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Sharpening Our Competitive Edge

USAFRICOM Guardian of the Seams

Winners of the 2023 Essay Competitions

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Cover 2 images (top to bottom): Airman 1st Class Kenneth Pedres, 66th Comptroller Squadron finance technician, waves to crowd at Fenway Park during Hats Off to Heroes ceremony in Boston, April 15, 2022 (U.S. Air Force/Todd Maki); Air Force Staff Sergeant Johnny White, 816th Security Forces Squadron EAS team leader, performs ammo can press at Defender Challenge tryout at Joint Base Andrews, Maryland, August 30, 2023 (U.S. Air Force/Matthew-John Braman); Airman 1st Class Hannah Cayton, F-15C Eagle assistant dedicated crew chief assigned to 44th Aircraft Maintenance Unit, cleans aircraft during preflight inspections, on Kadena Air Base, Japan, July 2, 2019 (U.S. Air Force/Cynthia Belío)

In This Issue

About the Cover
U.S. Servicemembers with Combined Joint Task Force–Horn of Africa hold up fellow Soldier as he grabs rope to get over water obstacle as part of French Desert Commando Course at Le centre d'entraînement au combat de Djibouti, in Arta, Djibouti, September 13, 2021 (U.S. Air Force/Andrew Kobialka)

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Astronaut Dave Bowman (Keir Dullea), aboard *Discovery One* spacecraft, interacts with HAL 9000 computer in Stanley Kubrick's 1968 film *2001: A Space Odyssey* (Allstar Picture Library Limited/Alamy)

Executive Summary

Henry Kissinger, Eric Schmidt (former Google CEO), and Daniel Huttenlocher (dean of the MIT Schwarzman College of Computing) have been speaking to audiences on the topic of artificial intelligence (AI) and humans, the subject of their book *The Age of AI* (Little, Brown and Company, 2021). They believe we will soon reach a point where machines develop their own language and start communicating in a way we humans do not understand. It is then that "we pull the plug on them," according to Schmidt. Kissinger suggests that a global discussion among governments and industry must occur soon and develop agreed-on limits to prevent AI from getting out of control.

History is full of such calls for global restraint of potentially dangerous machines, such as the 1921–1922 Washington Naval Conference, which hoped to limit the spread of naval battleships and constrain expansionist powers, especially in the Pacific. We also have the many nuclear arms control agreements, including the 1970 Nuclear Non-Proliferation Treaty, in which nearly all the world agreed to the peaceful use of nuclear power and swore to work together for the elimination of nuclear arms. Chemical and biological weapons have also been subject to such agreements with good progress toward elimination.

But have we not seen this movie before, that is, new capabilities that can seemingly overwhelm humankind's ability to control them? While Schmidt doubts these machines could become truly conscious, they likely could develop a decisionmaking capability that could, when operating on the battlefield, advantage both the offense and defense to quickly overwhelm the opponent. In practice, Schmidt believes if sufficiently resourced the AI-supported offense wins, and the defender loses. But can warfare become so simple that the offense can overwhelm the defense simply by having better analysis and the ability to carry out such computer-assisted plans?

Kissinger and his coauthors are asking the right questions: Where does AI place our current military advantages as well as those we plan to have in the future? Does AI script us into an arms race of multiple types, both hardware and software? Maybe we have already been in one for years that will now accelerate. How does AI play a role in the Joint Warfighting Concept (JWC)? This issue brings both answers and more questions about how the United States plans to meet the future militarily.

Building on General Mark Milley's discussion in *JFQ* 110 (3rd Quarter, 2023), our Forum section welcomes three articles that expand his discussion of future joint warfighting. First, Thomas Walsh and Alexandra Huber interview the Services' vice chiefs about how the concept affects their efforts to implement Joint Force Development and Design in their plans for the joint force. Vice Chairman Admiral Christopher Grady offers his thoughts on how we can build the joint force in line with the JWC. In an exclusive to *JFQ*, NATO's Supreme Allied

Commander Transformation Philippe Lavigne provides his perspective on how Alliance nations are adjusting national and NATO plans for modernization, especially during the extant threat of Russia to Ukraine and nearby nations.

As we do each October issue of *JFQ*, we present the winners of the Secretary of Defense and Chairman of the Joint Chiefs of Staff (CJCS) Essay Competitions, held this past spring at National Defense University. With judges gathered from across the professional military education enterprise, over 90 essays competed and 4 were selected, with a dual winner in one category. In the Secretary of Defense Strategic Research Paper category, Karl Scheuerman of the Eisenhower School connects the dots between Russia's threats to stop wheat exports and how that could impact the U.S. food supply. The first of two winners in the CJCS Strategic Paper category, Benjamin Donham of the U.S. Army War College writes about how AI could be applied successfully to joint medical operations. The other winner in this category, Nathaniel Peace from the Air War College, suggests a strategy to achieve space denial through deterrence.

In a first for *JFQ*, we offer a special section on U.S. Africa Command, featuring my interview with USAFRICOM Commander General Michael Langley, USMC, and three articles from his command staff. In an overview of the guiding principles adopted by the command, Melissa Stafford, Benjamin Okonofua, William Campbell, and Garth Anderson discuss the continuing value of diplomacy, development, and defense in the region. Looking more deeply into the first of these principles, Rose Keravuori, Peter Bailey, Eric Swett, and William Duval describe how USAFRICOM is working to implement the concept of Defense Diplomacy. With such a large geographic area of responsibility and a relatively small amount of assets to call on, Opher Heymann and Peter Yeager outline a range of opportunities for the command to make a difference across the continent.

Our Features section offers four articles from the field, including views on potential problems between China and Russia in the Artic, managing risk, understanding the history of Black Soldiers in World War II, and how modern military members can best learn from their industrial partners. Adam Lajeunesse, P. Whitney Lackenbauer, Sergey Sukhankin, and Troy Bouffard offer important insights into the challenges of Chinese and Russian use of the Artic. On managing risk, Bryan Groves, Jerad Rich, and Kaley Scholl educate us on how to best employ the joint force's existing frameworks for successful outcomes. Returning *JFQ* alumnus Bryon Greenwald provides us with his take on how the experiences of Black combat Soldiers in World War II can help us best leverage diversity and inclusion efforts today. Michael Lima discusses Training With Industry and shares his perspective on why more such assignments would help both sides of the commercial defense industrial base.

Rounding out this issue, along with three outstanding book reviews, is our Recall article. Casey Miller, Carl Jappart, and Matthew Jackson offer their lessons learned from the Allied response to the German U-Boat offensive of 1942.

As the outline of the JWC begins to become clearer to the joint force and beyond, we hope to hear from you about how it relates to your vision of the future, AI, geopolitical issues, and more. While this world may seem increasingly complex and complicated, sharing your thoughts on how to deal with it is always of value to our nation's leadership and your battle buddies alike. *JFQ* is always ready to air them out. **JFQ**

—William T. Eliason,
Editor in Chief

To the Editor

In their letter to the editor (*JFQ* 110, 3rd Quarter 2023), Michael P. Fischerkeller, Emily O. Goldman, and Richard J. Harknett concede that "employed persistently over time, a 'deterrent effect' might result from cyber campaigns." It is certainly accurate then to claim that persistent engagement will effect a level of deterrence by creating friction against malicious activity. This does not mean that persistent engagement was adopted by U.S. Cyber Command as a deterrent strategy.

Certainly, too, competition below armed conflict can indeed result in political change (and thus is consequential). But it is hard to understand or share their claim that such "[c]ampaigns in competition are not less consequential than actions in crisis and armed conflict." (Political influence campaigns are not less consequential than conventional or nuclear war?)

Deterrence is much easier to conceive at the strategic end of the competition continuum (for example, deterring strategic attack via cyberspace against critical infrastructure) and much harder at the low end, below armed conflict, as I specifically argue in my article titled "Cyber Deterrence Is Dead! Long Live 'Integrated Deterrence'!" (*JFQ* 109, 2nd Quarter 2023). A whole-of-government and cross-domain effort is needed to better shape the domain. This is why the Department of Defense is advancing *integrated* deterrence that involves all military domains across the spectrum of competition and that leverages all instruments of national power.

Broad claims that deterrence does not apply to cyberspace are unhelpful if they cannot accept any nuance that cyberspace activity can contribute to deterrence below armed conflict (however small) and that cyber deterrence at the strategic level probably does in fact exist.

—James Van de Velde
Professor, National Defense University

MH-60S Seahawk helicopter, assigned to "Tridents" of Helicopter Sea Combat Squadron 9, takes off from aircraft carrier USS *Gerald R. Ford* as it prepares to conduct vertical replenishment with *Ticonderoga*-class guided-missile cruiser USS *Normandy*, May 12, 2023, in Atlantic Ocean (U.S. Navy/Malachi Lakey)

A Symphony of Capabilities

How the Joint Warfighting Concept Guides Service Force Design and Development

By Thomas A. Walsh and Alexandra L. Huber

The United States today faces complex global challenges, including long-term strategic competition with major powers such as China and Russia, rogue states pursuing nuclear proliferation, and violent extremist organizations bent on sowing chaos. Rapidly evolving technologies—from generative artificial intelligence systems to advancements in human-machine teaming—are changing the character of warfare, and we are only just beginning to understand the implications of these changes. History shows that in times like this, nations that best capitalize on these changes create the greatest advantages in battle. Adapting to this evolving landscape requires the joint force—Army, Marine Corps, Navy, Air Force, and Space Force—to integrate capabilities and synchronize effects fluidly across domains. The

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opportunity for the joint force, as it looks forward to a future still blurred by the implications of rapid change, is to balance readiness for today's warfare with preparation for the warfare of the future.

