unrest, or casualties, weakening government legitimacy.
- Economic impact: Disruption to critical infrastructure, destabilization of financial institutions, losses in strategic sectors of the economy, erosion of internal and external economic confidence, and loss of other sources of income, causing economic stability.
- Political structure: Significant changes within government or state institutions, including shifts in political power, leadership changes, or alterations in governance frameworks. These changes may alter domestic or foreign policy as well as the legitimacy of governing bodies, affecting defense posture and national security strategy.
- Military structure: Reductions in military capability, readiness, or effectiveness, affecting defense posture and national security strategy.

For robust deterrence, threats of retaliation should ensure not only tactical success but also substantial lasting costs and consequences for the adversary.

Deterrence Representation Model. Kissinger's deterrence model, as previously discussed, assumed clear attribution guaranteed by kinetic aggression, with responses based on mutual retaliation, especially under the concept of MAD. During the Cold War, both the immediacy of attribution and the strategic impact of a nuclear strike were so self-evident that they required no formalization and thus were not explicitly included in the deterrence models of that era.

Building on this classical conception, we propose an adapted deterrence representation model designed to assess potential vulnerabilities in deterrent posture and evaluate its overall effectiveness. This model is conceptual and illustrative. It is meant to reflect the complexities of modern deterrence, particularly in the special operations and cyber domains, by integrating factors such as "attribution," "tacit agreements," and "strategic impact," rather than to generate precise numerical predictions.

These elements can lead to failures or weakened deterrent postures while also assisting in evaluating varying degrees of efficacy. By including cyber considerations, our modern deterrence model encompasses a broader range of factors:

$$D = Pc * Wr * Pb * At * (1 - Ta) * (STi)$$

where D represents deterrence; Pc is the power and capability of the deterrer to retaliate; Wr represents the will and resolve of the deterrer to act; Pb is the aggressor's perception of the deterrer's resolve to act; At represents the capacity of the deterrer to attribute, both intellectual and material, the attack (At = 1 indicates capacity; At = 0 indicates failure of deterrence); Ta represents tacit (or explicit, if they exist) agreements (Ta = 1 indicates agreements in place, Ta = 0 indicates no agreements—these represent the unspoken or formalized understandings that the deterrer is expected to uphold when responding to an attack); and STi reflects the deterrer's evaluation of the likely kinetic or nonkinetic effects their retaliation would have on the adversary's political, social, economic, and military situations. *Note*: Values exceeding 1 are not permitted. D = 0 implies uncertainty or potential failure, not necessarily absolute nullification of deterrence.

Two approaches are proposed:

Binary Representation. Here, Pc, Wr, Pb, At, and STi are limited to values of 0 or 1. If any factor equals 0, then D = 0, indicating a potential failure of deterrence.

Estimative Representation. In this case, Pc, Wr, and Pb can take values from 0 to 1, inclusive. If any factor equals 0, deterrence could fail; values between 0 and 1 indicate the parameter's existing level, with STi calculated as follows:

Standard representation:

$$STi = \frac{Ie + Im + Ip + Is}{4}$$

where each I represents an impact—economic, military, political, or social. A value of 1 indicates presence, while 0 indicates absence. The sum is divided by 4 to ensure STi remains between 0 and 1. If STi = 0, deterrence fails; any value greater than 0 suggests a partial deterrent effect, indicating some strategic impact contributes to deterrence.

Weighted Average: For a more quantitative threshold, weights can be assigned to each impact type to reflect its relevance:

$$STi = \frac{(we * Ie) + (wm * Im) + (wp * Ip) + (ws * Is)}{we + wm + wp + ws}$$

where Ie, Im, Ip, and Is remain the impact factors, and we, wm, wp, and ws are their respective weights. As in the estimative case, here even if one impact factor is zero, others may sufficiently sustain deterrence. If all weights are equal to 0, this indicates irrelevance in the considered impact areas, necessitating the use of the standard representation of STi. In all estimative calculations, multiplying the formula by 100 will yield a percentage estimation of deterrence.

Important Considerations

This framework is a starting point. New factors and more nuanced adjustments can be added to the model as needed to capture specific scenarios. The binary representation model focuses on evaluating the potential failure or success of deterrence by assigning direct values, while the estimative models offer more flexibility by allowing subjective estimations of certain parameters and accounting for different strategic impacts. The weighted STi approach allows certain impacts to have more influence on the overall assessment.

However, the subjective nature of these estimations and the challenge of quantifying impacts should be considered, along with the need to ensure transparency regarding methodology and consistency throughout this process. Additionally, the model's reliance on rational actor behavior may not always hold, as emotions, ideologies, and misperceptions can significantly influence decisionmaking. Its use should be approached with caution, especially in complex scenarios where additional variables may emerge.

For instance, the question "Can we do it repeatedly?" could introduce an additional term: $D = D_0 * R_p$, where D_0 denotes the original formula and R_p represents repeatability. If $R_p = 0$, then $D = 0$, indicating possible deterrence failure. Similarly, entanglement (E), reflecting external constraints like those imposed by the international community, can be added, giving $D = D_0 * R_p * (1 - E)$. If $E = 1$ (entanglement in place), then $D = 0$, indicating a weakened deterrence posture.

Conclusions

Since the emergence and intensification of state-sponsored operations in cyberspace throughout the 21st century, academic interest in the deterrent effects of this new domain of conflict has markedly increased. Initially, this interest was predicated on the assumption that cyber operations, or cyber warfare, could inflict catastrophic damage on adversaries. It was anticipated that these operations would exert an effective deterrent influence comparable to that of conventional or nuclear weapons in the past. However, it has become increasingly evident that cyber operations among states have escalated without achieving effective deterrence against such attacks.

This evolving scenario has spurred scholarly inquiry into the underlying dilemmas of deterrence failures in cyberspace, particularly as these challenges diverge from classical deterrence theories. Notably, this area has not been thoroughly examined within academia in relation to traditional special operations. This lack of attention may result from the secrecy surrounding their impacts or from the prevailing belief that such operations do not significantly alter the existing social or power dynamics of the adversary.

Drawing on a rigorous theoretical framework, academic studies, and historical examples, we have identified a clear pattern in state-sponsored intelligence special operations—encompassing both traditional and cyber domains—and demonstrating continuity in the strategies of espionage, sabotage, and subversion. While these operations may yield tactical successes, their long-term strategic impact on foreign relations, as well as on the social, economic, and power dynamics of states, appears more limited.

Moreover, emerging investigative perspectives view both special and cyber operations as continuous and integral components of strategic disruption, serving as vital complements to the overall deterrent posture of states. In this context, the significance of agreements—whether tacit or explicit—should not be underestimated. These agreements play a crucial role in moderating state responses and preventing the escalation of armed conflicts or war.

The adaptation of the classical deterrence model from the Cold War incorporates elements such as the viability of attribution, the existence of tacit agreements, and strategic impacts. As a preliminary illustrative framework, this adaptation allows us to highlight the complexity of evaluating, a priori, the potential degree of effectiveness or failure of contemporary deterrence, including cyber. This proposed dynamic and adjustable model reflects the hybrid and constantly evolving nature of modern conflicts.

The dilemma of cyber deterrence, much like that of traditional special operations, highlights the limitations of these approaches as stand-alone deterrent strategies. Instead, both serve as integral components that reinforce the broader deterrent posture of states, consistent with the principles of hybrid deterrence. Understanding the dynamics of deterrence within traditional special operations is therefore essential to comprehending the current limitations of cyber deterrence. Notably, the apparent failure of cyber deterrence is not entirely unprecedented; it reflects a historical continuity with the persistent challenges of deterring covert operations such as espionage, sabotage, and subversion. In simpler terms, both cyber and covert special operations—although often invisible or plausibly denied—are central tools through which states compete while avoiding full-scale war. Recognizing this continuity helps governments understand today's strategic environment more clearly and design more realistic and adaptive national security strategies. **JFQ**

Notes

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Coastguardsmen from USCGC *James* conduct boarding of fishing vessel in Eastern Pacific, August 3, 2022 (U.S. Coast Guard)

Combating IUU Fishing in the South American Pacific

An Opportunity to Counter Chinese Influence Closer to Home

By Alexander Goodno

In August 2022, USCGC *James* took evasive action to avoid a Chinese-flagged vessel that was attempting to ram the cutter in the Pacific Ocean.[1] While most confrontations between the United States and China center around Taiwan or the South China Sea, this event took place off the coast of South America—nearly 10,000 miles (16,000 kilometers) from mainland China. The incident had little to do with Chinese territorial expansion. Instead, it focused on illicit fishing activity, the Chinese vessel being a member of China's distant water fishing (DWF) fleet, the largest in the world.[2]

For many in the United States, news of this encounter was the first time they had heard of China's fishing activities in

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the Western Hemisphere; however, high-stakes encounters between Chinese fishing vessels and South American authorities have been common over the past decade. In 2016, an Argentine coast guard vessel sank the *Lu Yan Yuan Yu 010*, and in 2019, it fired on the *Hua Xiang 801*; both were Chinese DWF vessels caught fishing inside Argentina's exclusive economic zone (EEZ).[3] Similarly, the Ecuadorean navy confiscated the *Fu Yuan Yu Leng 999* in 2017 for fishing inside the Galápagos Maritime Reserve.[4]

With China's expanding presence in South America, these at-sea confrontations have tarnished the positive image China has tried to convey. They have also created an opportunity that the United States could exploit. By establishing itself at the forefront in combating illegal, unregulated, and unreported (IUU) fishing activities off the Pacific coast of South America, the United States could strengthen its role as a leader in the Western Hemisphere and counter growing Chinese influence in South America. To achieve this end, the United States must adopt a uniform approach to curbing IUU fishing, encourage the South Pacific Regional Fisheries Management Organisation (SPRFMO)—an international treaty-based organization—to implement unambiguous regulations that nations could easily enforce, and strengthen counter–IUU fishing operations with South American partner countries as well as with China.

China's Growing Influence in South America

China's presence in the Southern Hemisphere is not new, but its reach and ambitions on the South American continent have expanded significantly over the past 15 years. At the turn of the millennium, as China's mineral resources depleted domestically, Beijing began significantly increasing trade with South America, importing its untapped raw materials.[5] A decade later, China expanded the scope of its Latin American interests, incorporating South America into its Belt and Road Initiative (BRI) and encouraging increased investment on the continent.[6] These Chinese investments have largely focused on infrastructure, such as China's plan for the Twin-Ocean Railway, which would connect Brazil's Atlantic coast to Peru's Pacific coast, or its newly completed megaport in Chancay, Peru.[7] China has similarly encouraged companies to invest in South American utilities. Huawei, China's premier telecom company, was awarded separate contracts to build out a national 5G network in Ecuador, Chile, and Peru, and in 2024, China finalized its purchase of equity stakes in two of Peru's largest power suppliers.[8]

While many of these projects appear primarily focused on economic opportunities, they also support Beijing's goal of increasing its influence and cooperation on the South American continent. China has been open about these objectives. In the 2010s, Beijing established the China–Comunidad de Estados Latinoamericano y Caribeños (CCF), outlining a desire to bolster Sino–Latin American cooperation across multiple endeavors: space technology, disaster prevention, and climate change, among others.[9]

Their plan for expanded collaboration and partnership on the South American continent has had success. Consider China's relationship with Chile. At the start of the 21st century, China's relationship with Chile primarily focused on copper exports; today, their relationship is much more intertwined. During the COVID-19 pandemic, the two countries partnered in developing a coronavirus vaccine.[10] More recent, the two countries have been moving forward on a joint venture to build a 10-square-mile (26-square-kilometer) astronomical park in the Chilean Ventarrones Mountains that will house over 100 telescopes, including a 12-meter telescope.[11] While China's initial forays in South America may have been transactional, its future on the continent appears politically much broader in scope.

China's increasing presence in South America has not gone unnoticed. Although Beijing claims that its motive behind BRI investments and CCF collaborations is to bolster developing nations, Western policymakers believe otherwise. As an example, analysts at the International Institute for Strategic Studies and Asian–Latin American professors collectively suggest that specific infrastructure projects, like a South American transcontinental railway, could be a means for China to bypass the Panama Canal or provide a gateway for future naval logistics bases, similar to China's foreign military base in Djibouti.[12] Similarly, U.S. investigative journalists have highlighted that the proposed Chilean Ventarrones observatory could also serve as a military node, monitoring U.S. satellites and space operations, and complete China's network of five global sites needed for it to scan the entire northern and southern hemispheric skies every 30 minutes.[13]

In concert with Washington's apprehension, skepticism is percolating through the South American populace over Chinese intentions on their continent. South American manufacturing laborers, whose factories began closing due to low-cost imports, strongly oppose increased trade with China.[14] Additionally, Peruvian military leaders and business officials have argued that economic dependency on China and near-total Chinese control over Peruvian utilities create a national security liability in the region.[15]

Something Fishy on the High Seas

In parallel with South American concern over China's impact on the continent, discord over China's fishing operations is also garnering increased attention. China's South American DWF fleet—which began as a relatively small enterprise three decades ago, responding to dwindling Chinese squid fisheries—has grown exponentially and now numbers more than 500 vessels.[16] In an industrial-like operation, the at-sea fishing vessels rely on refrigerated mother ships to store their catch, transport fish to ports, and sustain the vessels with food and fuel. The fleet operates for months on end and can resemble an island city-state, covering swaths of the ocean nearly 200 miles (300 kilometers) long, equivalent to the length of the entire coastline of South Carolina.

The imposing presence of Chinese DWF creates a growing problem for the Pacific coastal nations of South America. Though China's DWF vessels claim to operate outside each country's EEZ, their practices are questionable: turning off their automatic identification systems to traverse into EEZs unnoticed, casting expansive fishing nets underwater into an EEZ while keeping the ship outside of the EEZ's boundary, or fishing for protected or regulated species.[17] As an example, in 2017, the Ecuadorean navy discovered 7,639 unreported sharks aboard the *Fu Yuan Yu Leng 999*, a Chinese vessel registered to catch squid.[18] More concerning is the impact that industrial-scale fishing has had on the ecosystem, disrupting migratory patterns of fish along the South American coast and depleting species necessary to support local artisanal fisheries.[19] For countries like Ecuador, the seventh-largest tuna-fishing nation in the world, or Chile, where fish is its largest export after copper, the impact is tremendous.[20] In 2020, IUU fishing accounted for a nearly $2.3 billion drain on South America's economy, with $600 million of these losses coming from individual incomes.[21] Left unchecked, the situation in the southern Pacific could gut the South American fishing industry, to say nothing of the ripple effects it will have across global fish stocks.

South America's Pacific countries are not standing idly by. As the problem has grown, many of these nations have begun strengthening their capacities to surveil and patrol their EEZs. Already a regional leader in surveillance, Chile has invested significantly in unmanned aerial vehicles and satellite technology to further increase its ability to monitor maritime protected areas farther offshore.[22] Like its neighbor to the south, Ecuador has expanded its surveillance capabilities. Leveraging technology used by Canada's Department of Fisheries and Oceans, Quito has begun using satellites and artificial intelligence to find and track "dark vessels"—that is, ships that turn their transponders off to evade detection when crossing into an EEZ unauthorized.[23]

At the same time as they seek to find offending fishing vessels from the sky, these countries are also expanding their naval capacity to patrol the oceanic commons. In April 2024, Peru signed a deal with South Korea's Honda Heavy Industries to build one multirole and one offshore patrol vessel. Lima hopes to add these to the eight Peruvian-built patrol boats it recently purchased, which have been successful in aiding Peru's efforts against IUU fishing.[24] Columbia and Ecuador are also expanding their navies, adopting similar plans to increase the number of multipurpose and offshore patrol vessels within their fleets.[25]

Nevertheless, despite these noteworthy efforts, large-scale IUU fishing in the South American Pacific persists. Part of the problem is a lack of adequately trained personnel. Multiple reports highlight that Ecuador lacks the necessary staffing to monitor its offshore waters properly and that its existing maritime enforcement personnel do not fully understand available legal tools against IUU fishing.[26] Chile is in a similar predicament. Consider that while Santiago invests more in its navy than nearly every other Central and South American country, its ratio of navy personnel to square mile of coastline is lower than half of these same countries.[27] Chile simply does not have the resources to cover its vast territorial waters.

The South American Pacific's demonstrated desire to curb IUU fishing, combined with its existing resource shortfall, presents a window of opportunity for Washington. To date, many of the U.S. efforts to counter China's global influence have focused on the Western Pacific. In the South American Pacific, Washington could both challenge Beijing's behaviors on this side of the globe while also strengthening relations with its partner countries to the south. In short, combating IUU fishing in the region requires deliberate action: South American countries cannot do it alone, it serves U.S. interests, and it is an effort that the United States can take the lead in delivering on.

Leading the Effort to Combat IUU Fishing

To succeed as a leader in countering IUU fishing in South America, Washington should focus on three lines of effort—each tailored to combat IUU fishing and build trust among its southern peers. These lines of effort include consistent messaging, regional fisheries management organization (RFMO) measures, and inclusive multinational training and operations.

1. ***Consistent Messaging.*** Adopting an even-handed approach will be essential for the United States to assert itself as a leader in South America's campaign against IUU fishing. In the past, Washington's attempts to enforce international policy have been inconsistent, holding one nation accountable while disregarding another. To avoid this perception in the Latin American South Pacific, consistency in America's messaging and enforcement will help legitimize its cause.[28]

Regarding messaging, the United States must implement a precise information operations campaign to voice concerns over all forms of IUU fishing. All too often, countries and spokespeople reduce the term *IUU fishing* to *illegal fishing*. The concept is much broader than that. The Food and Agriculture Organization (FAO) of the United Nations defines *IUU fishing* as *illegal*—fishing in sovereign waters without permission, *unreported*—not fully explaining in which type of fishing a vessel is engaging or misreporting the number of fish caught, and *unregulated*—failing to abide by national or international regulations and responsibilities focused on preserving maritime life.[29] Careless language creates ambiguity and provides a scapegoat for governments whose vessels are the offenders. This is particularly the case on the high seas (the oceanic area outside of an EEZ), where most infractions are not necessarily illegal—since vessels are not fishing within sovereign waters—but rather violate reporting or regulation requirements laid out by RMFOs, the United Nations, or other international fishing agreements.

The United States also needs to focus on combating *all* IUU fishing. While the introduction of this article highlights multiple standoffs with China's DWF fleet, China is not the only offender. China accounts for roughly half the DWF activity off the coast of South

Coastguardsmen's view looking aft across deck of squid jigger vessel during boarding inspection, with USCGC *Alder* in background, during Operation *Southern Shield* 2023, October 2023 (U.S. Coast Guard)

America, with DWF fleets from South Korea, Taiwan, and Spain making up the other half.[30] While Chinese fleets may be making the most headlines, coast guards and navies should not focus solely on Chinese DWF fleets but also on regulating *all* DWF activity. Beyond DWF activities, U.S. efforts should also consider those infractions by traditional small-scale fishing fleets closer to shore, especially since such infractions may be a more pressing concern to a local population than DWF violations hundreds of miles away. For example, Peru has voiced as much concern about Ecuadorean fishing vessels within its EEZ as it has over Chinese DWF.[31] The key throughout must be consistency, not just in messaging but also in enforcement.

2. *Strengthening RFMO Regulations.* As has been previously touched on, successfully enforcing fishing practices on the high seas depends on the regulatory measures of the relevant RFMOs, which are international organizations that provide regulations governing fishing practices on the high seas in a specific area.[32] Their membership includes nations located near the maritime region or with a vested fishing interest in the region.[33] The high-seas area off the western coast of South America falls within SPRFMO's jurisdiction, and the organization includes the United States, China, Taiwan, and the European Union among its nonlocal members.[34] The problem with RFMOs is that regulations can be ambiguous, and since the responsibility for taking punitive action against an offending fishing vessel falls on the flagged nation of that vessel, how these countries interpret the regulations and impose penalties can vary. For example, in certain instances, Beijing has been reluctant to impose penalties on Chinese DWF vessels, citing a lack of sufficient evidence to meet its threshold for violating SPRFMO's regulations protecting fish stocks.[35] As an SPRFMO member, the United States should lead efforts with fellow member nations to enact regulatory measures that achieve the organization's conservation aspirations but are less subjective in interpretation.

Inspiration to better direct SPRFMO's future conservation measures is available among its fellow member states. The West and Central Pacific

During Asia-Pacific Economic Cooperation Peru 2024 Forum, China's President Xi Jinping meets with Peru's President Dina Boluarte in Lima to strengthen their strategic partnership and celebrate inauguration of Chancay megaport, November 14, 2024 (Fotoholica Press Agency/Alamy Live News)

Fisheries Commission (WCPFC) and the North Pacific Regional Fisheries Commission (NPFC), two historically strong RFMOs, are good examples.[36] Six years ago, the WCPFC enacted a comprehensive measure restricting the overfishing of bluefin tuna and has since seen bluefin tuna populations rebound dramatically, surpassing the WCPFC's initial 5-year target within its first year.[37] SPRFMO could enact similarly stringent fishing conservation measures targeting specific species.

Other measures from peer RFMOs have targeted more transparent illicit activity associated with DWF. For example, by targeting human labor abuse at sea, a crime with strong ties to IUU fishing, governments have been able to curb IUU fishing in certain parts of the globe. Consider that, under pressure from the European Union, Thailand enacted a series of stricter labor laws for its fishing industry in the 2010s, indirectly reducing the number of Thai fishermen engaging in IUU fishing.[38] SPRFMO attempted such an indirect approach in 2024; however, its regulation only *encourages* nations to comply with international labor standards.[39] Instead, it should follow the WCPFC's lead by enacting regulations that establish a *legal requirement* for minimum labor standards on board fishing vessels within its waters.[40] In addition to looking at regulations regarding human labor rights, SPRFMO might also consider examining the NPFC's regulations combating pollution caused by DWF, or focusing on drug trafficking, an illicit activity that the Ecuadorean navy has regularly observed aboard IUU fishing vessels in the South American Pacific.[41]

Beyond arguing for the United States to leverage SPRFMO as a force enabler, Washington will need to overcome enforcement challenges inherent in the structure of RFMOs. For example, adding new conservation measures typically requires approval from a supermajority of RFMO members, making it challenging to pass measures with teeth.[42] SPRFMO faced this roadblock in 2021, when numerous South American countries proposed various measures, all of which China vetoed.[43] At impasses such as these, the United States must take the lead and work with China to find common-ground measures that can still effect change. Proposing fishing moratoriums, a regulation China openly supports, backed by scientific inputs from SPRFMO members, is a start.[44] The United States can also leverage

China's global status and membership in numerous other RFMOs to identify proven measures to which China is already a party or has already approved elsewhere. China's membership in the WCPFC and NPFC means that some of the examples highlighted in the preceding discussion could be suitable options.

Some critics also cite RFMOs' inability to enforce regulations.[45] However, SPRFMO's recent passage of a measure authorizing high-seas boarding inspections could be a game-changer.[46] Although still gaining acceptance in RFMOs worldwide, these inspections have proved highly effective in fostering a culture of compliance.[47] In short, with dedicated effort, SPRFMO has the potential to be an effective partner for U.S. operations against IUU fishing on the high seas.

3. ***A Multinational Approach.*** Whether enforcing SPRFMO regulations or South American national law, identifying IUU fishing violators and holding them accountable must be a multinational effort. Given its vast resources, the United States has a distinct opportunity to emerge as a leader in providing this capacity at sea. South American nations have routinely demonstrated a willingness to conduct boardings within their EEZ; however, they are less inclined to do so on the high seas.[48] Part of the problem is due to the limited number of Latin American naval vessels that can travel beyond the EEZ, and as highlighted previously, another part is due to a lack of personnel trained in countering IUU fishing.[49]

The United States can assist with the former by dedicating more of its vessels to counter–IUU fishing operations in South America. The desire within recent White House administrations to draw down in the Middle East and refocus on the Pacific could provide this opportunity, diverting U.S. Coast Guard cutter deployments from U.S. Central Command (USCENTCOM) to U.S. Southern Command (USSOUTHCOM). Perhaps more feasibly and with far-reaching impact, the United States can help the latter through increased training efforts and shiprider agreements. Unfortunately, despite the *Maritime Security and Fisheries Enforcement Act of 2019* (16 U.S.C. § 8001–8041) directing the increase of bilateral agreements to make shipriding a reality, little action has been taken toward this effort.[50] The U.S. Department of State must be more aggressive in establishing mechanisms for these invaluable cross-training opportunities.