Roadmap to the Future

In 1958, President Dwight D. Eisenhower, commenting on the Defense Reorganization Act, emphasized that "separate ground, sea, and air warfare is gone forever. If ever again we should be involved in war, we will fight in all elements, with all services, as one single concentrated effort."[1] Reinforcing this idea, the 2022 National Defense Strategy (NDS) states that the United States "will disrupt competitor warfighting advantages while reinforcing our own, and enhance interoperability and access."[2] The NDS's central tenet is the idea of integrated deterrence: "working seamlessly across warfighting domains, theaters, the spectrum of conflict, all instruments of U.S. national power, and our network of Alliances and partnerships."[3]

The joint force's answer to the NDS call and the current shift in the character of war is the Joint Warfighting Concept (JWC). Former Chairman of the Joint Chiefs of Staff General Mark A. Milley has called the JWC our "roadmap to the future."[4] It is a threat-informed, operational concept that provides an overarching approach to how the joint force will fight in the future, culminating nearly a decade of focused development, wargaming, and experimentation.[5] The JWC articulates a strategic vision for how the U.S. military will operate and fight as an integrated joint team across all domains. By guiding and shaping Service force design and development efforts, the JWC stands as a roadmap to ensure the joint force maintains advantage.

Joint Force Design and Development

The JWC does not chart a singular path through a landscape of budgetary and operational choices, as a roadmap through geographic terrain would. Rather, the JWC guides numerous operations, activities, and investments throughout the Department of Defense (DOD) by providing a common goal toward which the military Services strive. Additionally, the JWC informs how DOD partners in industry and the interagency community can support the joint warfighting effort. The JWC articulates a "deep understanding of the changing character of warfare, anticipates the operating environment, and guides how the joint force organizes, trains, and equips for future competition and conflict."[6] Perhaps not as detailed as a map or as specific as turn-by-turn directions, the JWC offers a shared vision of the terrain and common destination. In this way, the JWC provides alignment and flexibility to Service force development and design efforts. The ability of the JWC to guide preparation for contemporary warfare and balance modernization for future warfare is one of the reasons General Milley refers to the JWC as our "North Star."[7] The opportunity for the joint force now is to synchronize and integrate its various approaches, guided by the JWC, such that the right force is ready at the right time to compete with, deter, or defeat any adversary.

A Symphony of Capabilities

Some consider American jazz music as "America's classical music."[8] Improvisation is an important part of jazz, and in most performances, players perform solos they create on the spot. Because improvisation is so central to jazz, jazz musicians are tremendously creative, and they produce a wide variety of music. As a result, one might listen to many different jazz recordings of the same song, but none will sound identical.[9] The musicians' playing styles and the improvised solos combine to make something different. Jazz is about making something shared—a song everyone knows—into something personal.[10] To be able to improvise, however, a musician first needs to learn the basic musical scales, which provide a common foundation of knowledge. For the joint force, the JWC provides this foundation.

In a sense, each of the military Services exhibits similar creativity and improvisation as it makes something shared, like joint operations, into something personal, such as Service-led organization, training, and equipping of forces for those operations. Each of the military Services approaches force design and development in the manner it believes leverages its unique cultures and experiences and best prepares it for its missions. The Army, for example, uses the concept of Multidomain Operations (MDO) as a guide. The Air Force pursues force design in line with its Future Operating Concept. The Marine Corps looks to its own Force Design 2030 as it readies its Marines for the future. The Navy's Navigation Plan guides its force design efforts.

Integration among the Services, capitalizing on each Service's unique capabilities, perspective, and experience, strengthens the joint force. In combination with a high focus on adaptation and informed decisionmaking down to the lowest possible level, the U.S. military aims to maintain existing advantages in modern warfighting and combine them with human ingenuity and creativity to produce enduring advantage for the joint warfighter. By providing a common goal and vision of the future, the JWC harmonizes Service-led force design and development activities into a symphony of capabilities.

Tenets of the JWC

In July 2023, General Milley introduced the key tenets of the JWC, which seek to reinforce the NDS force development priorities: "infrastructure, logistics, command and control, dispersal and relocation, and mobilization."[11] The JWC tenets are:

- Integrated, combined joint force: Seamless integration of all military Services across all warfighting domains, enabling them to function as a unified force. This involves synchronized planning, shared situational awareness, and effective communication across different Services, fully aligned and interoperable with key allies and partners.

- Expanded maneuver: Fluidly moving through space and time, including but not limited to maneuvering through land, sea, air, space, cyber, the electromagnetic spectrum, information space, and the cognitive realm.
- Pulsed operations: A type of joint all-domain operation characterized by the deliberate application of joint force strength to generate or exploit advantages over an adversary.
- Integrated command, agile control: Seamless command and control (C2) across all domains, integrating sensors, platforms, and decisionmaking processes to achieve real-time battlespace awareness and enable rapid decisionmaking.
- Global fires: Integration of kinetic and nonkinetic fires to deliver precise, synchronized global effects across all domains and multiple areas of responsibility.
- Information advantage: The rapid collection, analysis, and dissemination of information using advanced technologies to enable decisionmaking superiority and action.
- Resilient logistics: The rapid movement of personnel and equipment to places and times of our choosing.[12]

These tenets serve like musical scales for jazz musicians, guiding the design and development activities of the respective military Services. They not only provide a common foundation but also allow for the creativity and improvisation necessary for each Service to optimize its operations, activities, and investments in line with its mission areas. These tenets can be found in each Service's force design and development efforts, and vice versa. In recent conversations, every Service's senior-most leader emphasized this point in describing how the Service is adapting for the future.

Army

In the past century, land has constituted a primary warfighting domain in major U.S. conflicts, resulting in many land-centric lessons that have been integrated across the joint force. Over the last 12 months, the Army has continued to transform the ways and means of its approach to warfare. From weapon and battle management systems to updated doctrine, today's Army is readying itself to compete, deter adversaries, and prevail in 21st-century warfare. This sweeping modernization effort reflects the tenets of the JWC.

Capability Modernization. The 2022 NDS states the need to support integrated deterrence through the idea of "deterrence by denial"[13]—the ability to withstand and quickly recover from multidomain attacks. Supporting this idea, Army fielding priorities center on multidomain, interoperable capabilities. By the end of fiscal year 2023, the Army will have fielded 24 new combat systems. These systems include long-range precision strike weapons, mobility systems, and an updated battle management C2 network.[14] Notably, in April 2023, the Army approved for full production the Integrated Battle Command System, which integrates multidomain sensors to create a holistic image of the battlefield and identify the best shooter to defend against incoming threats, quickly closing the sensor-to-shooter loop.[15]

The Army's new fires, maneuver, and C2 systems represent an ambitious modernization effort and shift in perspective regarding modernization altogether, emphasizing continual adaptation. According to Chief of Staff of the Army General Randy George, today's Army embraces "continuous transformation, where we are constantly evolving and improving not just material capabilities, but also the tactics, techniques, and procedures needed to optimize those capabilities."[16] New Army doctrine reflects this effort and describes the way the Service applies those capabilities in its approach to 21st-century warfare, which is informed by consistent experimentation across the enterprise, such as Army Futures Command, Service component commands, and cross-functional teams.

Multidomain Operations. In October 2022, the Army published Field Manual (FM) 3-0, *Operations*, solidifying the Army's concept of multidomain operations into doctrine. The concept, in the words of former Army Chief of Staff General James McConville, is "shaping the Army and transforming our people, readiness, and modernization efforts to meet current and future challenges and define the Army of 2030."[17] FM 3-0 defines *MDO* as "the combined arms employment of joint and Army capabilities to create and exploit relative advantages that achieve objectives, defeat enemy forces, and consolidate gains on behalf of joint force commanders."[18] *All operations, it highlights, are multidomain operations.*

MDO are at the heart of the JWC and underscore the tenets of expanded maneuver and pulsed operations. General Randy George notes that the evolution in the Army's doctrine optimizes it for pulsed operations through capabilities such as long-range precision fires, integrated air and missile defense, and close combat forces. Pulsed operations, in his view, are about using Army capabilities to "create openings in space and time for different components of the joint force to exploit, and vice versa. Those pulses make expanded maneuver possible."[19] Operators and formations need to sense, make sense, and act in the operational environment faster than ever before. This requires a leaner, more mobile, and more networked Army.

Through capabilities and doctrine, today's Army is adapting to a modernized way of war for the 21st century. Land operations remain central to Army force design and development, and those efforts increasingly reflect the necessity to integrate and synchronize effects across domains, which is the heart of the JWC. In this sense, the Army is using the musical scales provided by the JWC and other concepts to leverage its own part of the orchestra, strengthening the symphony as a whole. Whether in space or undersea, in the Pacific or elsewhere, "every theater," General George highlights, "is joint."[20]

Marine Corps

When it comes to force design and development, the Marine Corps is prioritizing speed, initiative, and current advantages. While the Marine Corps has drawn criticism from some retired

Marine Corps Marine Unmanned Aerial Vehicle Squadron 3, Marine Aircraft Group 24, maneuvers MQ-9A down flight line on Marine Corps Air Station Kaneohe Bay, Hawaii, June 20, 2023 (U.S. Marine Corps/Cody Purcell)

ranks because of its rapidly divesting legacy materiel, these divestitures have better prepared the Corps for future warfare and the tenets of the JWC.[21] According to the Corps' senior-most Marines, the changes are vital to ensuring the Marine Corps is ready to meet 21st-century challenges.

Force Design 2030. In March 2020, the Marine Corps announced a major force design initiative called Force Design 2030.[22] The initiative, planned to take place over the following 10 years, aims to redesign the Service for naval expeditionary warfare to better align itself with the NDS and address the challenges identified therein. Since 2020, the Marine Corps has eliminated and reorganized units in accordance with the concept and has divested several capabilities, such as heavy armor. The Service has also fielded new capabilities and task units, including unmanned aerial vehicle squadrons with its first MQ-9As in Hawaii, Marine Corps Information Command, and the 3rd Marine Littoral Regiment.[23]

Designed at the same time as early iterations of the JWC, Force Design 2030 addresses the Service-specific requirements for force design and adaptation to modern warfare. These efforts remain tightly aligned with joint force goals outlined in the NDS and JWC. The JWC, according to General Eric Smith, Commandant of the U.S. Marine Corps, "is the vehicle by which we show our jointness."[24]

A New Paradigm. Deeper integration and synchronization of these modernization efforts with the other Services is central to Marine Corps force transformation. As General Smith notes, this integration "significantly increases the capability, lethality, and effectiveness of the joint force."[25] Reflecting the JWC's tenet of an integrated, combined joint force, Force Design 2030 emphasizes that Marine Air-to-Ground Task Force C2 capabilities must rapidly transition across the competition continuum "to enable all-domain joint and combined kill webs."[26] To do this, Force Design 2030 calls for a shift away from legacy air-land battle paradigms to a 21st-century, all-domain, joint battle mindset. According to General Smith, the key to this joint mindedness is striking the proper balance between top-level guidance and Service-level efforts to innovate, adapt, and transform for the future.

The Marine Corps' Stand-in Forces (SIF) and Expeditionary Advanced Basing Operations (EABO) concepts puts these ideas into practice. The SIF concept envisions a consistent Marine presence west of the international dateline to provide constant forward-based sustainment and counter-C2, computing, communications, cyber, intelligence, surveillance, reconnaissance, and targeting (C5ISRT) capabilities designed to enable the first pulse of JWC's pulsed operations.[27] General Smith highlights that the SIF concept enables Marines to create an opportunity for other forces to enter the theater by "opening the door from the inside."[28] Currently, the Corps has over 28,000 Marines stationed in this region

Marine Corps F-35B Lightning IIs, assigned to Marine Fighter Attack Squadron 121 from Marine Corps Air Station Iwakuni, fly alongside Air Force KC-135 Stratotanker over Pacific Ocean, January 19, 2023 (U.S. Air Force/Tylir Meyer)


12
VMFA-121
12
15
USS TRIPOLI
15

Servicemembers review data at Schriever Space Force Base, Colorado, December 19, 2022 (U.S. Space Force/Dennis Rogers)

to maintain presence, support regional allies and partners, and "open the door" for the rest of the joint force in the case of a contingency.[29] As the 2022 NDS prioritizes key infrastructure investments and continued collaboration with allies and partners in the Indo-Pacific region, the Marine presence in the region will endure.[30]

To refine the Marine concept of EABO and the JWC, General Smith emphasizes the importance of experimentation, exercising, and testing—in particular, nesting experimentation within larger exercise campaigns. Modern Great Power competition requires the joint force to accelerate experimentation efforts and, where needed, accept greater risk. According to General Smith, the joint force must "boldly move toward the future."[31] Since 2021, the Marines have embarked on a mission to conduct "near-constant" experimentation in EABO operations and training, integrating new technology, materiel, and tactics.[32] In the metaphor of a jazz ensemble, the Marines have embraced improvisation in new and experimental ways. These experiments will inform future EABO operations and Marine Corps concepts, accelerating overall joint force development and strengthening the Marines' role in joint warfighting.

The most critical part of the JWC—and all Service concepts—is, according to General Smith, ensuring that all warfighters understand the role their Service plays in the joint force.[33] All Services should maintain their unique capabilities and perspectives, which have been hard-earned over time and in battle. These are vital to the Services' respective strengths. The JWC helps maximize those strengths by integrating them into a cohesive, credible, and adaptive joint force. As Force Design 2030 acknowledges, only by expanding integration and creating new advantages when we sense changes in the operating environment will the Marine Corps remain "most ready, when the Nation is least ready."[34]

Navy

The Navy's overarching contribution to the JWC is Distributed Maritime Operations (DMO), the Navy's central organizing concept for its future operations. DMO increase naval lethality and survivability while providing operational advantage to the joint force. The Navy's Navigation Plan focuses Navy's capability investments to support DMO, focusing on six force design imperatives:

- expand distance
- leverage deception
- harden defense
- increase distribution
- ensure delivery
- generate decision advantage.[35]

The Navy's strategic guidance and supporting concepts fully align to the JWC and its tenets, integrating with the joint force symphony while supporting the NDS foundational priority of integrated deterrence.

Adaptation Through Cross-Force Integration. Vice Chief of Naval Operations Admiral Lisa Franchetti emphasizes the centrality of cross-force integration in naval development. According to Admiral Franchetti, "supporting integrated deterrence and the Joint Warfighting Concept guides the Navy's investment and acquisition priorities." One of the Navy's core functions is strategic deterrence, which supports the JWC by providing the ultimate backstop to integrated deterrence. Beyond strategic deterrence, the JWC provides the framework for the Navy to integrate with joint force counterparts, allies, and partner nations to "develop future operational concepts that capitalize on each other's strengths and maximize delivery of effects as a joint and combined force."[36] To ensure current concept implementation and future concept development efforts remain aligned across all stakeholders, the Navy leverages the NDS and JWC as guides, thus "looking at Distributed Maritime Operations in different geographic contexts and time epochs."[37] In other words, the Navy uses the NDS priorities and JWC tenets to employ DMO and create advantages for the entire joint and combined force.

A key aspect of this approach is continued engagement at the senior-leader level. According to Admiral Franchetti, continued leadership engagement in forums such as the Globally Integrated Wargame and Large Scale [Global] Exercises "yields deep understanding of joint concept and capability development."[38] This engagement at all levels of the force ensures the Navy's development remains relevant across the joint force, and by pursuing alignment with all Services, the Navy ensures cohesive joint capabilities. In support of its Navigation Plan, the Navy instituted the NAVPLAN Implementation Framework (NIF) to drive joint force–relevant capability development that anticipates and responds to fellow Service efforts.

Technology and Capability Development. The Navy's ongoing NIF and Force Design 2045 efforts prioritize capabilities with the most promise to fulfill JWC tenets. To deliver on its six force design imperatives, the Navy established objectives for long-range fires; terminal defense; C5ISRT; unmanned systems; AI; and Naval Operational Architecture (Overmatch) to support the JWC tenets of regarding global fires and integrated command, agile control. Specific to naval-enabled logistics, contested logistics and end-to-end supply chain objectives demonstrate how the Navy will help the joint force maneuver into and within the theater of operations.

Furthermore, when planning or fielding these future systems and platforms, the Navy prioritizes agility and multifunctional capabilities, keeping "modernization in mind" throughout the planning cycle.[39] Reflecting the rapid pace of technological change, Admiral Franchetti states that "it is necessary for us to build systems that offer flexibility and can adapt to both changing environments and operational imperatives."[40] As with concept development, capability fielding incorporates joint force, allies, and partner nation equities from the inception, seeking a final product that will benefit forces across domains, Services, and partners.

Air Force

The Air Force Future Operating Concept (AFFOC), designed to align with the JWC, centers on five core functions:

- air superiority
- global strike
- global mobility
- intelligence, surveillance, and reconnaissance (ISR)
- integrated C2.[41]

In a discussion of the AFFOC and JWC, Vice Chief of Staff of the Air Force General David Allvin emphasized the need to expand joint force unity. Continual adaptation, agility, flexibility, and alignment must be central to the joint force's mindset as it responds to the changing character of war.

Synchronization and Agility. General Allvin observed that the JWC has provided the Air Force (and joint force) a common baseline from which to develop future concepts, ensuring that all Services remain aligned while fulfilling their respective functions. Synchronizing across the joint force requires an active joint mindset. General Allvin highlights that we "can't be satisfied with what [modernization] does for the Air Force—we need to see how it plugs into the joint force."[42] Creating joint-mindedness is critical to ensuring that the NDS priorities, JWC tenets, and the AFFOC functions are fulfilled, ensuring the Services are able to use each other's strengths to create a stronger whole.

Fulfilling the JWC tenets and AFFOC functions centers on the ideas of agility and adaptation to today's rapidly changing operating environment. This includes JWC's "agile control" and expands beyond it to include systems, materiel, and Airmen. General Allvin advocates for capabilities that can fulfill many functions and requirements, noting the Air Force "should never take in another system without factoring in agility and the rapid pace of change."[43] In the past decade, the Air Force has pivoted to seeking agile capabilities that can be employed in many ways and adapted quickly, reducing the need to field new equipment in the future. The idea of agility does not just apply to equipment, though—agile Airmen are vital to mission success.

The Air Force's multicapable-Airmen initiative seeks to create Airmen who can employ a variety of basic skills outside their specialty code, allowing them to respond quickly and efficiently in unfamiliar situations or environments.[44] General Allvin notes that mental agility is equally critical and is a central idea in the Air Force's pivot to mission command,

which "empowers Airmen to operate in uncertain, complex, and rapidly changing environments through trust, shared awareness, and understanding of the commander's intent."[45] In combination, multicapable Airmen and a mission command approach enhance autonomy and the speed of decisionmaking.

Expanded Maneuver and Pulsed Operations in Airpower. The AFFOC argues that winning the air fight centers on "pulsed airpower"—that is, periods of temporary air superiority to create opportunity for the entire joint force to fight.[46] This idea, which echoes the JWC tenets of expanded maneuver and pulsed operations, characterizes the Air Force's enduring role in joint warfighting. To be effective, General Allvin describes the need for a unique tempo in pulsed operations (or pulsed airpower): If a typical pulse can be compared to a heartbeat that is steady and predictable, then the Air Force's pulse must have an "arrhythmia" that the joint force knows and an adversary cannot predict. In other words, only the orchestra should know what the tune will be.

Finally, the future force must use agility and adaptability to maintain an open mind and flexibility to change. As General Allvin states, agility means that "you know you won't [always] be right, but when you're wrong, you can get right quicker."[47] This kind of rapid iteration, and the decisionmaking that accompanies it, require the joint force to establish and maintain information advantage over competitors and adversaries. And just as a jazz musician uses a finely tuned ear to improvise and adapt, the joint force must perceive changes in the operational environment faster, and more accurately than others, and then optimally respond to those changes.

Space Force

As the U.S. military's newest Service, the Space Force faces the unique challenge of establishing its place among the Services while working to adapt to the current and future operating environments. Chief of Space Operations General B. Chance Saltzman outlines three lines of effort to pursue the Space Force's critical areas: fielding combat-ready forces, amplifying the Guardian spirit, and partnering to win.[48] These priorities allow the Space Force to pursue Service-specific responsibilities and capabilities and ensure that jointness is an inherent attribute of Space Force functions and development.