In contrast to the inaction on bilateral shipriding agreements, USSOUTHCOM and the USCG have been aggressive in building robust programs to address needed multinational training on countering IUU fishing. Leveraging its U.S. Pacific Regional Fisheries Training Center, the USCG has established a mobile training course designed for partner nations.[51] The course trains foreign sailors and coastguardsmen on boarding procedures, evidence collecting, authorities, case studies, and mock boardings.[52]

In tandem with these training initiatives, the United States should also increase opportunities to conduct counter–IUU fishing drills within multinational military exercises and operations in Latin America. Participation not only would achieve the goal of training more South American partners in counter–IUU fishing operations but also could provide a temporary infusion of U.S. counter–IUU fishing assets in the South American Pacific. Consider USSOUTHCOM-sponsored exercise Resolute Sentinel. Started in 2021, this U.S.–South American exercise, which includes all four South American Pacific countries, focuses on joint military training and readiness in humanitarian assistance and disaster response, cybersecurity, space domain awareness, and counterthreat training.[53] Though combating IUU fishing is not among these listed lines of effort, in 2023, the U.S. Coast Guard embedded its IUU fishing mobile training course within the exercise's construct.[54] Leveraging exercise assets, the U.S.-led multinational training course included a capstone event, where students and instructors flew onboard a U.S. C-130 over the Peruvian EEZ and high seas to put their training into practice.[55] USSOUTHCOM has since maintained counter–IUU fishing training within Resolute Sentinel's framework, adding USCG-led counter–IUU fishing ship boardings during its 2024 exercise.[56]

Ecuador's exercise Galapex, a 2-week effort focused entirely on combating IUU fishing near the Galàpagos, holds even greater promise in demonstrating U.S. commitment to multinational training on countering IUU fishing. Comprising 14 countries, this exercise places significant emphasis on a partnered approach to decreasing IUU fishing within the South American South Pacific. USSOUTHCOM has been an active participant since the exercise's inception. However, during the exercise's 2024 edition, the United States conducted only one shipriding partnership, between the USCGC *Benjamin Bottoms* and the Ecuadorean navy. USSOUTHCOM should further expand such opportunities by including additional maritime assets to expose even more nations to U.S. tactics, techniques, and procedures.[57]

The United States should not limit collaborative multinational efforts to exercises alone; instead, it should include partner nations in limited enforcement operations. Consider the USCG's Operation *Southern Shield*, which focused on countering IUU fishing and took place in October 2023. The operation had SPRFMO's backing, involved multinational partners in its intelligence and coordination, and included partner nations in its after-action distribution; however, it fell short of including partner-nation vessels at sea alongside USCG vessels.[58] The United States should avoid unilateral patrols to the maximum extent possible. Demonstrating multinational resolve through actual enforcement will make it much easier for SPRFMO nations to hold one another accountable and ensure that the United States does not project an overbearing image.

A Multinational Approach Should Include China

Besides working alongside South American naval forces, Washington should also consider partnering with China to combat IUU fishing. Desiring to be a maritime leader, China has openly stated it has "zero tolerance for illegal

fishing" and has enacted stiff penalties on its DWF vessels that turn off their automatic identification systems, fail to comply with inspectors, or commit other violations.[59] With this being the case, the United States must use this rare opportunity to reach across the table and work together.

Collaborative efforts may initially involve inspection training as previously described, participation in a future counter–IUU fishing exercise, and possibly limited shiprider opportunities. Over time, the United States might also encourage Chinese coast guard vessels to participate actively in regulatory operations in the South American Pacific, either alone or alongside the USCG.

Given the current political climate between the two nations, such collaboration may prove complex. However, it has precedent. During the height of the Cold War, the United States and Soviet Union set aside their political differences to establish an agreement that permitted Soviet DWF vessels access to U.S. ports in exchange for limiting the number of fish that Soviet vessels caught on the high seas off the U.S. Pacific Northwest.[60] In a more recent example specific to Sino-U.S. relations, China and the United States partnered in the multinational effort to crack down on piracy in the Gulf of Aden. Even during President Barack Obama's strategic reprioritization to limit Chinese geopolitical influence, the two countries successfully collaborated on the African coast, sharing limited intelligence on piracy operations, agreeing to emergency landing rights for Chinese helicopters on U.S. Navy vessels, and achieving success as a team.[61]

To be clear, such a partnership will not be easy. Relations between the two countries have only regressed further in the decade since Obama's Presidency. To succeed, both countries will have to overcome growing mistrust and build on small gains, such as confining intelligence sharing to open-source information, like monitoring of automatic identification systems. These impediments, however, are constraints, not barriers. As demonstrated by the 2023 statement at Sunnylands, California, in which the United States and China reaffirmed their commitment to jointly work toward addressing climate change, even amid increased saber-rattling, these two countries are willing to work together to address specific transnational issues.[62]

Thus, proposing a collaborative effort in the South American Pacific should not be dismissed for its audacity. If anything, by including a nation whose DWF vessels have routinely come under question, Washington would further legitimize efforts to police IUU fishing, be better positioned to ensure that China's proclamations against IUU fishing are not empty rhetoric, and perhaps even create an avenue by which to ease political tensions between the two global powers.

A Partner That South America Can Rely On

To ensure that lines of effort directed toward combating IUU fishing have the secondary effect of strengthening the United States as a leader within the Western Hemisphere, they must emphasize fully integrated multilateral efforts. Undoubtedly, reducing IUU fishing boosts the economics of all affected nations: protecting local artisanal fishermen, national fishing exports, and wildlife tourism (such as in the Galápagos). However, a key enabler in establishing trust between nations occurs when foreign militaries work closely together.[63] Studies have shown that when militaries work together in collaborative efforts—specifically exchanging tactics and doctrine—it creates linkages among participants that extend military familiarity to political cooperation.[64] By directly assisting in a cause through mutual partnerships with Western Hemisphere nations, these secondary and tertiary effects can double U.S. positive return across the region.

The United States should also remain measured in its approach. Washington has had a complex and shifting relationship with its southern neighbors, who might argue against the United States assuming an active leadership role in combating IUU fishing off their respective Pacific coasts. Such concerns are not unfounded. U.S. fishing vessels have been the subject of IUU fishing activity in South American fisheries since the 1950s, continuing up to as recently as 2001.[65] Throughout that period, Peru, Chile, and Ecuador regularly confronted the United States over these incursions, resulting in multiple signed agreements and a loss of faith in U.S. adherence to maritime law.[66] These infractions will certainly give South Americans pause about a renewed U.S. interest in fishing along their Pacific Coast.

Nonetheless, active interest in countering IUU fishing might allow Washington to repair previous grievances, mainly since its enforcement is focused on international rules and not on protecting U.S. fishing fleets. If anything, failure to assist might project an image of indifference to those impacted by these fishing violations, or, worse, demonstrate tacit approval to those nations that allow IUU fishing to go unchecked. So long as the United States enforces equitably against all offenders, it has more to gain from actively assisting and leading efforts to combat IUU fishing in South America than from otherwise abstaining.

Conclusion

This article highlights three broad lines of effort to curb IUU fishing in the South American Pacific: consistent messaging, strengthening RFMO regulations, and pursuing greater multinational collaboration. While some of these lines of effort, such as strengthening RFMO regulations, may take time to develop or receive foreign endorsement, there are specific actions that the United States can take now. First, increase U.S. participation in South American exercises with a focus on IUU fishing. Exercise Galapex 2024 included only one maritime vessel, the USCG *Benjamin Bottoms.* The current U.S. force posture may not have the capacity to sustain extensive patrols against IUU fishing patrols in the South American Pacific, but it should have the ability to commit more maritime assets temporarily toward counter–IUU fishing training in future South American exercises. Second, increase opportunities for South American mari-

Coastguardsmen from USCGC *James* conduct boarding of fishing vessel in Eastern Pacific, August 4, 2022 (U.S. Coast Guard/Justin Upshaw)

time enforcement personnel to receive counter–IUU fishing training in the United States. Schoolhouses, such as those offered by the National Oceanic and Atmospheric Administration and the USCG, provide an affordable option by leveraging existing training facilities and curricula. Last, increase public awareness of this issue. Most Americans remain unaware of DWF fleet actions off the South American Pacific coast. As U.S. leaders have done to increase public awareness of China's role in feeding the fentanyl pipeline through Central America, they have an opportunity to bring greater awareness of the role of China's DWF fleet in IUU fishing on this side of the Pacific.

Though these actions are achievable, there will also be limitations on Washington's ability to execute the proposed lines of effort. As already highlighted, cooperating with China to counter IUU fishing in the South American Pacific will be foremost, likely requiring a graduated approach toward an eventual military partnership. Competing global demands and finite U.S. military resources are another limit. After two decades in the Middle East, the United States has voiced a desire to draw down its presence in the region. However, as current Israeli conflicts have shown, the U.S. military may not be able to withdraw from USCENTCOM as quickly as its strategists desire, hampering the U.S. ability to direct those assets toward areas of irregular competition with China.

Today, no single nation can combat every problem at sea. Doing so requires a collective effort.[67] Contesting IUU fishing activity in the South American Pacific, exacerbated in recent years by China's DWF fleet, is no different. It will require multinational collaboration in which the United States should play a key role. Furthermore, IUU fishing enforcement in the Southern Hemisphere presents the United States with a unique opportunity, particularly when viewed through the lens of America's global competition with China. Here, the United States can not only create greater security for South American fisheries, strengthen relationships with South American countries, and assert its leadership role in the Western Hemisphere but also hedge against further Chinese influence in the region. **JFQ**

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Army UH-60L Black Hawk helicopter crew chiefs with Charlie Company, Detachment 2, 1-171st General Support Aviation Battalion, 57th Troop Command, New Jersey Army National Guard, conduct medical evacuation training with combat medics with 1st Battalion, 114th Infantry Regiment, 44th Infantry Brigade Combat Team, New Jersey Army National Guard, at Joint Base McGuire-Dix-Lakehurst, New Jersey, November 7, 2023 (New Jersey National Guard/Mark C. Olsen)

What's Old Is New

LSCO Casualty Evacuation in the 21st Century

By Jonathan S. Pederson

An update and integration of our military medical strategy is needed before the next large conflict. In the current lull between major conflicts, much discussion has been generated regarding the next fight, which is postulated to be quite different than the wars in Afghanistan and Iraq. This predicted large-scale combat operation (LSCO) battle will require different strategies and tactics to adequately evacuate and treat the large numbers of expected casualties not seen since the mid-20th century.[1] It is expected that the next LSCO will generate thousands of casualties in the opening days and stress the U.S. health-care system. Casualty evacuation will present new challenges. The scope and scale of the conflict will

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require a greater level of coordination between military and civilian healthcare systems to aid the large numbers of expected casualties. Old lessons can be revamped, however, and innovation is needed. Recognition of our healthcare system as a national security asset is required.

The historical "rear area" of past conflicts may not exist in the predicted modern conflict.[2] Long-range munitions and multidomain operations (satellites, long-range reconnaissance) will expand the combat zone where the enemy can be targeted. Casualties will need to be evacuated quickly and for longer distances until they are in a safe zone and definitive care can be rendered. Sustainment (under which medical support falls), logistics, and resupply have always been recognized as vitally important in winning a war.[3] With this being the case, the foe will target these key features if it can. Medical assets may not enjoy the protection they have had in past conflicts.

Casualty evacuation is largely a logistical problem and thus depends on logistic supply lines. If a Servicemember is injured in a conflict at the front line, ideally, he or she would immediately be removed from the line of fire, be triaged, and receive first aid from a medic or corpsman. Casualty collection points right off the front line will be established where more triage, treatment, and casualty movement to higher levels of care will occur—within minutes if possible. If immediate movement is not possible or is constrained, medics will need to provide prolonged care in the field until evacuation is possible. Moreover, recognizing that uncontested air space might not exist during a LSCO fight, "prolonged field care" is being taught and encouraged. This training assumes that a medic will need to take care of a casualty or casualties for potentially days before they are able to be evacuated to a role of care such as a battalion aid station (Role I) or equivalent with more medical and lifesaving capability. However, medics will need to resist the urge to consolidate and congregate with other medics' casualty collection points to avoid being targeted.[4]

Current numbers of dedicated military casualty evacuation platforms are likely inadequate and would be overwhelmed by the number of casualties in a LSCO conflict.[5] Other means of casualty evacuation will be employed. Necessity will dictate that anything that rolls, floats, drives, or flies will be considered and utilized. Casualties will become an important priority of movement for logistical resupply operations. Supplies will go forward, and casualties will come back. Whether it is an Air Force Air Mobility Command aircraft, Navy Military Sealift Command ship, or Army 5-ton truck, cargo will go out and patients will come in. Any platform used for logistics may be pressed into casualty evacuation service. Medical planners will need to become intimately familiar with an area of operation's main supply routes, alternate supply routes' resupply, and retrograde timetables. They will need to know the number and types of vehicles used in the supply convoy.

Medical planners within a fighting unit will estimate the number of expected casualties from a pending battle. They will calculate how many casualties can be evacuated and at what times from preplanned resupply packages and rank them within the priority-of-movement system. Casualties will be loaded on to trucks, flatbeds, and other vehicles coming back from a battle after they drop off their supplies. Casualties will be put on ships, planes, trains, or any other means of transportation being used by logistics. Using these preplanned logistical resupply schedules, medical officers can predict how many casualties could potentially be evacuated from a given area. This medical information gives commanders the ability to compare how many casualties could potentially be evacuated with the estimated casualty numbers from pending battles and help inform decisions on where to attack.