A Guiding Star for Force Development. The USSF was established in 2019 as the joint force was grappling with the changing character of modern war. Because of this, the Space Force is a future-facing organization by design. According to former Vice Chief of Space Operations General David Thompson, the JWC and its tenets describe what future warfighting will look like, guiding the Space Force through a common future picture across the joint force. "The JWC," General Thompson stated, "is the guiding star for how the Space Force needs to develop and integrate capabilities."[49] For a Service whose business is space, the analogy is apt.

In turn, Space Force doctrine and strategy add context and detail to the Service's aim to enable greater skill and integration across the joint force. In addition to the Chief of Space Operations' priorities, the Space Force's core competencies encompass space security, combat power projection, space mobility and logistics, information mobility, and space domain awareness.[50] These competencies will not only enable more secure communications and global mobility for the joint force but also reinforce and strengthen each key tenet of the JWC.

Synchronizing and Accelerating. The 2022 NDS states that "[b]ecause the cyber and space domains empower the entire joint force, we will prioritize building resilience in these areas."[51] As such, prioritizing joint alignment and interoperability is an inherent Space Force priority. In a symphony, the Space Force may be the overarching acoustical infrastructure, amplifying and supporting the capabilities of other Services. Since its inception in 2019, the Space Force has stood up multiple organizations meant to integrate cross-DOD perspectives in every stage of planning and problem-solving. The Space

Warfighting Analysis Center (SWAC) stands as a central example: equities from across the Services and combatant commands are represented in the SWAC analytic process, creating solutions acceptable for the entire joint force.

In addition to interoperability, General Thompson emphasizes the criticality of synchronizing timelines and generational technology across the joint force. The Space Force has significantly less legacy materiel and equipment than its counterparts, meaning it does not need to divest large amounts of equipment to create room for modernization. However, as all Services rely on space architecture, Space Force planners must remain conscious of how legacy capabilities and new capabilities, such as an integrated space data network, interact to ensure that the joint force remains fully connected during periods of transition. This, General Thompson highlights, is the crucial role the Joint Requirements Oversight Council (JROC) plays in force

Secretary of Defense Lloyd J. Austin III delivers remarks at Air Force B-21 Raider unveiling ceremony, in Palmdale, California, December 2, 2022 (DOD/Chad J. McNeeley)

design and development. By integrating joint space requirements, the JROC helps ensure the future force is an integrated joint force.[52]

All Services share the imperative to successfully adapt to the changing character of war. Adaptation involves risk. The joint force, General Thompson notes, must be willing to accept risk as it accelerates for design and development because the modern competitive environment "does not allow for risk aversion." The consequences of moving slowly are, in General Thompson's view, just as risky as those of moving too fast. The crucial factor for the joint force is adapting together. "Every single one of us," General Thompson points out, "must adapt to the changing character of war, both individually and collectively, in every Service and every domain, to achieve the vision of the JWC, or we will lose."[53]

National Guard Bureau

The National Guard Bureau (NGB), as 20 percent of the U.S. military, represents a vital component of DOD readiness.[54] Guardsmen study, train, and exercise using the same concepts and strategy as their Active-duty counterparts and thus align with Service and joint concepts. Vice Chief of the National Guard Bureau Lieutenant General Marc Sasseville emphasizes that National Guard leadership has a special responsibility to disseminate and explain the JWC to Soldiers and Airmen throughout the Guard so that they understand their role "in joint operations both now and in the future execution of the JWC."[55]

Learning the JWC Through Practice. In a discussion on the JWC and its tenets, Lieutenant General Sasseville stated that the "capabilities and capacities of the National Guard, and the Reserve components in general, need to be considered early in the planning and concept development process."[56] Furthermore, Lieutenant General Sasseville emphasizes the importance of Guardsmen experiencing the JWC and its tenets through practice and execution. The JWC, he highlights, "must become integrated with and eventually foundational to our training programs."[57] The best learning will occur, according to Lieutenant General Sasseville, "with the infusion of the JWC into war planning and scenario-driven objectives into Service and joint training exercises."[58] In other words, although jazz is largely improvisation, practicing to ensure cohesiveness among the players is critical.

Guardsmen regularly participate in Active-duty exercises and training to maintain cohesion across the force. In May 2023, for example, members of the Kentucky and Michigan National

Guards made history during Exercise Agile Chariot, a large-scale training event focused on improving Total Force Agile Combat Employment (ACE) capacity. Combat controllers from Kentucky parachuted from an MC-130J and secured a highway landing zone for incoming aircraft on a Wyoming asphalt roadway. Following this, Active component Airmen from Hurlburt Field established a forward area refueling point to quickly refuel a pair of Michigan National Guard A-10 Warthogs and an MQ-9 Reaper, operated by the Air Force Reserve, demonstrating joint force interoperability and ACE's effectiveness in a contested zone.[59] Exercises like these showcase the value of combat-ready Guard and Reserve forces and highlight the Total Force integration necessary to successfully implement key elements of the JWC.

Indispensable Partnerships. According to Lieutenant General Sasseville, exercises like Agile Chariot are particularly crucial for the NGB, as they allow Guardsmen to ensure their current capabilities continue to align with the Services. Large-scale global exercises expand knowledge of the JWC across the NGB. Guardsmen have already begun working on internal NGB and cross-Service lines of effort to rehearse and test the JWC's pulsed operations, successfully using the Air Force's ACE and the Army's MDO concepts as vectors.

The 2022 NDS states that "[m]utually beneficial [a]lliances and partnerships are our greatest global strategic advantage."[60] Beyond the joint force, the National Guard ensures interoperability and alignment with America's vast network of allies and partners through its unique State Partnership Program. This program, which has established partnerships with over 50 percent of the world's nations, affords the NGB a uniquely vast network of allies and partners with which to practice and train. In 2023 alone, Lieutenant General Sasseville notes, the NGB "participated in more than 1,500 engagements with 100 partner nations in every . . . combatant commander's [area of operations]."[61] In June 2023, more than 2,500 National Guard Airmen and 100 aircraft from 35 states participated in the German-led Air Defender 2023 exercise. This exercise brought together more than 20 allied nations to test interoperability and strengthen security cooperation. In July 2023, the Washington National Guard and the Canadian Air Force were able to execute ACE tactics of small, maneuverable basing to "complicate adversary targeting of logistical footprints," according to Lieutenant General Sasseville.[62] As the JWC becomes more widespread across the force, NGB leadership hopes to use exercises like AirDefender to train U.S. allies and partners on the tenets as well, maintaining and strengthening critical U.S. relationships.

Conclusion

Each Service's force design and development efforts nests within the JWC. By providing the fundamental scales of joint warfighting at a time characterized by rapid changes in the character of war, the JWC provides the alignment and flexibility needed for each Service to develop, integrate, and synchronize joint capabilities. Within Service concepts, the JWC tenets remain consistent, demonstrating the operational need to remain connected and aligned throughout modernization processes. Most prominent are the tenets of *expanded maneuver* and *pulsed operations*, which in tandem create expanded, dispersed presence in theater and across domains, leveraging Service strengths to create episodic superiority throughout a conflict.

Service acquisition has shifted to focus on multiuse capabilities that span domains and adapt to a rapidly shifting battlespace, maintaining an *integrated, combined joint force*. In 21st-century warfare, agility is crucial for success. Physical agility—small, light, maneuverable units—is central to ACE, EABO, and DMO, and all Service concepts acknowledge the need for mental and cross-domain agility. The Services have focused future operations on understanding how Service-specific capabilities support the entire joint force and enable all-domain, synchronized operations to further cross-force integration. Agility is key to ensuring synchronized effects. Servicemembers must be able to operate in a variety of situations and environments and communicate across systems and domains to ensure all operate as one joint force.

The 2022 NDS states that the "current system is too slow and too focused on acquiring systems not designed to address the most critical challenges."[63] As such, speed and enhanced risk tolerance are critical to a superior joint force, enabling *information advantage* and *resilient logistics*. Primary characteristics of the modern and future operating environments are accelerated decisionmaking and rapid operations. The organizational and technological efforts currently being explored by the joint force enable fast decisionmaking at the lowest possible level to provide necessary advantages in future warfighting. The combination of speed and risk tolerance is crucial to ensure the timely delivery of needed materiel, disseminate critical information to warfighters, and make decisions on the battlefield. Risk tolerance may rise or fall in different circumstances. Creating shared understanding of fluid acceptable levels of risk enables faster operations, allowing the joint force to gain and maintain advantage at critical junctures.

Technology development and its integration into the joint force must keep pace with peer and near-peer actors. While the human element remains the core of U.S. warfighting, integrating advanced technology to assist and support warfighters allows the United States to maintain its current advantages. Today's operational environment requires greater integration and the infusion of emerging technology to enable integrated C2, global fires, sensing, sense-making, and decisionmaking. As seen in individual operating concepts, the Services prioritize joint applicability and cross-domain effects in capability development and fielding, ensuring that new capabilities further enable cross-Service integration and cooperation.

Finally, enabling and maintaining joint mindedness across the force is vital to fulfilling the JWC tenets and implementing the NDS's integrated deterrence. Ensuring that exercises,

training, and education address the jointness of Service concepts further inculcates a joint mindset in individual warfighters. To successfully implement joint and Service concepts, the Services must understand each of their individual contributions to the symphony of capabilities that 21st-century warfighting requires. The scales of the JWC are what allow the future joint force to use these capabilities as a cohesive whole. In other words, the JWC keeps the joint force on the same sheet of music, and as General Smith observes, "every Service needs to understand their part to play."[64] **JFQ**

Notes

[1] Dwight D. Eisenhower, "Quotes," President Dwight D. Eisenhower Presidential Library, Museum, and Boyhood Home, https://www.eisenhowerlibrary.gov/eisenhowers/quotes#War.

[2] *2022 National Defense Strategy of the United States of America* (NDS) (Washington, DC: Department of Defense, 2022), 12, https://media.defense.gov/2022/Oct/27/2003103845/-1/-1/1/2022-national-defense-strategy-npr-mdr.pdf.

[3] Ibid., 1.