Nonstandard casualty evacuation platforms will be utilized and should be included in our current military exercise scenarios. All civilian modes of transportation should be considered. If a contested area has a robust rail network, medical planners should know how many casualties could potentially be evacuated using trains and coordinate their use if needed. If a contested area has a system of domestic ferries to move people and supplies in peacetime, medical planners should calculate how many casualties could be moved using these platforms. If there is an extensive network of canals or rivers (for example, in Europe), the number of potential casualties using these evacuation routes should be calculated.

Civilian passenger jets have the potential to be retrofitted to transport casualties as well.[6] The current military medical casualty evacuation system—field ambulances or medical helicopters to a C-17 or C-130 transport aircraft, to a medical ship, or to a fixed medical facility—will be quickly overwhelmed and prove inadequate during a LSCO fight. The Civil Reserve Air Fleet is a Department of Transportation and Department of War (DOW) program in which U.S. civilian airlines volunteer their aircraft during a national defense crisis.[7] It has been activated three times since it was established in 1951 and was last used in 2021 to evacuate U.S. citizens and personnel, Special Immigrant Visa applicants, and other at-risk individuals from Afghanistan.[8]

In regions like the Indo-Pacific, watercraft casualty evacuation may become the primary mode in contested airspace. Navy and Army transport vessels will be pressed into service for casualty evacuation and ad hoc treatment platforms. The Navy, in anticipation of this scenario, is purchasing fast ferries and retrofitting them into medical treatment and transport platforms.[9] These will expand and diversify military medical capabilities as well as increase survivability via speed and agility. The current hospital ships, USNS *Mercy* and USNS *Comfort*, are large, slow, and vulnerable.

Dispersion is key to survival on the battlefields of the future. Any congregations of personnel or equipment will be under threat if they are larger than the enemy's targeting threshold and stationary long enough for fires against them to be calculated and executed. This expanded area of conflict resulting from the introduction of long-range precision

Army Specialist Jazmyne Wanger, combat medic specialist with Headquarters and Headquarters Company, 56th Stryker Brigade Combat Team, Pennsylvania National Guard, tends to simulated wounded soldier while HH-60 Black Hawk helicopter draws near pickup site during air medevac exercise at Grafenwoehr Training Area, October 11, 2024 (U.S. Army National Guard/Leanne Demboski)

munitions will mean that all casualty care will need to be mobile, which means smaller and more mobile than current doctrine dictates.[10]

Role I aid stations, the most far-forward medical capability, will need to be exceptionally mobile and move frequently to avoid being targeted. The larger Role II aid stations will also need to be mobile and frequently moved if they are to provide far-forward medical and surgical capabilities without being targeted.[11] Many of our current Role I and Role II combat medical aid stations are not designed to be agile or mobile. As such, they will need to be set up far outside the much larger combat zones of the future to avoid being targeted. In turn, these stations will become less relevant to their mission of providing intermediate care and salvage surgery en route to the next tier (Role III) medical care facility as they encroach on the safe spaces this next tier occupies as well. During our more recent conflicts, casualties frequently bypassed Role II forward surgical capabilities and were taken to Role III facilities for more definitive surgery when casualty evacuation was expeditious.[12] Highly agile medical assets will increase survivability and give commanders more options as they perform risk analysis for medical coverage within combat zones. If the appropriate threshold for survivability of precious surgical/medical assets cannot be obtained within the future combat zone, rapid casualty evacuation becomes even more critical.

The tactical realities of the future battlefield need to inspire strategic medical requirements now. Our current tactical battlefield medical structure will likely not survive within the future expanded combat zone without becoming more agile and mobile. Role I may need to become a single tent that can be put up and taken down in minutes, coupled with a 5-ton truck that can quickly move out if needed with everything onboard. Role II may become an expandable 20-foot surgical suite container on the back of a HEMTT (heavy expanded mobility tactical truck), unlike the current complex of several fixed tents with little organic transportation capability. A modular system, with a small mobile base unit of perhaps 10 beds that can scale up and down quickly, will be more survivable and useful than large immobile Role IIs and IIIs. All three Services have versions of expeditionary hospitalization. A LSCO will put interoperability (not necessarily interchangeability) to the test.[13]

Lines of evacuation will coincide with logistical hubs. As casualties flow back from contested theaters of operation, they will coalesce at large military treatment facilities (MTFs). Casualties from European or Middle East theaters will continue to flow to Ramstein Air Base, then to Landstuhl Regional Medical Center in Germany or to secondary medical facilities in Europe, such as RAF Lakenheath in the United Kingdom, and then on to Walter Reed/National Capital

Air Force 1st Lieutenant Erin Patinella and Master Sergeant Brandon Fitch, clinical nurse and medical technician, respectively, with 932nd Aeromedical Staging Squadron, treat simulated field casualty during Tactical Combat Casualty Care training for exercise Patriot Medic 25, August 10, 2025, Grissom Air Reserve Base, Indiana (U.S. Air Force/Noah J. Tancer)

Region, with overflow to facilities such as Naval Medical Center Portsmouth. Casualties from U.S. Southern Command will flow to San Antonio's Brooke Army Medical Center. U.S. Indo-Pacific Command casualties will flow through air logistical hubs such as Joint Base Lewis–McChord, where Madigan Army Medical Center is located, and then on to other hubs such as Travis Air Force Base in California, where David Grant USAF Medical Center is located, or to Naval Medical Center San Diego.

Other lines of evacuation may include bases such as Joint Base Elmendorf–Richardson in Anchorage, where the 673rd Medical Group is based. Tripler Army Medical Center in Hawaii may become the logistical/casualty line of evacuation hub for those coming by sea. Casualties will be treated, triaged, and dispositioned. Some of these casualties will then be moved and dispersed to their unit's base treatment facility or locations close to their homes of record for long-term recuperation and be under the care of their local medical facilities. Many of these medical facilities will be civilian. This system already exists on a small scale, such as Army Soldier Recovery Units, but will need to be vastly expanded and jointly applied during a LSCO fight.[14] The Department of Veterans Affairs (VA) will be a major player in the long-term treatment of LSCO casualties.

There will be a large shift in medical providers within the abovementioned areas with large MTFs. Active-duty medical personnel will deploy downrange. Guard and Reserve medical providers will be called up either to deploy directly to the contested theater of operation or to be assigned to backfill those Active-duty medical personnel who are deployed. This Guard and Reserve activation will have a large effect on both the civilian and VA health-care facilities within these population centers. Currently, 55 percent of the Army's operational medical personnel are located within the Guard and Reserve.[15] Their mobilization will create large gaps in these communities' civilian health-care capabilities. This may accelerate the triage, disposition, and dispersion of casualties to their homes of record more widely distributed across the United States, better sharing the patient/casualty medical care load. Small community health-care centers will be essential to the medical war effort. Every able-bodied medical provider in even the smallest towns will thus become an important contributor to the National Military Medical Care System. National strategies to rectify impending physician shortages deserve greater emphasis within this context of national health security.[16]

The nature of health care as a strategic national asset was starkly revealed during the COVID-19 pandemic. It served as a wake-up call to the type of mobilization and civil-military partnering that is required to provide medical care in times of emergency. During the COVID-19 crisis, state governments mobilized

their respective National Guard units to augment their overwhelmed medical systems. This did not always mean mobilized medical personnel. Nonmedical National Guardsmen were activated and deployed to rural clinics to serve as clerks or nonmedical attendants to alleviate overburdened staff.[17] The USNS *Comfort* and a Department of Defense–manned care facility within the Javits Convention Center were mobilized in New York City. To preserve and sustain these civilian-military relationships, periodic exercises among the civilian, VA, and military health-care systems should be conducted.

Exercises should start with the large DOW MTFs. Conduct tabletop exercises with a scenario that involves the entire military, VA, civilian health care, and support-service sector in the area. What happens if most of the Active-duty medical staff are deployed overseas? What happens when the Guard and Reserve medical personnel are activated and deployed overseas or tasked to backfill for those who deployed overseas? Who is left to take care of the civilian population? What services can safely be curtailed? During the COVID-19 pandemic, health-care services were restricted to essential-only in many areas of the country. In a wartime environment where thousands of casualties are arriving at large MTFs daily, similar health service degradations may occur in the surrounding area as health-care workers tend the wounded. Having periodic exercises within these communities and wargaming what would happen in this type of scenario could mitigate the impact of such a situation and galvanize the community better when the scenario unfolds.

A strong national health-care system is critical to our national security. DOW should take a hard look at how it can partner better with the civilian health-care system and VA to expand access and capabilities in the event of a large influx of casualties from a LSCO fight. Ensure there is a reliable chain of care from front-line medic/corpsman to hometown provider by having periodic exercises with the entire health-care system within a community. Start with the communities where large MTFs are located (for example, Puget Sound, National Capital Region, San Antonio, San Diego) and develop the collaborative VA and civilian medical center relationships and muscle memory before the hour of need arises. Additionally, DOW should inculcate rigorous casualty evacuation dilemmas within joint exercises. The use of available nonstandard casualty evacuation platforms (for instance, resupply vehicles, trains, ferries, and civilian aircraft) should be encouraged and exercised. Emphasize rapid mobility, dispersion, and medical inter-Service interoperability within the scenario. Drive innovative change by studying the large-scale combat operations of the 20th century and adapting them to those in the 21st century. **JFQ**

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Coast Guard Cutters *Munro* and *Alex Haley* steam alongside while patrolling Gulf of Alaska, July 5, 2025 (U.S. Coast Guard/Samika Lewis)

U.S. Arctic Sea Lines of Communication

The Imperative for a Maritime Complex and Corridor in the Bering Region

By Samuel Krakower and Troy Bouffard

Maritime activity has been a constant feature of the world's oceans since the development of seafaring capabilities. Whether at peace or at war, nations use the oceans to achieve their national strategic objectives and expand their power projection to the world. The United States is no different, and in the years following World War II, America and its allies enjoyed and continue to enjoy unparalleled access to the maritime domain. Maritime vessels transport millions of tons of cargo daily across the world,

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bolstering the global economy and commercial trade. This unprecedented access results not from international harmony but from sustained maritime security efforts. In a world of competition, global maritime security oversees this vital aspect of the world's trade. The maritime domain differs from the other domains in that aspect—the land, air, and space domains remain relatively dormant until activated by conflict and do not require the security needs that the maritime domain does to continue unimpeded activity.

In late 2023, the Red Sea became a focal point in global maritime security, with Houthi forces attacking shipping lanes in the area. The United States produced a swift response; the U.S. Navy launched Operation *Prosperity Guardian*, bringing together several nations to provide maritime security under Task Force 153's leadership.[1] The coalition demonstrated sustained effectiveness throughout its control of the operation, with numerous adversary drones, missiles, and small boats destroyed, establishing protective coverage for commercial traffic to continue maritime commerce.[2] The operation's success depended significantly on established allied infrastructure in the region. Despite the distance from the United States, the U.S. Navy not only supported but also led the operation to secure continued freedom of navigation in the Red Sea and Gulf of Aden. This article argues that establishing a deep-draft port at Nome, Alaska, is now a strategic necessity for U.S. power projection and crisis response in the Arctic and therefore merits immediate joint action by the Department of War (DOW), the Department of Homeland Security, and Congress.

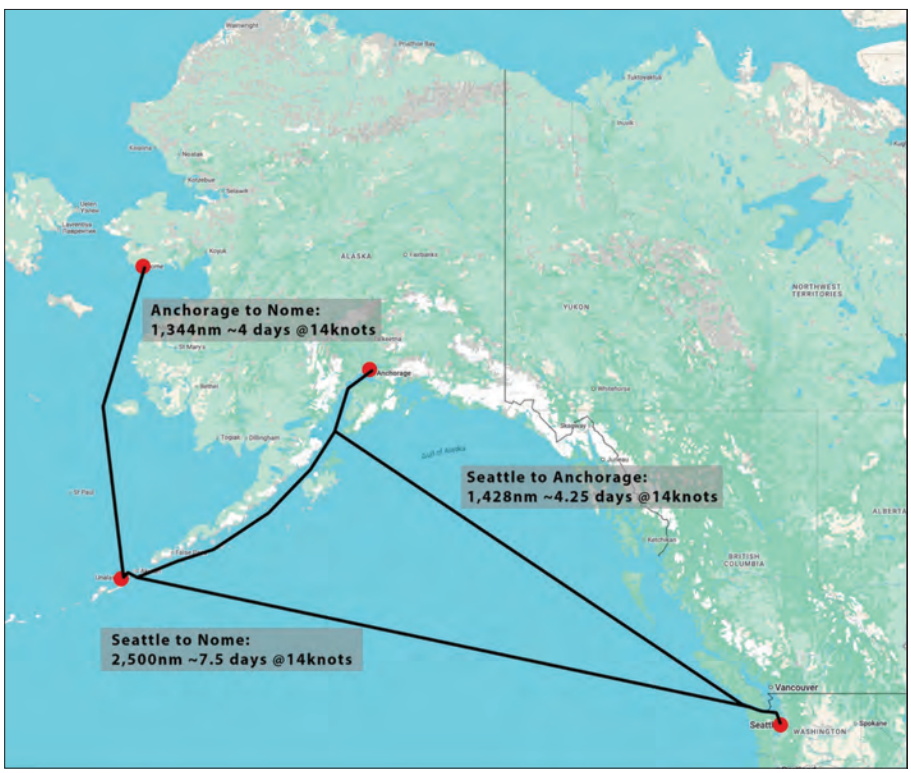
As Arctic sea ice continues to diminish, increased access will likely result in more presence and activity throughout the Arctic region.[3] Such circumstances require proportionate operational capabilities to help manage numerous expected challenges, including emergency situations, disaster response, search and rescue, law enforcement issues, resupply and maintenance needs, and many others. The ability to engage with such issues in the maritime environment depends greatly on—if not outright requires—proximity to infrastructure support, as the Red Sea crisis clearly shows. Presence, and the ability to be present quickly, in the maritime domain often determines operational success. Whether in port or steaming into an area of operation, distance matters, even more so in difficult maritime environments. For the Arctic, distances and current U.S. operational maritime surface capabilities continue to be a problem in proportion to increasing activity in the region.

The distance from Anchorage to Nome is 1,334 nautical miles, which translates to about 4 days of travel at 14 knots.[4] The distance from Seattle to Anchorage is 1,428 nautical miles, about 4.25 days of travel at 14 knots. The distance from Seattle to Nome is 2,500 nautical miles, or about 7.5 days of travel at 14 knots.[5] And Nome itself remains approximately 150 nautical miles south of the Arctic Circle. Anchorage as a sea line of communication (SLOC) remains a challenge given significant daily tidal change, which requires effective timing, often extending delays to operational presence. While a deepwater port at Nome cannot replace the infrastructure role of homeports, its presence could change the ability to facilitate operational maritime presence. For U.S. Arctic-related national security interests, a deepwater port in Nome would change the Arctic maritime operational calculus by becoming an established SLOC.

Sea Lines of Communication

Alfred Thayer Mahan argued that a nation's ability to project power and safeguard commerce ultimately hinges on assured access to SLOCs—whoever "holds the sea" can decide both the tempo and geography of conflict.[6] Julian Corbett refined this insight, noting that maritime control is rarely absolute and therefore concentrates on focal areas—narrow passages and logistic nodes where fleeting command can yield decisive advantage.[7] In the 21st-century Arctic, the Bering Strait and the chokepoint at 75° N along the

Figure 1. Map of Sail Distances and Times



Source: Authors modified from Google Maps

Northern Sea Route constitute precisely such focal areas: each funnels traffic through a corridor less than 55 nautical miles wide, easing both interdiction and rapid reinforcement. As seasonal ice recedes and Russian "bastion" patrols increase, sustaining American and allied freedom of movement will depend less on nominal blue-water superiority and more on the timely establishment of forward-support nodes that mitigate Arctic time-distance constraints. Taken together, Mahan's call for sustained SLOC access and Corbett's focus on focal-area control underscore that a deep-draft port in the Bering Region is indispensable to closing the Arctic response gap.

Geopolitically, SLOCs play a significant role in the success of nations through trade and freedom of the seas. In peacetime, SLOCs function as the main mode of transporting commerce, with 90 percent of trade moved by sea.[8] Nicholas Spykman's *America's Strategy in World Politics* discusses the importance of SLOCs at length in the perspective of the United States. Written in 1942, the seminal work recognizes that one of the greatest U.S. aspirations in becoming a global superpower was securing control of all oceanic coastal routes and interior lines of communication between the Atlantic and Pacific.[9] Achieving this control, the United States and its allies enjoyed significant freedom of navigation through major sea lanes, both commercial and military, in the 20th and 21st centuries, bolstering the global economy and ensuring the continued success of marine transportation. Now, with the Arctic opening, a new sea lane emerges. Changes in transportation routes, and the contests for them, can greatly shift both political and economic power. America now bears a responsibility to protect its new highway emerging in the Bering Strait.

America's History With SLOCs

American naval supremacy emerged definitively during World War II. The United States successfully operationalized Mahanian and Corbettian theories in the Pacific theater, demonstrating their strategic validity. Both the United States and Japan recognized the importance of SLOCs to achieve their strategic goals. Japan needed to sustain its war effort of Pacific expansion, while the United States sought to limit Japan's capability to do so.[10] While major naval battles took place at the Coral Sea, Midway, Guadalcanal, and Leyte Gulf, the United States used its Pacific submarine fleet to effectively blockade Japan. With the relentless American attacks on mainland Japan and its commercial traffic, and the Japanese navy's overextension of its own SLOCs, the Japanese found themselves systematically isolated from their new resources in southeast Asia and with progressively diminishing operational capability to fight the war.[11] The submarine campaign is credited with the sinking of 1,178 merchant vessels and 214 naval vessels, leading to over 5.6 million tons of sunk Japanese resources.[12] Japan's goal of a short war was thwarted, and its inability to maintain its overextended SLOCs led to eventual defeat. Thus, the importance of protecting SLOCs became increasingly clear to the United States as well as other countries for future maritime superiority.

The Cold War proved an opportunity for the United States to defend its own SLOCs and attempt to deter the Soviet Union's use of its own. The Cold War's strategic mission on sea control appeared simple in this context—the United States needed to move its own military as well as humanitarian and economic supplies through its respective SLOCs while denying such access to the Soviet Union.[13] How the Navy saw this happening changed from start to finish. The United States initially and incorrectly assumed the Soviet Union wanted a third Battle of the Atlantic and to attack America's SLOCs; however, the Soviet Navy instead chose to defend its homeland and its capabilities rather than pursue the offensive.[14] While the Soviet Union willingly chose not to attack American SLOCs and to play the defensive, the United States nevertheless bolstered its own SLOC defense in the North Atlantic with the Navy's 2nd Fleet on patrol to deal with any anti-SLOC risk from the Soviet Union.[15] Fleet effectiveness metrics remain contested as the 2nd Fleet never saw action against its SLOC defense and the Cold War remained mostly cold until the collapse of the Soviet Union in 1991. Nevertheless, the powerful U.S. Navy, and its presence in the region, defended America's SLOCs to Europe and guaranteed the safety of allied maritime transit.

Today, SLOCs remain ever critical for the United States and its allies as a major factor in U.S. Navy and North Atlantic Treaty Organization (NATO) strategy. The mission of NATO's Joint Force Command–Norfolk explicitly states that the command will "defend the Strategic Lines of Communications across all domains between Europe and North America."[16] The 2nd Fleet was initially disbanded in 2011 but then recommissioned in 2018 following concerns about Russia's resurgence. Partially due to the 2nd Fleet's presence, the North Atlantic SLOCs remain comfortably secure. The 2nd Fleet can easily access its SLOC nodes and receive maintenance, supplies, and additional support as required for its operations, with major allied ports across its area of operations. The same cannot be said of the North Pacific and Arctic oceans, which until recently were not SLOCs worthy of significant consideration. Now, however, is the time to focus on these oceans, which show significant Russian and Chinese presence and increased maritime traffic but do not retain a U.S. Navy or Coast Guard fleet.

Expanded Purpose of SLOCs

To defend a SLOC, as previously mentioned, requires points to provide relief for operators in its area and providing its defense. Both the military and commercial operators seek reprieve in heavy or unexpected weather, in emergencies, and in the face of aggression from adversaries. Furthermore, these points serve an expanded purpose—the support through various other services, such as air support and seabasing assistance, and supporting other national security objectives—and allow greater SLOC defense.

East Coast–based Naval Special Warfare Operator and Norwegian naval special operations commandos test ice thickness next to *Los Angeles*–class attack submarine USS *Hampton* to establish landing zone for MH-47G Chinook helicopter assigned to 160th Special Operations Aviation Regiment (Airborne) during integration exercise, March 9, 2024, as part of Arctic Edge 24, Arctic Ocean (U.S. Navy/Jeff Atherton)

Expeditionary operations require the creation of forward-operating bases to forward-deploy military units via land, sea, or air. Over the last century, American military success has depended on the ability to send and support expeditionary forces in the defense of security and economic interests.[17] This is vital to the success of an objective in antiaccess warfare, such as SLOC defense. A force that can maneuver over long distances, transition to offense, and fight in difficult conditions gains a significant tactical advantage over adversaries. To do requires a "jumping-off point" from which to coordinate its defense. Nearby SLOC nodes provide perfect locations for forward-operating bases, given their infrastructure and logistical support network. This includes the capacity for increased air forces for both manned and unmanned aircraft if an airfield is available. As a joint network, expeditionary operations support will be successful depending on coordinated and reinforced land, air, and sea forces.[18] This is most easily completed through sea control and SLOC defense.

Seabasing follows a similar route of success with the creation of a nearby SLOC node. *Seabasing* can be defined as the ability of the United States to use the maritime domain in a similar way as other U.S. forces use overseas land bases, which include deterrence, cooperative security, allied support, forward operations, and power projection.[19] Seabasing also requires sea control, which then requires successful SLOC defense. Seabasing thus further extends sea control into the actual maritime domain and becomes crucial in remote environments such as the Arctic Region. Seabasing creates a forward presence and produces a deterrent effect that cannot be achieved from other domains.[20] The closest SLOC node, then, becomes the point from which maintenance, supplies, and other forces will support the seabase from shore.

The importance of other nonmilitary factors due to enhanced SLOCs and SLOC nodes in austere environments is also worth consideration. For commercial activities, such as maritime trade

or tourism, safe harbors provide welcome shelter from storms; maintenance and repair opportunities; and resupply. For vessels sailing the Transpolar Sea Route or Northwest Passage, no major noncontinental U.S. port exists on the North Pacific side of North America other than Seattle or Anchorage. On the other side of the continent, there is Nuuk, Greenland, or Nanisivik, Canada—which, at present, remains incomplete and technically only for use by the Royal Canadian Navy. This great distance between ports is critical not only for repair purposes but also for search-and-rescue and environmental response capabilities. The Northern Sea Route invites closer ports in the Arctic Ocean, but under the auspices of the Russian Federation. A NATO-aligned Arctic Ocean SLOC node, either supported jointly by Canada and the United States or separately by either nation and shared by allies, would provide a strong safety net for vessels transiting the Arctic Ocean by improving proximity and capability.

The Current State of Arctic SLOC Defense

Analysis of Arctic requirements and the chokepoints requiring SLOC defense demonstrates that the "points" Mahan covered remain fundamental. Mahan specifically notes that distant regions require secure ports for vessels, both commercial and military, to secure the line of communication.[21] As noted, Alaska does maintain deepwater ports used as SLOC nodes for the North Pacific and Arctic regions. These include Anchorage, Dutch Harbor, and Kodiak. Depending on the size and capabilities of ships, even Seattle is a key SLOC point for the Bering Strait. These facilities contribute to regional operations and help establish a line of communication to the Arctic. The critical deficiency involves SLOC support for operations in the Arctic Ocean itself. The closest American deepwater port to the Arctic Ocean is the Port of Dutch Harbor, over 700 nautical miles south of Nome. For a situation requiring immediate action in the North Bering or Chukchi seas, deployment and response from further south risks operational failure.

The Don Young Port of Alaska in Anchorage is Alaska's largest port. Owned by the Municipality of Anchorage, the port handles approximately half of all Alaska-inbound freight and enjoys a strong intermodal transit network connecting Alaska's primary road, rail, pipeline, marine, and air systems.[22] Additionally, the port maintains Commercial Strategic Seaport status from the Department of Transportation's Maritime Administration, making Anchorage 1 of only 18 port cities in the United States designed for force deployment during contingencies and national defense emergencies. The secure port operates year-round and maintains seven berths dredged to 35 feet, supporting commercial and military ships.[23] The port positions itself as America's premier facility for supporting Arctic shipping routes—a claim that, while currently accurate, obscures significant operational limitations.[24] This assertion requires qualification, given the port's location approximately 1,500 nautical miles from the Arctic Circle.

Another significant concern is the tidal range for Anchorage. The average tidal range in Anchorage is among the most extreme in the United States, with a mean tidal range of over 26 feet.[25] This significant tidal variation is mostly due to the shape of Cook Inlet, which intensifies tidal movements as water flows into the narrower portions near Anchorage. The highest tides can exceed 35 feet at peak times, and the lowest ebb tides can drop to just a few feet below base level. This wide range is extremely important for vessels transiting into and out of the port, requiring careful scheduling and adaptation to the tidal cycle. In cases of emergency, hours could easily be lost waiting on the tide to allow vessel movement.