[4] Mark A. Milley, "Strategic Inflection Point: The Most Historically Significant and Fundamental Change in the Character of War Is Happening Now—While the Future Is Clouded in Mist and Uncertainty," *Joint Force Quarterly* 110 (3rd Quarter 2023), 9, https://ndupress.ndu.edu/JFQ/Joint-Force-Quarterly-110/Article/Article/3447159/strategic-inflection-point-the-most-historically-significant-and-fundamental-ch/.

[5] Ibid., 9.

[6] Chairman of the Joint Chiefs of Staff Instruction 3030.01A, *Implementing Joint Force Development and Design* (Washington, DC: The Joint Staff, October 3, 2022), A-6.

[7] Milley, "Strategic Inflection Point," 12.

[8] "What Is Jazz," National Museum of American History, Behring Center, n.d., https://americanhistory.si.edu/smithsonian-jazz/education/what-jazz.

[9] Ibid.

[10] Ibid.

[11] NDS, 12.

[12] Milley, "Strategic Inflection Point," 12.

[13] NDS, 8.

[14] Jen Judson, "U.S. Army on Track to Field 24 Systems in FY23 in Bid for a Modern Force," *Defense News*, October 9, 2022, https://www.defensenews.com/digital-show-dailies/ausa/2022/10/09/us-army-on-track-to-field-24-systems-in-fy23-in-bid-for-a-modern-force/.

[15] Mikayla Easley, "Army Green Lights IBCS for Initial Operational Capability," *Defense Scoop*, May 1, 2023, https://defensescoop.com/2023/05/01/army-ibcs-initial-operational-capability/.

[16] General Randy George, USA, interview with authors, August 2, 2023.

[17] Field Manual (FM) 3-0, *Operations* (Washington, DC: Headquarters Department of the Army, 2022), foreword.

[18] Ibid., 1-2.

[19] George, interview.

[20] George, interview.

[21] Irene Loewenson, "Top Marine Pushes Back on Critics' 'Lack of Trust' in Corps' Overhaul," *Marine Corps Times*, June 22, 2023, https://www.marinecorpstimes.com/news/your-marine-corps/2023/06/22/top-marine-pushes-back-on-critics-lack-of-trust-in-corps-overhaul/.

[22] *Force Design 2030* (Washington, DC: Headquarters Department of the Navy, March 2020).

[23] *Force Design 2030: Annual Update* (Washington, DC: Headquarters Department of the Navy, June 2023), 2.

[24] General Eric Smith, USMC, interview with authors, August 8, 2023.

[25] *Force Design 2030: Annual Update*, 5.

[26] Ibid., 6.

[27] "Marine Corps Publishes New Document Titled 'A Concept for Stand-in Forces,'" *Marines.mil*, December 1, 2021, https://www.marines.mil/News/Press-Releases/Press-Release-Display/Article/2858309/marine-corps-publishes-new-document-titled-a-concept-for-stand-in-forces/.

[28] Smith, interview.

[29] Ibid.

[30] NDS, 13.

[31] Smith, interview.

[32] Megan Eckstein, "Marines Begin Experimentation to Refine Manual for Expeditionary Advanced Base Operations," *USNI News*, April 16, 2021, https://news.usni.org/2021/04/15/marines-begin-experimentation-to-refine-manual-for-expeditionary-advanced-base-operations.

[33] Smith, interview.

[34] *Force Design: Annual Update*, 16.

[35] *Chief of Naval Operations Navigation Plan 2022* (Washington, DC: Headquarters Department of the Navy, 2022), https://media.defense.gov/2022/Jul/26/2003042389/-1/-1/1/NAVIGATION%20PLAN%202022_SIGNED.PDF.

[36] Admiral Lisa Franchetti, USN, statement provided on the record, August 5, 2023.

[37] Ibid.

[38] Ibid.

[39] *Chief of Naval Operations Navigation Plan 2022*, 11.

[40] Franchetti, statement.

[41] "Air Force Future Operating Concept (AFFOC) Executive Summary," *AF.mil*, March 6, 2023, https://www.af.mil/Portals/1/documents/2023SAF/Air_Force_Future_Operating_Concept_EXSUM_FINAL.pdf.

[42] General David Allvin, USAF, interview with authors, July 28, 2023.

[43] Ibid.

[44] Kristen Pittman, "403rd Wing Develops Multi-Capable Airmen During 'Super UTA,'" *AF.mil*, February 9, 2022, https://www.af.mil/News/Article-Display/Article/2929489/403rd-wing-develops-multi-capable-airmen-during-super-uta/.

[45] AFFOC.

[46] Ibid.

[47] Allvin, interview.

[48] Greg Hadley, "Saltzman's Priorities for Space Force: Three New Lines of Effort," *Air & Space Forces*, January 20, 2023, https://www.airandspaceforces.com/saltzmans-priorities-for-space-force-three-new-lines-of-effort/.

[49] General David Thompson, USSF, interview with authors, July 31, 2023.

[50] *Space Force Capstone Publication: Spacepower Doctrine for Space Forces* (Washington, DC: Headquarters U.S. Space Force, June 2020), https://www.spoc.spaceforce.mil/Portals/4/Documents/USSF%20Publications/Space%20Capstone%20Publication_10%20Aug%202020.pdf?ver=q2cbzItvov2XnEQbtlztOg%3d%3d.

[51] NDS, 8.

[52] Thompson, interview.

[53] Ibid.

[54] Lieutenant General Marc Sasseville, interview by authors, July 21, 2023.

[55] Ibid.

[56] Ibid.

[57] Ibid.

[58] Ibid.

[59] Cody Ramirez, "AFSOC, Total Force Lands MC-130J, MQ-9, A-10s, MH-6s on Wyoming Highways," Air National Guard, May 10, 2023, https://www.ang.af.mil/Media/Article-Display/Article/3390576/afsoc-total-force-lands-mc-130j-mq-9-a-10s-mh-6s-on-wyoming-highways/.

[60] NDS, 2.

[61] Sasseville, interview.

[62] Ibid.

[63] NDS, 19.

[64] Smith, interview.

11th Armored Cavalry Regiment and Threat Systems Management Office operate swarm of 40 drones to test rotational units' capabilities during Battle of Razish, National Training Center, May 8, 2019 (U.S. Army/James Newsome)

Sharpening Our Competitive Edge

Honing Our Warfighting Capabilities Through the Joint Warfighting Concept

By Admiral Christopher W. Grady

The Joint Warfighting Concept (JWC) challenges the joint force to rethink competition, deterrence, and conflict. This necessitates a shift in how we utilize our current capabilities and a leap toward new ones. To truly sharpen our competitive edge, we must outpace our adversaries in adaptability and innovation. While the Pentagon has made strides in recent years, there is more to be done. The Joint Requirements Oversight Council (JROC) is pivotal in this transformation. It brings all the Services together to assess the capabilities required by the JWC, identifies gaps, and strategizes to bridge them. However, the JROC is just one facet. Achieving integration across domains and regions demands cohesive processes. We must harness our Department's capacity to experiment, innovate, set priorities, allocate resources strategically, and expedite capability acquisition. Furthermore, with many key stakeholders outside the joint force, it is crucial to synchronize our strategies with experts, industry, and international allies and partners.

Admiral Christopher W. Grady, USN, is Vice Chairman of the Joint Chiefs of Staff.

The role of the Vice Chairman of the Joint Chiefs of Staff is a unique and multifaceted one, standing at the crossroads of various critical lines of effort within the Department of Defense (DOD). It is a position that intertwines military advice to strategy and policy, budgeting, acquisition, and requirements, affording unique insights into the opportunities and challenges for our Services, combatant commands, and DOD.

As the Vice Chairman, I participate in our senior joint decisionmaking bodies, such as the Joint Requirements Oversight Council (JROC), the Deputies Management Group (DMAG), the Joint Chiefs of Staff Tank, as well as many other issue-focused oversight and coordination groups. In these forums, leaders universally and fully recognize the task before us: We must deliver agile, reliable, and combat-credible capabilities at speed and scale to the joint force so that warfighters can deter aggression and win if called to fight. We know from experience that our decisions are most effective when they are threat-informed, risk-based, and data-enabled.

As former Chairman of the Joint Chiefs of Staff General Mark Milley aptly described in *Joint Force Quarterly* 110, challenges to our rules-based international order—and unprecedented changes in the character of warfare—are catalysts for the joint force to adopt a unifying joint operational vision that deliberately drives future force development and design.[1] This unifying vision is the Joint Warfighting Concept. It serves as our "roadmap to the future," challenging the joint force to make a fundamental shift in the way we think about competition, deterrence, and conflict.[2]

The Secretary of Defense designated the JWC as a key to drive experimentation and accelerate Joint Force Development and Design (JFDD) with DOD-wide urgency and teamwork. He highlighted the importance of this work, noting that "with significant challenge comes opportunity for bold change."[3] This bold change, at speed, is essential for the United States, and its allies and partners, to design and develop forces that will prevail in future conflicts.

The JROC is one key tool to operationalize this shift. The JROC convenes all the Services around one table to consider the joint capabilities we need to execute the JWC, identify gaps, and then make recommendations about how we can fill those gaps to secure warfighter advantage. The JROC, though, is only one tool at military leaders' disposal. To achieve integration across domains and geographies, we need these all to work together. We need integrated processes that move the full might of DOD to experiment with new ideas, set requirements based on what we learn, make strategy-informed resourcing decisions, and then move quickly to acquire the capabilities the joint force needs. This process—from experimentation with new ideas, to requirements, to resourcing, to acquisition—requires the best insights of experts, allies and partners, and industry to achieve our JFDD objectives. This article explores several of these tools essential for instilling the tenets of the JWC in our future warfighting capabilities.[4]

The Joint Warfighting Concept

DOD looks to three seminal documents that define our strategic direction. The National Security Strategy, National Defense Strategy, and National Military Strategy outline the *what* that the Nation expects the military instrument of power to achieve. They define our most consequential challenges and prioritize our activities to address emerging threats and maintain our national security.

It is the JWC that provides the *how*. The joint force must constantly update its thinking as new threats to American security emerge. The JWC represents our best thinking on how the United States and its allies can mitigate and defeat military threats from peer adversaries. It informs DOD-wide operations, activities, and investments. It encapsulates the wide range of thought on future warfighting from across DOD. It includes the necessary level of specificity to guide DOD in investment and modernization, readiness, organizational changes, and training initiatives in critical joint areas.