Why Now? Arctic SLOCs Under Pressure (2023–25)

- **August 2023**: China's *Xue Long 2* Sails Through Bering Sea: The expedition was organized by the Chinese Ministry of Natural Resources together with Beijing's Polar Institute.
- **September 2023**: Russia Conducts Exercise Finval-2023: A few days after the U.S. Coast Guard Cutter (USCGC) *Healy* sailed into the Chukchi Sea, the Russian Pacific Fleet launched a major exercise in the area.
- **July 2024**: Canada Warship Tracks Chinese Icebreaker Through Bering Strait: HMCS *Regina* "interacted safely and professionally" with the *Xue Long 2*, China's first indigenous polar research vessel.
- **September 2024**: USCG Encounters Russian Naval Vessels Near Alaska: USCGC *Stratton* (WMSL-752) observed the Russian Federation Navy vessels transiting southeast along Alaska in U.S. Arctic waters to avoid sea ice.
- **September 2024**: China Conducts Arctic Shipping Voyages: A week after a Panamax container ship became the first vessel of its size to successfully transit the Arctic, another Chinese shipping operator dispatched a second Panamax box carrier.
- **October 2024**: USCG Encounters Joint Chinese and Russian State Vessel Patrol in Bering Sea: HC-130J Super Hercules airplane crew from Coast Guard Air Station Kodiak observed two Russian Border Guard ships and two Chinese Coast Guard ships approximately 440 miles southwest of St. Lawrence Island.

Taken together, these events compress the decision timeline: forward infrastructure in the Bering Region is no longer optional; it is now the pacing requirement for U.S. Arctic presence.

Coast Guard Cutter *Stratton* transits Glacier Bay, Alaska, August 1, 2024 (U.S. Coast Guard)

As Alaska's main port of operations, the port cannot always directly provide ready-service fuel for vessels. This includes an instance in which an *Arleigh Burke*–class destroyer needed its fuel requirement to be met via fuel trucks rather than through the port's pipeline. A struggle to get marine-grade diesel also added to delays to the destroyer's operational schedule. Anchorage remains an unequivocally strong port for the Gulf of Alaska and remains a key component of the U.S. North Pacific SLOC, but the port is too far away to support the region as the primary port for Arctic SLOC defense.

Approximately 1,000 nautical miles to the southwest of Anchorage, the Amaxnax̂ Island (also known as Amaknak) is home to the closest U.S. deepwater port to the Arctic Ocean, Dutch Harbor, which is a vital port and SLOC point, hosting major vessels on the Unangam Tanangin (Aleutian Islands). A U.S. Coast Guard favorite for vessels operating in the Bering Sea and beyond, the port hosts six docks ranging in depth from 19 to 50 feet.[26] Time-distance calculations, however, reveal Dutch Harbor's limitations as an Arctic SLOC node. Dutch Harbor lies approximately 700 nautical miles south of Nome and an additional 150 nautical miles south of the Arctic Circle, making the trip a 2-day transit at 15 knots to the northern Bering and Chukchi seas. Additionally, while Dutch Harbor remains the closest deepwater port, as an island the port does not possess the capacity to expand its multimodal functions, locked into marine and air modes of transit.

Both Anchorage and Dutch Harbor are vital to the chain of SLOC defense, but in the case of the capacity to respond effectively and quickly to emergencies in the Arctic Ocean, distance and capabilities—and, in the case of Anchorage, its environment—limit support. Pointedly, there is a significant need for an Arctic deepwater port as a SLOC node. The American Society of Civil Engineers' most recent Alaska Infrastructure Report Card includes a lengthy discussion of the need for a deepwater Arctic port to accommodate Arctic and sub-Arctic shipping and resource extraction. The report states that an Arctic deepwater port would provide

economic development opportunities; decrease the cost of goods; offer safe harbor and protection for vessels in the area; provide vessel repair and maintenance support as well as emergency response facilities; and most important, provide logistical support to vessels operating in the Arctic while raising awareness of the United States as an Arctic nation.[27]

Although the U.S. National Strategy for the Arctic Region, released in 2022, does not outright mention SLOCs, it seems to agree on the need for additional presence and SLOC defense in the region. The first pillar, "Security: Develop Capabilities for Expanded Arctic Activity," noted as the highest priority, discusses the need to enhance and expand civilian and military capabilities in the Arctic to deter threats and respond to human-made and natural emergencies.[28] This includes the strategic objective to advance American military presence in the region, specifically in support of "homeland defense . . . power projection, and deterrence goals."[29] Perhaps most significant, the strategy specifically states that the White House would "support development of a deep draft harbor in Nome" to assist in emergency response times and recovery.[30] As previously stated, the current lack of a deepwater port and coastal infrastructure in the region limits the U.S. ability to sustain power projection and support forward-deployed sea and air assets.[31] The evidence is clear: the United States requires a SLOC node in the Arctic Region.

The Next Arctic SLOC Node: Nome, Alaska

The city of Nome (also known as Sitŋasuaq) on the southern tip of the Seward Peninsula is home to approximately 4,000 Alaskans. Once the most populated city in Alaska, Nome is famous for the 1898 gold rush as well as the annual Iditarod Trail Sled Dog Race. Nome represents America's most viable option for establishing an Arctic SLOC node. The Port of Nome has seen remarkable growth in the last decade, with increased numbers of private and commercial vessels transiting the Bering Strait using Nome as a resupply port.[32] The port accommodates significant cruise ship traffic, supports 450 regional seafood harvesters, and averaged 7.5 million gallons of petroleum products a year over the past decade.[33] The port's current depth is around 22 feet in the outer basin, safely accommodating vessels with a draft of 18 feet or less due to tidal variations.[34] This significantly inhibits major commercial and military traffic, with larger vessels forced to anchor in the harbor or ignore the port entirely and make way for Dutch Harbor. Nome maintains a regional airport and a significant surrounding road network, but the roads do not access major Alaska road systems.[35] The city, its people, and its leadership, which includes the Bering Straits Native Corporation and Sitnasuak Native Corporation, maintain an effective regional logistics center supporting approximately 50 communities in western and northern Alaska. Port expansion would fundamentally transform America's Arctic SLOC defense capabilities.

The Water Resources Development Act of 2007 authorized a feasibility study into a project to modify the depth of Nome Harbor.[36] The final report, released in 2020, recommended a plan to improve navigation access to the port, which included, among other suggestions, a new deepwater basin to a depth of approximately 40 feet at Mean Lower Low Water.[37] The report found the expanded port could "improve the viability of numerous Alaska native communities, strengthen the resiliency of the region, and serve as a critical outpost for national security."[38] Since the Army Corps' report, the expansion discussion has been a controversial topic, with many recognizing the economic, national strategic, and resiliency positives, while also acknowledging the massive alteration to the lives of the people of Nome should the project be completed. Nevertheless, significant positive changes would result from port development. Primarily, larger vessels such as the U.S. Coast Guard's icebreakers and U.S. Navy destroyers and submarines could moor at the outer basin pier, providing a significant, albeit limited logistics hub in an austere and remote environment. The deep-draft port would enable sustained logistical support to these vessels and provide shore-based maintenance, logistics, and training required for SLOC defense and Arctic operations.[39] As shown throughout the report, a vessel departing from Nome at standard transit speed of 14 knots could be in the Chukchi Sea in less than half a day to respond to emergencies or defense operations in the Arctic Region. Given Nome's proximity to the Bering Strait, an infrastructure hub supporting these major assets greatly enhances timely response to national security, environmental, and marine traffic crises.

Additional roles Nome could play are as a forward-deploying base for alternative forces aside from the maritime domain to support SLOC defense—among them, manned and unmanned air support and expeditionary forces—and as a jumping-off point for seabasing farther north into the Arctic Ocean. Infrastructure investments would need to go well beyond expanding the port depth to make Nome a successful SLOC node. Having coastal infrastructure in a remote area of operations enhances multidomain capabilities in the region. To do this would require full Federal, state, tribal, and local government support to transform the city of just under 4,000 into a logistical hub for not only the U.S. military's increased presence but also an increased commercial presence. This would also likely require further road infrastructure to connect Nome and its surrounding communities to Alaska's major highways. The Nome community has split opinions on the port expansion, with some advocating for the economic benefit and national strategic importance of the port and the infrastructure buildup, while others believe concerns with chronic social problems in the region, such as housing shortages and substance abuse, take priority and prefer the port to stay as it is.[40] To make the national strategic objective of Nome as a permanent SLOC node a lasting success, the U.S. Government will need to work closely with stakeholders during the buildup and into its operational period to ensure its longevity.

Seaman Sarah Treacy stands watch on navigation bridge of Coast Guard Cutter *Healy* as cutter transits Chukchi Sea, June 30, 2025 (U.S. Coast Guard/Steve Strohmaier)

Counterarguments and Comparative Analysis

While the strategic imperative for Arctic infrastructure is clear, legitimate concerns about environmental impact, economic feasibility, and alternative sites merit serious consideration. A rigorous assessment strengthens rather than weakens the case for Nome as America's Arctic SLOC node.

The Port of Nome expansion project has been stalled by a fundamental mismatch between government cost estimates and actual contractor bids, with the Army Corps of Engineers forced to cancel the initial $662 million solicitation in October 2024 when pricing exceeded statutory procurement limits,[41] leading to a scaled-down Phase 1A approach that reduces scope from 3,500 to 1,200 feet of causeway extension and armor stone from 22 to 18 tons.[42] The core problem stems from underestimating the true costs of Arctic construction logistics, weather delays, and material transport to remote Alaska locations, compounded by rigid Federal acquisition regulations that prohibit accepting bids more than 25 percent above government estimates, creating a cycle where realistic project costs cannot be legally awarded despite secured funding of $425 million from Federal and state sources.

Environmental assessments identify potential impacts on the Bering Strait region, which hosts critical habitats for sea birds and marine mammals.[43] Increased vessel traffic could disrupt subsistence hunting patterns, while dredging operations risk disturbing contaminated sediments from gold rush–era mining. However, the environmental risks of inaction may exceed those of controlled development. Without adequate port infrastructure, vessels anchor offshore in unprotected waters, increasing pollution risk.

Costs continue to cause concern for the project, which is not uncommon for U.S. Arctic infrastructure debates. However, comparative analysis strengthens the economic case for an improved port in Nome. Canada's Port of Churchill generates $100 million annually despite serving a smaller population.[44] Iceland's Akureyri added a new pier in 2019, which continues to help bolster economic opportunities.[45] Similar effects at Nome would generate significant jobs and revenue, eventually producing positive returns

within 8 to 10 years. Notably, Kotzebue and Utqiaġvik (formerly Barrow) advocate leveraging their proximity to Arctic waters as well. However, cost comparisons demonstrate Nome's decisive advantages. Kotzebue would require $1.2 billion in dredging costs—double Nome's requirements—plus massive breakwater construction. Utqiaġvik faces 300-percent higher construction costs and ice conditions, limiting navigation to 60 to 90 days annually versus Nome's 150-plus days. Nome's existing jet-capable airport, fuel storage, and regional networks provide irreplaceable advantages. Rail extension to Nome would cost $2.1 billion compared to $3.8 billion for Kotzebue. While Utqiaġvik remains economically unfeasible, Kotzebue feasibility studies were discontinued because of coastal erosion rates alone.[46]

The greatest risk lies in continued inaction. Each year allows Russia to consolidate Northern Sea Route control while China maps underwater terrain through "research" voyages. Arctic contingencies without infrastructure upgrades could force disadvantages involving territorial disputes or navigation restrictions. The above analysis suggests that controlled development at Nome could reduce environmental risk while generating positive economic returns. Moreover, alternative sites face insurmountable obstacles that make them unsuitable for timely SLOC development. Most critical, the strategic risks of inaction far exceed manageable development risks. The question is not whether America needs Arctic infrastructure—but whether it will act before competitors make that choice irrelevant.

Policy Recommendations

The October 2024 joint Chinese-Russian patrol in U.S. Arctic waters indicated intent to demonstrate presence where the United States is lacking, representing objectives that facilitate and enable operational capabilities and further strategic competition. The following recommendations provide urgent actions required within 24 months to establish Nome as a critical maritime infrastructure hub.

DOW must designate Nome as a Strategic Arctic Port under the National Port Readiness Network (NPRN), unlocking priority funding streams for military specifications.[47] This notion may initially seem implausible, but based on Maritime Administration NPRN criteria, Nome presents a compelling case for designation as a Strategic Port, particularly given evolving Arctic threats and the DOW's explicit identification of the Arctic as a strategic priority region. To be sure, the multitude of NPRN criteria–related requirements presents challenges, some demonstrated in this article, and warrants comprehensive analysis. Additionally, DOW can effectively improve presence capabilities through quarterly destroyer visits during ice-free months, while showing allies and adversaries that America can project power into Arctic waters. At a minimum, critical infrastructure substantial capital requirements must include shore power for *Arleigh Burke*–class destroyers, 15-million-gallon fuel storage, and emergency repair capabilities for Polar Security Cutters.