The JWC reflects our deep focus and study of our adversaries and operating environment, which will require the joint force to conduct simultaneous and successive operations across all domains, in multiple dimensions, and across the electromagnetic spectrum.[5] The joint force's agility, adaptability, and combat credibility will be our advantages over any adversary. To achieve this, we leverage the creativity in the DNA of our nation and our force—the joint force's specialty is the ability to innovate, respond flexibly, and adapt to unexpected strategic and tactical changes.

The JWC also serves as an analytic engine operating within a multiyear JFDD timeline. Comprehensive reviews, expert analyses, and joint experimentation efforts provide a threat-informed framework and unifying vision to guide future force design, development, generation, and employment. It is our playbook for gaining positions of advantage against our adversaries and for securing our competitive edge.

The Secretary of Defense plays a vital role in JWC implementation, providing fundamental direction and priorities for the JWC through the National Defense Strategy and defense planning scenarios, directing implementation via global campaign plans and defense planning guidance, and directing periodic reviews of the JWC, as necessary.[6] The Secretary's endorsement and support for the JWC provide the force with a "North Star," and the JWC tenets are woven throughout the work of our major defense planning forums.

Our imperative is clear: We will have a modernized joint force, sufficiently sized and ready, that enables sustained deterrence and combat effectiveness via credible U.S. capabilities and interoperability with allies and partners. Implementing the JWC in the joint force is the best preparatory action to deter adversarial actors from military aggression and preserve peace. It informs the ways in which the joint force must approach organizing, training, and equipping for future competition and conflict.[7]

Operationalizing the JWC: Tools at Our Disposal

One of the senior joint decisionmaking bodies responsible by law for driving this shift in warfighter modernization is the Joint Requirements Oversight Council (JROC), which identifies requirements for the joint force using the JWC as a guide. As the Vice Chairman, I convene the JROC with the Service vice chiefs and civilian advisers to identify, prioritize, and address critical gaps in our joint operational employment concepts.[8] The JROC assesses military capabilities and makes recommendations to address our most pressing capability gaps through changes in doctrine, organizations, training, materiel solutions, leadership, policy, facilities, and personnel (DOTMLPF-P) as well as rapid acquisition processes.[9]

Since its establishment in 1986, the JROC has many improvements in its approach to warfighter requirements. Previous Vice Chairmen General Paul Selva and General John Hyten realized significant reforms, recommitting the council to the mission tasked to it by Congress in U.S. Code Title 10 Section 181. They created a management process designed to emphasize the joint force's "top-down" high-priority modernization needs while also attending to "bottom-up" combatant command operational requirements—fusing into a comprehensive recommendation from warfighters to policymakers on the most important capabilities to design and develop for current needs and future conflicts. They also knew that JROC success would be determined not by single-system stovepipes or by over-defining technical specifications that ought to be left to engineers, but by performing the joint force leadership task of investigating and prioritizing portfolios of capabilities.

Today, the JROC process reviews capability portfolios that advance the Concept Required Capabilities (CRCs) needed to execute the JWC. CRCs are a new hallmark of the JWC and are why the JWC is so critical to the work of JFDD and the JROC. By emphasizing concept-driven and threat-informed capability development through Capability Portfolio Management Reviews (CPMRs), the JROC encourages concerted action toward military modernization across stovepipes, domains, and geographies. JROC findings explicitly incorporate the views of the Services and Joint Staff as statutory members as well as those of the policymakers and combatant commands who advise every JROC meeting. While there is much work left to do to refine the JROC's process to ensure it is as effective as possible, JROC CPMRs based on the strategic environment, threat, technological maturity, risk, and capacity constitute a significant step forward.

Critics often view the JROC and the deliberate acquisitions system as overly bureaucratic and too slow—and some criticisms are valid. Still, it is important to acknowledge that this process was designed to allow for deliberate and robust assessments of capabilities to ensure codified decisions across the joint force. These thoughtful activities support a more informed assumption of risk by the joint force.

Indeed, the CPMR process looks at capability development from a holistic perspective to ensure the right level of risk is understood and carefully allocated across the DOD portfolio of capabilities. We will never have zero risk. But the joint force does have a responsibility to think deeply about the risks we are taking, to constantly improve our nation's defense, and to articulate to policymakers and the American people how we propose to manage the tension between current readiness and modernization, given finite resources.

To make threat-informed, risk-based, and data-enabled decisions on these difficult tradeoffs, the JROC relies on experts drawn from across the Services, combatant commands, and elsewhere in DOD organized into portfolio-focused Functional Capability Boards (FCBs). These teams draw from the JWC, expertise from real-world warfighting experience, experimentation results, modeling, wargaming, and more to analyze and recommend priorities for each portfolio, identifying opportunities where new capabilities can fill a warfighting gap, prioritizing which gaps most need to be filled to execute the JWC, and integrating what capabilities in each domain can be brought to bear within a portfolio.

For example, a key challenge for the joint force is how to provide logistical support in a contested environment, supporting frontline units in a high-end fight. Over the last 2 years the Logistics FCB conducted CPMRs on multicapable distribution platforms and rapid deployment and distribution. These CPMRs tackle the challenge of disaggregated and expansive logistics environments, a central capability described in the JWC. These contested-logistics CPMRs characterized existing commercial and military capabilities to balance DOD-wide sustainment costs, graded progress for critical procurement programs, and highlighted feasible air and maritime logistics technologies central to long-term JWC implementation.[10] I have drawn from these findings heavily as I have made budget recommendations in the Deputy's Management Action Group (DMAG).

Similarly, the Force Application FCB conducted recent CPMRs on capabilities of surface fire and tactical air. These reviews investigated the capabilities that would be required to execute the JWC CRCs for global fires, which envisions the synchronization of global effects across domains and geographic regions. CPMR recommendations directly led to a comprehensive munitions study that will drive research, programmatic, and investment decisions optimizing regional munitions mixes for the next decade.[11] Again, this analysis informs my recommendations in the DMAG.

In collaboration with the JROC's FCBs, the JWC development team within the Joint Staff Joint Force Development Directorate (Joint Staff J7) routinely draws from its own analysis and the latest thinking from across the defense enterprise to refresh and update CRCs against the dynamic threat environment. The team's recommendations consider various factors, such as the different phases of the JWC's expanded maneuver concept, National Military Strategy key operational problems, and National Defense Strategy endstates.[12] The outcomes of these

Army Soldier with New Jersey National Guard's D Company, 1-114th Infantry Regiment (Air Assault), operates M240B on Virtual Convoy Operations Trainer at Observer Coach/Trainer Operations Group Regional Battle Simulation Training Center on Joint Base McGuire-Dix-Lakehurst, New Jersey, February 9, 2020 (U.S. Air National Guard/Matt Hecht

efforts are captured in JROC strategic directives and other JROC memoranda, documenting the council's recommendations of the best pathways to achieve JWC implementation.

JROC recommendations also inform Integrated Acquisition Portfolio Reviews (IAPRs), a new mechanism managed by the Office of the Under Secretary of Defense for Acquisitions and Sustainment to draw from the data-informed work of the JROC as well as the deep expertise and analysis of DOD acquisitions professionals and to design acquisitions strategy that identify critical gaps, interdependencies, and opportunities for improvement within each portfolio. Structured, early alignment, more in parallel than sequential, is key. We have only begun to align the requirements process and acquisitions reviews, but there is great promise for greater speed and improved decisionmaking in this synergy.

The CPMRs and IAPRs form two of the three pillars that uphold the JFDD framework. The third—and equally vital—pillar is innovation. Recognizing innovation's paramount importance, the Deputy Secretary of Defense recently established the Deputy's Innovation Steering Group. This group is designed to harness diverse DOD innovation pathways, aiming to swiftly address key operational challenges. By complementing traditional capability development and acquisition pathways, the group leverages commercial technologies and other non-traditional scaling approaches. Together, these three pillars of JFDD feed senior governance forums, providing much of the data and analysis that DOD uses to make hard choices. These efforts are designed around National Defense Strategy priorities and are deeply rooted in the tenets of the JWC, setting the stage for our innovation progress.

Accelerating Progress: Innovation Initiatives

Expanding our advantage and accelerating progress in the complex landscape of modern warfare is not only a matter of strategy and tactics. It is also about collaboration, innovation, and the critical role of allies, partners, and industry in deliberate experimentation and future force design, from inception to implementation.

Military officials conduct wargaming exercise at U.S. Naval War College in Newport, Rhode Island, in 1952 (left), and Vice Chief of Naval Operations Admiral Lisa Franchetti poses for photo with senior officers and civilians at CNO Futures Wargame in Newport, August 30, 2023 (Courtesy Naval War College)

Over the last 2 years, I have worked with my counterparts from many of our allied and partnered militaries. They face the same challenges we do and see many of the same opportunities ahead.

The joint force benefits from and relies on allies and partners to accomplish our mission. There are three axes of integration for today's joint force—across domains, globally across geographies, and with allies and partners. So progress toward modernization within the U.S. joint force will be hollow if it is not aligned with the modernization priorities and pathways of our allies and partners. In this interconnected landscape, sharpening our competitive edge means not just advancing our own capabilities but also ensuring that they mesh seamlessly with those of our partners.

Recognizing this, I have sought out ways to incorporate our closest partners in a process to evolve requirements together. We have recently made progress in establishing the International JROC (I-JROC) initiative, a collaborative forum among the vice chiefs of defense of the United States, the United Kingdom, and Australia. I-JROC serves as a venue to identify and validate joint and combined warfighter proposals.[13] Interoperability and interchangeability are easier to achieve when pursued from the beginning, and the agreements reached this year in the I-JROC are a testament to this collaborative spirit. They include both materiel and nonmateriel efforts, such as the reduction of barriers to information-sharing when able and the early identification of roadblocks to achieve shared goals and objectives across domains.[14] Once the I-JROC truly works among the founding three parties, I would like to add more allies and partnerships to the conversation to address our future challenges and opportunities—together.

We also need to streamline our internal processes. Closer to home, we need "more bridges and express lanes" that bypass the usual bureaucratic roadblocks of the "Valley of Death" (the period during which a vendor transitions a prototype or commercially available product to a DOD contract). We know that agility and efficiency generate the best, fastest results for the warfighter.[15] This vision is about ensuring that our advancements in defense technology do not get bogged down in red tape and risk aversion but instead move swiftly from research and development to production, reaching our warfighters when it matters most. It is about fostering an innovation mindset across DOD, from policymaking to prototyping, ensuring that our innovations have a clear and rapid path to implementation and that good ideas can scale quickly across the expansive defense enterprise.

To further this vision, Deputy Secretary of Defense Kathleen Hicks recently announced a new initiative, Replicator, that aims to speed innovation. Its first effort is to field attritable systems at a scale of multiple thousands, in multiple domains, within the next 18 to 24 months.[16] This initiative will be steered by the Deputy's Innovation Steering Group to unify major DOD innovation initiatives and reflect our commitment to bridging the gap between military needs and industry capabilities. By fostering collaborative endeavors, we ensure that our warfighting strategies are not only informed by the latest technological advancements but are also adaptable and forward looking in an ever-evolving global landscape.

We also must look to maximize academic, materiel, and innovative contributions from outside DOD and across all domains. Rapid innovation from industry is a boon for defense applications, and regular partnership gives us an opportunity for early collaboration and deliberate joint applicability from the design phase. To be a good partner, we owe it to industry to establish clear asks. Communicating capability and inventory requirements, in terms that connect with industry, capitalize on public-private ventures, and embrace academia and nontraditional industry partners. Leveraging the great creativity of American business and American thinkers is our best path to find unanticipated wins but required us to overcome acquisition hurdles to bridge the bureaucratic malfunction of the Valley of Death. It is a great strength of the United States that our private industry is constantly in search of new technologies, and we will need to adapt to fully incorporate this energy to bring the technology of tomorrow into the joint force.

As the Capability Portfolio Management Reviews examine "as-is" and "to-be" capabilities, the JROC is also tightly aligned with partner entities such as Office of the Undersecretary of Defense for Research and Engineering (OUSD R&E) and its work within the experimentation space. Rapid Defense Experimentation Reserve (RDER) projects are executed on an annual basis with candidate experiments assessed for highest promise in closing warfighter gaps. RDER can identify the minimum viable prototyping necessary to bring a novel capability into acquisition channels and, if acceptable, quickly scale production to meet warfighter needs.

Furthermore, the Warfighting Lab Incentive Fund (WLIF) drives rapid, deliberate field experimentation with mature capabilities to develop and deliver innovative warfighter-tested joint concepts of operation within a year of project execution. The program enables diverse teams, including labs, industry, and Service transition experts to "fail fast" as they conduct iterative assessments of potential solutions "in the dirt" and within joint exercises. WLIF project teams, many advanced by the combatant commands and warfighters in the field, integrate emerging technologies with off-the-shelf capabilities—both commercial and government—to address near-term warfighting problems.

Constant Improvement: Wargaming and Experimentation

Joint experimentation, which incorporates wargaming, modeling, and simulation, is vital to the validation of concepts introduced in the JWC. It provides opportunities for practitioners and warfighters to explore concepts and technologies, test abstract ideas and synergies, and rapidly increase the organization's collective understanding. According to the Defense Science Board, experimentation fuels the discovery and creation of knowledge and leads to the development and improvement of products, processes, systems, and organizations.[17]

Every component of the joint force plays a vital role in this experimentation process, providing critical ideas and resources for refining and testing the key principles articulated in the JWC. Service-led force design, and each's unique concept implementation, complements the broader vision of the JWC. Combatant commands, too, are essential players in this process, bringing their real-world expertise to otherwise novel or hypothetical scenarios. Stakeholders at the DOD level include the Chief Digital and Artificial Intelligence Office, the Defense Innovation Unit, Service innovation entities, and command innovation groups such as the U.S. Indo-Pacific Command's Joint Mission Accelerator Directorate.[18]

For example, DOD-wide experimentation events such as the Global Information Dominance Exercise (GIDE) serve as forums for baselining existing command and control (C2) workflows, experimentation, and rapid prototyping, all critical to JWC tenets such as Information Advantage and Integrated Command, Agile Control. These experiments allow the joint force and DOD to "measure C2" by capturing the amount and speed of available data that inform senior-leader decisions, evaluating effectiveness, and highlighting areas for improvements. These experiments also provide venues to challenge current warfighting C2 paradigms, allowing the joint force to experiment with novel C2 structures that allow for more aligned operations across domains and geographies.

The Globally Integrated Wargame (GIWG) series is a staple event that showcases the Services and "Five Eyes" allies and partners as an integrated, combined joint force employing multidomain operations in accordance with the tenets of the JWC.[19] (Five Eyes is an intelligence alliance consisting of Australia, Canada, New Zealand, the United Kingdom, and the United States.) The GIWG routinely validates the necessity for mission command, where leaders at all levels are prepared to exercise judgment, assess risk, and take decisive action.[20] Through this and other similarly scoped wargaming series, we can press the joint force to break out of its domain-centric comfort zones at any level of warfare and integrate to move fluidly across domains.[21]

Also, combatant command and Service-level exercises, such as the U.S. Indo-Pacific Command's Talisman Sabre and the U.S. Navy's Large Scale Exercise, provide additional arenas to test JWC tenets. Executing multidomain operations and enhancing interoperability between U.S. and partner forces is critical for missions today and in the future. They provide an opportunity to field and challenge Service-specific visions for their incorporation into joint design and to better understand the relative strengths of our pulsed operations in contested environments and against adaptive opposition forces.

The Joint Staff Force Structure, Resources, and Assessment Directorate (Joint Staff J8) is critical to effective global wargaming. While it does not have specific oversight over the conduct of wargames across DOD, the J8 administers the Wargaming Incentive Fund and manages the Wargaming Repository to foster novel wargaming and collect observations. The Studies, Analysis, and Gaming Division of the J8 also executes the Vice Chairman's Wargaming series, in which JROC participants and capability portfolio owners look at an upcoming JROC topic through an operational lens. When coupled with complementary experiments and independent analyses, this series and other wargaming opportunities improve the depth and credibility of analysis, enable senior leaders' decision-making, and provide evidentiary basis for investment decisions.[22]

The Joint Staff J7 is responsible for hosting the annual Joint Experimentation Forum, where deliberate outputs from Joint Experimentation Program events as well as DOD-wide convenings and combatant command and Service-specific wargames are gathered for combined review. Prioritization is set for future experimentation events, and observations are gathered for collective benefit. The outputs of this forum go on to feed Operations Deputies (OPSDEPS)

United Launch Alliance Delta IV-Heavy rocket lifts off from Space Launch Complex 37B at Cape Canaveral Air Force Station, Florida, June 11, 2016, carrying classified national security payload for U.S. National Reconnaissance Office (Courtesy United Launch Alliance)

Aircraft carrier USS *John C. Stennis*, front left, French Marine Nationale aircraft carrier FS *Charles de Gaulle*, front right, guided-missile destroyer USS *McFaul*, guided-missile cruiser USS *Mobile Bay*, Royal Danish navy frigate HDMS *Niels Juel*, and French air defense destroyer FS *Forbin* transit in formation in Red Sea, April 15, 2019 (U.S. Navy/Skyler Okerman)

meetings that make recommendations for DOD operational decisions, Chairman of the Joint Chiefs of Staff Tanks, and JROC and DMAG convenings, ensuring that recommendations and risk determinations made by senior decisionmakers are fully informed by the outcomes of our wargaming and experimentation cycles.

I am eager to see the joint force take the opportunities of these exercise and experimentation series to really challenge our current warfighting paradigms. This is the road to rapid improvement. We can use the outcomes of these convenings to break the mold and to propel novel C2 concepts out of the notional and into the light of day. True experimentation must embrace risks and drive thinking to inform our rapid and virtuous cycle of concept and capabilities development. From our liaison officers embedded within the Joint Staff J7 and J8, to the promise of the international iteration of the JROC for Joint Force Development and Design and joint experimentation, we are realizing our National Defense Strategy imperative at pace. All this effort is strengthened by our allies, partners, and industry teammates who are an exponential advantage in the competition phase and beyond.

Experimentation is the crucible where ideas are tested and refined. It provides immediate feedback for concept improvement, rapid acquisition opportunities, and additional venues to collaborate rapidly with industry and allies and partners. This collective process allows participants to bring complementary technology and novel concepts that align with or challenge the core ideas of the JWC. Our objective is clear: to provide a combined joint force commander with the ability to work seamlessly across all domains and geographies with precision, integration, and lethality.

Conclusion

Organizing to secure our advantage is not just a strategic goal; it is an imperative that assures our nation's future defense. No warfighting domain remains uncontested. The complexity of warfighting is growing with technology, so no single Service capability can win alone without truly realized joint force capabilities. We owe it to the American people and to our Servicemembers to get this right.

Ensuring we have an authoritative, integrated way to drive JFDD is a challenge. The most difficult issues we face for the future revolve around emerging joint problems. We have the National Military Strategy that describes a powerful and highly capable future joint force, and we have the JWC to guide us through these tough problems. We have myriad tools within DOD to evaluate our gaps, prioritize what must be done to deliver necessary integrated capabilities, and drive integrated innovation to achieve our objectives. Each step we take is a stride toward honing our competitive edge.

However, an overhanging question persists: Who is the authoritative senior advocate for the joint warfighter? Who will hold all our constituent parts—Joint Staff, Services, combatant commands—accountable for working together to deliver a truly modernized joint force? Who is responsible for driving integrated JFDD?

The Chairman certainly has a role to play in this, with the responsibility in Title 10 Section 153 to ensure "global integration."[23] Meanwhile, the JROC is a convening authority and can accomplish a great deal with the Services by coordinating and catalyzing. I have found that the Vice Chairman's role at the intersection of strategy and military advice to policy, budgeting, acquisition, and requirements is one of the points of integration as we seek to improve horizontal and vertical collaboration through DOD to achieve our desired endstates. But I believe we are coming up to the edge of what we can accomplish under the current design. We are operating 1980s software to solve 21st-century challenges.