Coast Guard aviation must deploy to Nome seasonally, and for extended periods of time, reducing Bering Sea and Chukchi Sea rescue response. In 2024, Coast Guard aviation maintained a forward presence in Kotzebue for only 3 weeks, entirely unsatisfactory for the traffic in the neighboring waters. An Arctic Maritime Operations Center is essential to coordinate the 150-plus daily vessel transits now occurring through an essentially unmonitored Bering Strait. Prepositioned spill response equipment and ice-capable rescue vessels would help prevent another disaster on the scale of MV *Selendang Ayu* in waters where backup is days away.[48]

An additional policy consideration is an executive order establishing an Arctic Infrastructure Task Force, co-chaired by the deputy secretaries of War and Homeland Security, which would break traditional stovepipes that have paralyzed Arctic policy for decades. Such a task force could potentially include representative advisors from the North American Aerospace Defense Command and the Canadian Coast Guard. A $50 million Community Impact Fund, managed with Alaska Native Corporations, would address legitimate local concerns about housing, health services, and cultural preservation. Finally, support for public-private partnerships could generate annual funding from cruise ships and transpolar shipping for the purposes of creating sustainable operations funding.

Conclusion

In October 2024, the U.S. Army Corps of Engineers canceled the solicitation for the Port of Nome Modification Project's first phase of construction, citing costs well above statutory cost limits and exceeding allocated funds made available by the Infrastructure Investment and Jobs Act.[49] Only one company placed a bid on the project.[50] Although the project has not formally been canceled, the project delays frustrate Arctic policy experts who recognize the region's escalating geopolitical significance. As countries such as China and Russia continue to expand their presence in the region, the United States once again finds itself lagging in the Arctic. Protecting the "great highways" that Rear Admiral Mahan articulated over 100 years ago proved the basis for American success at sea since World War II. SLOC defense ensured success during the Cold War and continues to deter adversaries across the globe today.

In regions where commercial and military maritime activity increases at an expeditious rate, the United States especially must maintain the capability to control the newfound SLOCs, sustain freedom of navigation, and deter adversaries from harming U.S. national strategic interests. As the new North Pacific and Arctic SLOCs open, evidence suggests the current U.S. SLOC nodes in Alaska and elsewhere cannot support the sustained presence, proximity, or capability required to successfully react to emergencies in the High North, be they environmental, lifesaving, or security-based in nature. Expanding the Port of Nome for U.S. Navy, Coast Guard, and commercial use would significantly

Coast Guard MH-60 Jayhawk helicopter crew lowers hoisting cable to crew members on flight deck of Coast Guard Cutter *Alex Haley* while underway in Bering Sea, April 8, 2024 (U.S. Coast Guard/John Hightower)

enhance America's ability to protect the region as a key SLOC hub. The ability to eliminate days' worth of travel to respond to events and the capability to use different domains suddenly made available through an increased infrastructure presence would show the United States is serious about its role as an Arctic nation.

The October 2024 solicitation failure should serve as a catalyst for renewed urgency rather than resignation. Congressional appropriators, defense planners, and Arctic stakeholders must recognize that the cost of inaction—measured in permanent loss of Arctic access and freedom of navigation—justifies the infrastructure investment required. The strategic arithmetic is straightforward: an investment today prevents far more expensive strategic disadvantages tomorrow. Through coordinated action among the city of Nome, its corresponding Alaska Native Corporations, and the State of Alaska, the U.S. Government can create a new SLOC node in Nome that will support the national strategic objectives within America's Arctic maritime domain. **JFQ**

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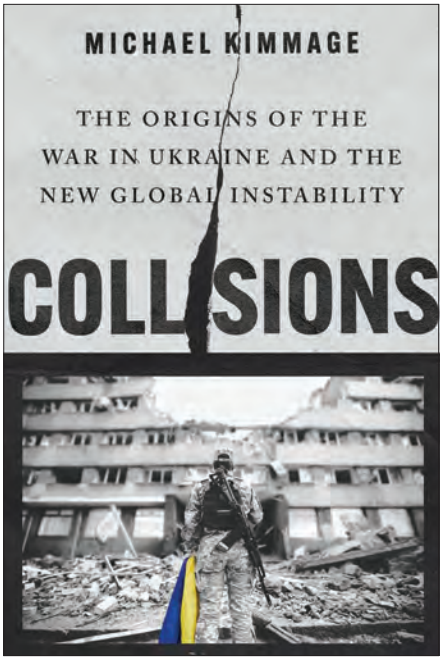

Collisions: The Origins of the War in Ukraine and the New Global Instability

By Michael Kimmage
Oxford University Press, 2024
282 pp., $29.99
ISBN-13: 978-0197751794
Reviewed by Peter R. Carkhuff

Collisions by Michael Kimmage offers a timely contemporary history of the conflict in Ukraine in which he argues that the war is the culmination of three different yet overlapping geopolitical "collisions" between Russia and Ukraine, Russia and Europe, and Russia and the United States. When analyzing the perspectives of these geopolitical actors, Kimmage deploys his experience as a historian and former State Department official to examine the war's origins. Both scholars and practitioners will benefit from the deep dive into the conflict that goes beyond causation and highlights the ongoing impact on the global power dynamics among the United States, China, and Russia.

Collisions is divided into three parts: first, open questions on Ukraine's and Russia's relationships with the West (the United States and Western Europe). Second, parting ways between the West and Russia and the rising tensions over Ukraine. Third, Vladimir Putin's decision to go to war with Ukraine and the immediate aftermath. Kimmage posits four causes of the war: Russia's will to control Ukraine, the precarious situation of Ukraine as a strategically important nation without real allies, the West's ambivalence with respect to Ukraine's sovereignty, and Putin's perception of American decline. When assessing the root causes, Kimmage takes the reader back to the early 2000s and contextualizes the West, Ukraine, and Russia based on the political conditions within each actor.

This contextualization and depth of historical understanding in *Collisions* is its greatest strength. For example, Kimmage describes how Russian views of global power structures are connected to, and were altered by, U.S. and NATO intervention in the Balkans, Iraq, and Libya. Through a Russian lens, these interventions were seen as an overreach and abuse of American power. According to Russian logic, "Russian foreign policy inevitably has to be of an independent and assertive nature." Nonetheless, Kimmage juxtaposes the Russian perspective with Ukrainian and Western positions on Ukraine's place in Europe. He places readers into the minds of Russian, Ukrainian, and American leaders to illustrate the sources of conflict. Kimmage writes: "In an enduring asymmetry, the West tended to understand Ukrainian problems as Ukrainian problems to which there were Ukrainian solutions, while Russia tended to understand Ukrainian problems as Russian problems to which there could only be Russian or regional or Europe-wide solutions."

Meanwhile, Kimmage demonstrates that during the 2000s and early 2010s, Ukrainian leadership attempted to balance conflicting pressures and interests. Externally, Ukrainian political leaders were forced to hedge their future in the European Union, which faced political and bureaucratic challenges and interference from Russia. Russia, in turn, viewed Ukraine as an extension of the Russian empire. At the same time, internally, Ukrainian politicians were faced with a younger generation resolved to link Ukrainian identity to Europe and who were willing to protest and mobilize for the cause. By inhabiting these competing perspectives and tracing the logic of political leaders, Kimmage highlights the nuanced fault lines that existed prior to the 2022 invasion. In so doing, the book provides important context for understanding how dynamic political and social factors lead to military conflict.

Kimmage's excellent ability to craft these different perspectives stems from his deep knowledge of Ukraine's position in the world. He uses a combination of scholarly articles, speeches, and experiences to shape the book's trajectory. Moreover, Kimmage relies on personal memoirs from U.S. Presidents George W. Bush and Barack Obama when crafting leadership profiles on Putin or other world leaders, such as Angela Merkel and Viktor Yanukovych, the former President of Ukraine. For example, Kimmage writes that President Bush was, perhaps infamously, able to "glimpse into Putin's soul" during their 2001 summit in Slovenia. Citing Bush's memoir, in which Putin bonds with the former U.S. President over faith, Kimmage highlights how Putin would eventually twist and leverage the connections between Russia and Ukraine through the Eastern Orthodox Church to help justify an invasion.

However, due to the recency of the war, Kimmage admits that *Collisions* lacks detail at times. This lack of detail can be reductionistic because it results in glossing over key historical events, such as how the Chechen wars reshaped the Russian military. Kimmage's penultimate chapter explores the immediate impact of the conflict on geopolitics, economics, and global responses. The war, for example, exacerbated inflation in the United States and gave room to North Atlantic Treaty Organization allies like Turkey to take advantage of the conflict to advance regional ambitions. While Kimmage focuses heavily on political leadership and decisionmaking in the book, there is room for future historians to do more thorough analysis of other factors—such as emerging technology, the impact of COVID-19, or Russian military form—on the conflict's roots.

In addition to scholars, military professionals will benefit from reading *Collisions*.

Joint leaders will find that it provides needed contemporary historical context for understanding the war in Ukraine and introduces the region's complex geopolitical dynamics. For commanders and staff officers, it can help illuminate the geopolitical tensions and differing perspectives on Ukraine to inform strategic plans and policy development. It is also an excellent read for strategists and foreign area officers serving in J5 directorates (strategy, plans, and policy) or U.S. European Command. Specifically, chapter 7, "The Search for Guardrails," and chapter 8, "Removing the Guardrails," can be used in professional military education to study deterrence. For instance, the collective failure of European states to address regional security following the Minsk agreements and a 20-year war in Afghanistan fueled Russia's belief that it would not pay a high cost for attacking Ukraine. Kimmage writes, "What mattered in the fall of 2021 [to Russia] was not the military's real-life inadequacies . . . what mattered was the military Putin thought he had. On its supposed excellence, he would make decisions about war and peace." The insular nature of Putin's autocratic rule created an echo chamber for the Russian government to perceive a greater chance of initial success in Ukraine. This is an important case study for deterrence theorists as it demonstrates how a leader's perception of military might, realized or not, encourages military action.

Collisions is a worthwhile chronicle of one of the most consequential conflicts since World War II. While the book suffers somewhat due to the access limitations around source material, it is an excellent contextualization of the Ukraine war's competing perspectives and drivers. For military leaders, especially those in planning or strategy, Kimmage provides a solid foundation for understanding the geopolitical forces shaping the war in Ukraine. The book's ability to balance the competing worldviews that led to the war and offer insightful lessons from these "collisions" is an important historical resource for the joint force. **JFQ**

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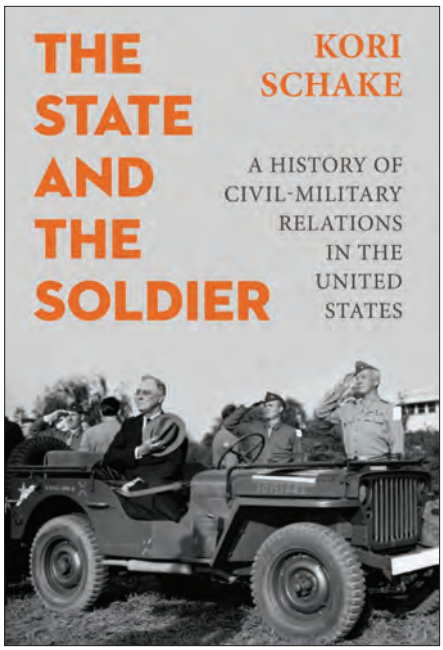

The State and the Soldier: A History of Civil-Military Relation in the United States

By Kori Schake
Polity, 2025
253 pp., $29.95
ISBN-13: 978-1509570539
Reviewed by Lindsay L. Rodman

Kori Schake's *The State and the Soldier* is an engaging, compact, and comprehensive examination of U.S. civil-military relations history. The book recounts the defining moments in the relationship between civilian political leadership and the military from the perspective of a scholar and think-tanker who is well-known for her commentary on a wide range of defense policy-related topics. *The State and the Soldier* is an important and timely resource—amidst increasing public discourse regarding the current state of norms in civil-military relations, Schake provides much-needed historical perspective on what constitutes a civil-military crisis, and how worried we should be.

Throughout the nearly 250-year history of the United States, the military has been a bulwark of democracy, despite the Founding Fathers' original fears about a standing army. The U.S. military has consistently passed Schake's two essential tests of healthy civil-military relations: can the president fire military leaders with impunity, and will the military carry out policies with which it does not agree? Even so, current public discourse suggests that we are at a perilous point for civil-military relations. Schake provides context for general readers as well as military professionals who seek to better understand what is at stake and how to navigate the tricky relationship between military and civilian leadership.

Most military professionals' understanding of civil-military relations is based on Samuel Huntington's 1957 *The Soldier and the State*. Professional military education still relies heavily on Huntington's theory of objective civilian control, which posits that civil-military relations are best maintained when there is strict separation between military and civilian spheres. In the Huntingtonian formulation, military leadership should remain technically expert, providing "best military advice" to civilian leadership, but otherwise refrain from politics and civilian decisionmaking. Yet any military professional who has served in the National Capital Region knows that military leaders are frequently asked to engage in political-level decisions.

Navigating civil-military relations today requires more than a reading of *The Soldier and the State*. Schake weaves the scholarship of prominent voices in civil-military relations into her historical retrospective, highlighting the works of Peter Feaver, Risa Brooks, and Eliot Cohen, among others. The strong theoretical work—providing a new perspective on Huntington and his contemporary rival, Morris Janowitz—is left for the epilogue. There, Schake notes the impracticality of both Huntington's strict separation and Janowitz's desire for complete integration. Informed by history, she concludes that both are "extreme models at variance with what has actually worked, and worked well, in American history."

Schake advocates for a more practical and modern conceptualization of healthy civil-military relations. The key to military subservience to civilian authority and the integrity of the profession in the United States begins with General

and President George Washington, who set numerous important precedents that today's military carries forward as norms of civil-military relations. Schake recounts Washington's scrupulousness in honoring Congress's role in both strategy and managing the purse strings, even when he disagreed with its decisions or lamented the slowness with which it operated. Washington's willingness to step away from his leadership roles was also remarkable at the time, impressing onlookers including King George III.

Schake's admiration for Washington is based on his political acumen, not his apoliticism. Understanding the politics of the moment (and perhaps the future), Washington made deliberate decisions to strengthen certain institutions over others, clarifying the subordination of the military to civilian authority and signaling to the public the importance of adherence to the Constitution. It was Washington, not Huntington, who laid out the tenets of American military professionalism.

Though the foundation for the stability of the U.S. civil-military relationship originated with Washington, it took time for these norms to take root. Here, *The State and the Soldier* makes a significant contribution by exploring the numerous often-overlooked instances of general officers challenging elected political authority within the first 100 years of U.S. history, including insubordination from future Presidents such as Ulysses S. Grant and Zachary Taylor. Even so, the staying power of the norms established during Washington's tenure carried through the tough early years to serve as the better example from early U.S. history.

The most dangerous event in U.S. civil-military history might have been the failed conspiracy of former Vice President Aaron Burr and the Commanding General of the U.S. Army, James Wilkinson. However, Schake believes the most trying moment was when Congress compelled General Ulysses Grant to testify against the President and the Secretary of War. In December 1867, the House was considering President Andrew Johnson's impeachment, posing tough questions to Grant about the President's policies. Although Grant had a checkered history regarding civil-military relations, in this critical moment he followed in Washington's footsteps by siding with Congress in its Constitutional oversight role, regardless of the effect on the military and commander-in-chief.

According to Schake, two major efforts contributed to a transformation in civil-military relations: the passage of the Posse Comitatus Act in 1878 and the professionalization of the military around the turn of the century, following the example of the Prussian school. The result was a military that invested in its own technical competence and ethos, designed for employment primarily overseas. Schake is just as meticulous about retelling the history of civil-military relations in the United States after these first 100 years, through the modern era and until today, including an entire chapter devoted to the past decade, but notes that these events pale in comparison to the potential threats posed in the early years.

Despite the professionalization of the military that inculcated many of the norms Washington pioneered, the civil-military relationship today is far from perfect. Using historical cases, Schake performs some course-correction on prevailing narratives regarding more recent events in civil-military relations. She provides examples of general officers staying above the political fray and mistakes that general officers have made in attempting to constructively engage in inherently political conversations. Ultimately, it is the civilian leadership's responsibility to make and own strategic decisions. For example, while H.R. McMaster wrote that military officers were derelict in their duty to push back on bad civilian strategy during the Vietnam War, Schake questions whether his preferred approach would be appropriate as civil-military relations advice.

Instead of outright defiance, the civil-military relationship in the modern era has been mostly characterized by Feaver's concept of "shirking"—that is, military leadership's placing bureaucratic obstacles in the way of implementation of civilian political decisions. While military professionals are taught to remain "apolitical," adept bureaucratic maneuvering is often lauded as an important skill set for senior officers. Military leaders are often called on to navigate political worlds, requiring a more sophisticated understanding of the history and context in which military professionals are operating today. *The State and the Soldier* is essential reading for any military professional who anticipates an assignment in the National Capital Region or other strategic-level commands requiring engagement with senior civilian leadership. **JFQ**

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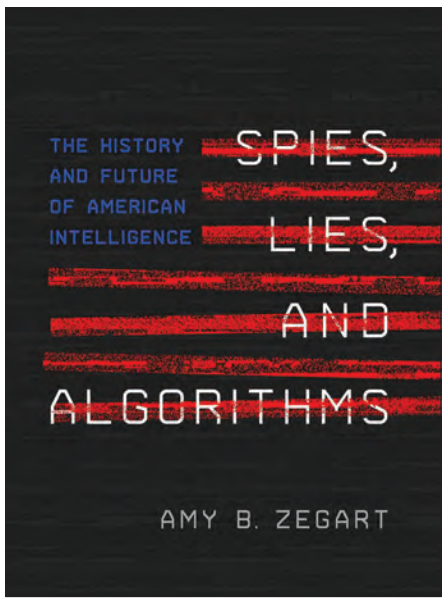

Spies, Lies, and Algorithms: The History and Future of American Intelligence

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Reviewed by Nalonie J.M. Tyrrell

Amy Zegart has long been intrigued—and often confounded—by America's obsession with what she calls "spytainment": the blending of espionage and enter-

tainment. A respected political scientist, Senior Fellow at the Hoover Institution, and courtesy professor at Stanford University, Zegart is well-positioned to critique both the myth and the reality of intelligence work. She observed that following the events of September 11th, public interest in intelligence surged, yet this did not translate into a deeper understanding of the field's realities.

Her latest book, *Spies, Lies, and Algorithms: The History and Future of American Intelligence*, serves as both a primer and a provocation. Zegart attempts to bridge the gap between public fascination and professional understanding, writing for policymakers, students, and lay readers alike. The book offers a comprehensive overview of the American intelligence community, addressing core topics such as intelligence definitions, historical development, covert operations, counterintelligence, congressional oversight, and the rapidly evolving realm of open-source intelligence. Although Zegart intentionally omits some details to maintain accessibility, the book succeeds in tackling areas where public misunderstanding is most pervasive.

After establishing foundational knowledge, Zegart turns to critique. She argues that American intelligence agencies are "woefully unprepared to face the challenges of the twenty-first century" and warns that they "must either adapt or fail." Her concerns stem from four primary challenges: empowered adversaries, overwhelming data volumes, the erosion of secrecy as a result of technological diffusion, and insufficient collaboration with innovation hubs such as Silicon Valley. Zegart identifies the last factor as a strategic disadvantage—unlike their U.S. counterparts, the intelligence services of our adversaries are more agile and integrated with their countries' respective tech sectors.

In addition to external threats, Zegart highlights internal cognitive vulnerabilities. She dedicates a compelling discussion to cognitive biases, referring to them as "cognitive traps that can lead even the sharpest minds astray." While such biases are a universal human tendency, the intelligence community's insular and secretive nature magnifies their consequences. The absence of transparency and limited external scrutiny often elevate flawed assessments to unquestioned truths, exacerbating the risk of error. Zegart argues that genuine reform must go beyond operational secrecy and embrace a new paradigm—one that values openness, especially in leveraging open-source intelligence.

For students at professional military education institutions, *Spies, Lies, and Algorithms* is more than just an introduction to the intelligence community—it is a strategic warning. Zegart's emphasis on the challenges of cognitive bias, technological disruption, and adversaries' willingness to innovate has direct relevance for the joint force. Future planners and operators must be able to critically assess intelligence, understand its inherent limitations, and integrate open-source information with traditional methods. In an era of strategic competition where misinformation and data saturation are weapons, Zegart's insights equip our students not only to consume intelligence but also to question its foundations and adapt it for operational decision-making.

Her warning becomes even more urgent in light of the rapid adoption of artificial intelligence (AI) in the national security sphere. As professionals grow increasingly reliant on AI tools—despite well-known limitations such as algorithmic bias and hallucination—the potential for flawed intelligence estimates with real-world consequences becomes acute. Zegart's analysis implicitly calls for a recalibration of how technological tools are assessed and integrated into intelligence workflows.

What distinguishes *Spies, Lies, and Algorithms* is Zegart's dual perspective: she combines the analytical clarity of a policy scholar with the sensitivity of someone closely attuned to the human dilemmas of intelligence work. Through interviews and real-world case studies, she captures not only the systemic challenges but also the ethical and personal struggles faced by intelligence professionals. The result is a book that balances academic insight with narrative accessibility.

Whether one is a national security professional, a student of intelligence, or simply a curious citizen captivated by espionage thrillers, *Spies, Lies, and Algorithms* offers a lucid and timely exploration of a field undergoing tectonic change. Zegart makes a persuasive case: understanding intelligence today requires moving beyond the shadows and into the algorithms. Her book is essential reading. **JFQ**

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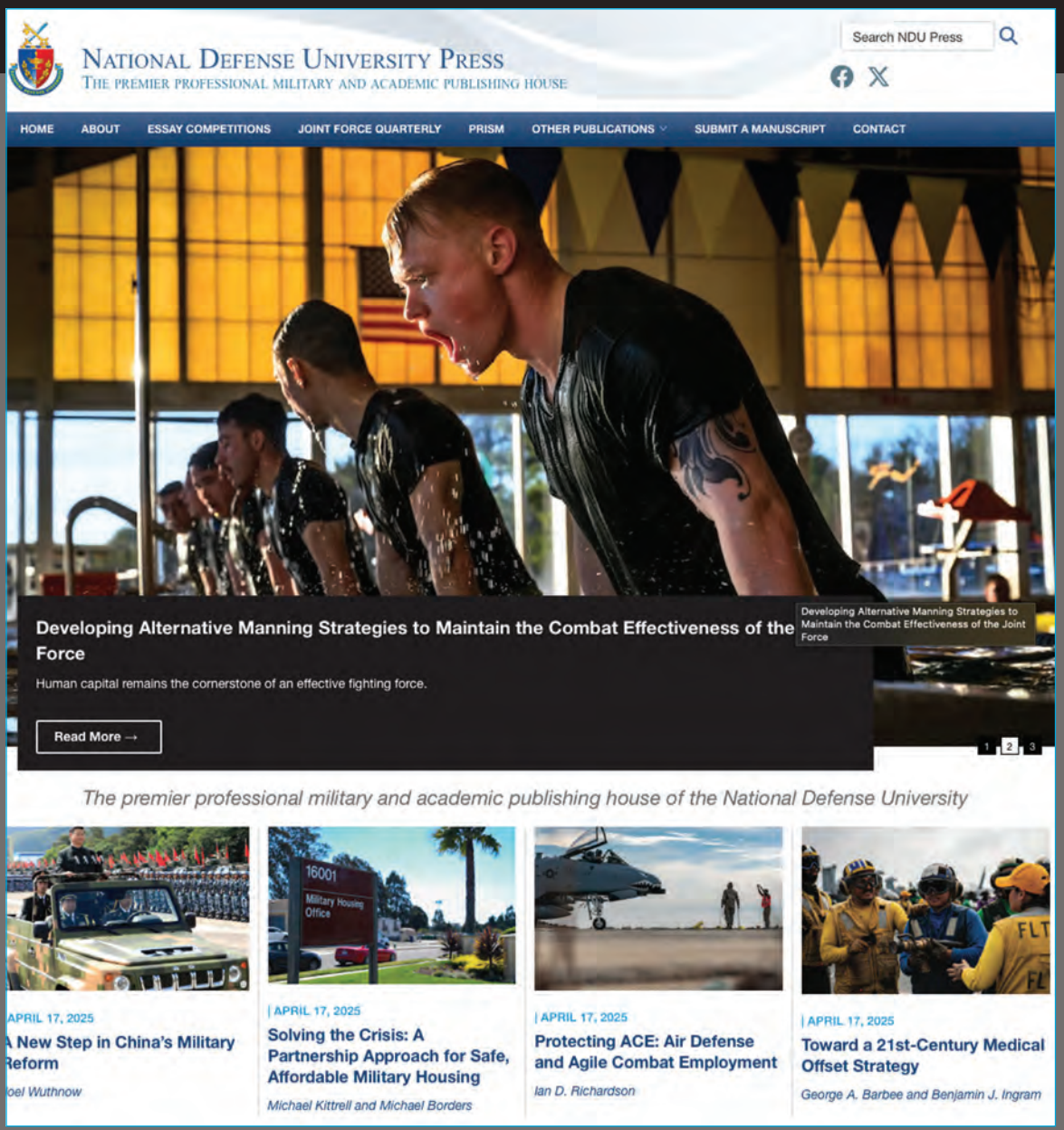

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