Chairman Milley's recent article in *Joint Force Quarterly* acknowledges that despite the clear roadmap outlined by the JWC, the joint force must pivot faster to take on our future challenges. He proposes a future-focused organization that would prioritize joint experimentation, deeper integration with allies and partners, and designation of a sole senior advocate focused on this force development and force design function.[24]

Others have suggested other models. Be it empowering entities like the JROC with oversight responsibilities, designating different responsibities to existing roles within the Joint Staff, or inaugurating new entities altogether, the changing landscape of modern warfare necessitates an organization that drives adaptability grounded in the principles of the JWC. There is no easy or overnight solution. I personally favor a wider discussion on this critical question of how we align our strategy, organization, and authorities, as I believe there are many options to consider streamlining our progress toward the truly integrated joint force that we know is necessary to defeat a peer adversary.

In the meantime, progress is being made across the board. The recent publication of Joint Publication 1, Volume 1, *Joint Warfighting*, marks a distinctive paradigm shift. It emphasizes our proactive stance in a persistent competitive environment where military advantages are not set in stone.[25] We must think expansively, beyond conventional operational domains. It is crucial to understand that this is not a one-time endeavor; our required capabilities are ever-evolving, echoing the fluidity of modern warfare, and they must be informed by the JWC's tenets.

Our current security environment is changing rapidly, and we must too. Bolstering deterrence, amplifying our global network of allies and partners, driving down risk, and fast tracking the development of innovative capabilities and operational concepts are paramount. Ongoing strategic competition demands an integrated approach, fusing the capabilities of each Service, command, and partner into a joint and combined whole that is more than the sum of its parts.

We must harness our nation's combined strengths, showcasing our adaptability and resolving to safeguard our nation's future. The JWC sets an ambitious but achievable way forward for the joint force, and we are streamlining the process to implement it. In this endeavor, our commitment to sharpening our competitive edge remains unwavering. Still, there is more to do, until constant innovation and "rapid speed to the fleet" are no longer the province of special initiatives but just the way we do business. **JFQ**

Notes

[1] Mark A. Milley, "Strategic Inflection Point: The Most Historically Significant and Fundamental Change in the Character of War Is Happening Now—While the Future Is Clouded in Mist and Uncertainty," *Joint Force Quarterly* 110 (3rd Quarter 2023), 9.

[2] Ibid.

[3] Kathleen Hicks, "The Urgency to Innovate," *Defense.gov*, August 28, 2023, https://www.defense.gov/News/Speeches/Speech/Article/3507156/deputy-secretary-of-defense-kathleen-hicks-keynote-address-the-urgency-to-innov/.

[4] For more on the tenets of the Joint Warfighting Concept (JWC), see General Milley's "Strategic Inflection Point" as well as Thomas A. Walsh and Alexandra L. Huber, "A Symphony of Capabilities: How the Joint Warfighting Concept Guides Service Force Design and Development," in this issue.

[5] Milley, "Strategic Inflection Point," 12.

[6] Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3030.01A, *Implementing Joint Force Development and Design* (Washington, DC: The Joint Staff, October 3, 2022), A-1–A-2, E-1.

[7] Ibid., A-6.

[8] U.S. Code Title 10 § 181, "Joint Requirements Oversight Council," January 15, 2013, https://uscode.house.gov/view.xhtml?req=granuleid:USC-2012-title10-section181&num=0&edition=2012.

[9] CJCSI 3010.02E, *Guidance for Developing and Implementing Joint Concepts* (Washington, DC: The Joint Staff, August 17, 2016), A-3.

[10] Joint Capabilities Integration and Development System, *Manual for the Operation of the Joint Capabilities Integration and Development System* (Washington, DC: The Joint Staff, August 31, 2018), 262.

[11] Mark F. Cancian, "Rebuilding U.S. Inventories: Six Critical Systems," *Center for Strategic Studies and International Studies*, January 9, 2023, https://www.csis.org/analysis/rebuilding-us-inventories-six-critical-systems.

[12] Milley, "Strategic Inflection Point," 12.

[13] Department of Defense (DOD) Directive 5105.79, *DOD Senior Governance Framework* (Washington, DC: DOD, November 8, 2021), 6.

[14] CJCSI 5123.01I, *Charter of the Joint Requirements Oversight Council and Implementation of the Joint Capabilities Integration and Development System* (Washington, DC: The Joint Staff, October 30, 2021), D-2, D-4.

[15] Theresa Hitchens, "JROC Flexes New Muscles on Joint Requirements for FY23 Budget Request," *Breaking Defense*, March 29, 2022, https://breakingdefense.com/2022/03/jroc-flexes-new-muscles-on-joint-requirements-for-fy23-budget-request/.

[16] Brandi Vincent, "Hicks Shares New Details on DOD's Vision for Replicator Autonomous Systems, but Questions Linger," *Defense Scoop*, September 6, 2023, https://defensescoop.com/2023/09/06/hicks-shares-new-details-on-dods-vision-for-replicator-autonomous-systems-but-questions-linger/.

[17] *The Defense Science Board Report on Technology and Innovation Enablers for Superiority in 2030* (Washington, DC: DOD, October 2013), https://defenseinnovationmarketplace.dtic.mil/wp-content/uploads/2018/04/DSB_TechnologyInnovationEnablersSuperiority2030.pdf.

[18] Jaspreet Gill, "INDOPACOM Stands Up New Directorate to Better Connect Industry, DOD Innovation Efforts," *Breaking Defense*, August 28, 2023, https://breakingdefense.com/2023/08/indopacom-stands-up-new-directorate-to-better-connect-industry-dod-innovation-efforts/.

[19] CJCSI 3030.01A, *Implementing Joint Force Development and Design*, A-5.

[20] Air Force Doctrine Publication, Volume 1-1, *Mission Command* (Washington, DC: Headquarters Department of the Air Force, August 14, 2023), 3.

[21] John A. Tirpak, "Wargame Ends Better With 'Trans-Domain' Moves Plugged In, Hinote Says," *Air & Space Forces*, September 28, 2022, https://www.airandspaceforces.com/wargame-ends-better-with-trans-domain-moves-plugged-in-hinote-says/.

[22] CJCSI 3100.01E, *Joint Strategic Planning System* (Washington, DC: The Joint Staff, May 21, 2021), F-3.

[23] 10 U.S. Code § 153, "Chairman: Functions," Government Publishing Office, https://www.govinfo.gov/content/pkg/USCODE-2010-title10/html/USCODE-2010-title10-subtitleA-partI-chap5-sec153.htm.

[24] Milley, "Strategic Inflection Point," 12.

[25] Joint Publication 1, Vol. 1, *Joint Warfighting* (Washington, DC: The Joint Staff, August 27, 2023), IV-1.

Soldiers assigned to 2nd Battalion, 22nd Infantry Regiment, 1st Brigade Combat Team, 10th Mountain Division, execute joint training event with NATO Allies during Northern Forest 23, at Rovajärvi military range and training area, Finland, May 28, 2023 (U.S. Army/Kasimir Jackson)

Embracing Change
A Sense of Urgency

By Philippe Lavigne

At the dawn of an ever-evolving geopolitical era, the North Atlantic Treaty Organization (NATO), the world's most powerful political and military alliance, faces a new reality. This article examines the issues facing NATO and suggests ways to modernize and adapt the Alliance to meet current and future security challenges. There are many complementary parallels to the U.S. Joint Warfighting Concept (JWC) and its implementation across the spectrum of NATO warfare development. From the need to rethink defense strategy and capability development to expanding cooperation with new partners, this analysis highlights the steps needed to strengthen the Alliance's edge in a digital world. With a focus on innovation, agility, and multidomain capabilities, it aims to chart a solid path for NATO's transformation to ensure its relevance and resilience in the decades ahead.

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Navigating the New Reality

In the fast-evolving global security environment, NATO faces several complex situations that have reshaped the dynamics of international relations. The emergence of new global challenges has contributed to an uncertain and diverse security landscape.

Over the past 20 years, the rapid development of space, cyberspace, artificial intelligence, and autonomous weapon systems has opened new avenues for state and nonstate actors to project power and wage unconventional warfare. The threat of cyber attacks, disinformation campaigns, and the weaponization of emerging technologies has increased the importance of cybersecurity and raised concerns about the vulnerability of critical

Soldiers with U.S. Army's 2nd Cavalry Regiment participate in live-fire drill during exercise Griffin Shock, in Bemowo Piskie, Poland, May 24, 2023 (NATO)

infrastructure and the resilience of our societies. These dynamics have intensified competition for influence, resources, and strategic advantage, leading to heightened tensions and rivalries. Russia, terrorist groups, and wider challenges such as China or Iran could take multiple strategic paths over the next 20 years.

During these challenges, Russia's brutal aggression in Ukraine on February 24, 2022, was a wake-up call. With this sudden return of war on European soil, countries have realized that a comprehensive, proactive, and cooperative approach to global security is now essential.

Fortunately, NATO Allies are ahead of the game. At the Madrid Summit 4 months later, they agreed to a fundamental shift in our deterrence and defense, with new propositions of plans to dedicate specific forces to defend any or all Allies, higher readiness, more stocks, and more prepositioned equipment. The refocusing of our posture on collective defense begins at the operational level, with regional plans, and continues throughout the capability process: new force model, force structure requirements, command and control, and infrastructure—constantly updated in the light of lessons learned and, in particular, the Ukrainian ones.

Nearly 75 years after its founding, the Alliance is more relevant than ever. At Norfolk, the role of Supreme Allied Command Transformation is to ensure that NATO maintains its edge. And a big part of that is being best equipped to deal with what I call the new reality.

What's New in the New Reality? More, Faster, Everywhere

The basic nature of warfare and its principles—clash of wills, force, friction, the fog of war, and centers of gravity—have held true for centuries. As former Chairman of the Joint Chiefs of Staff General Mark A. Milley explains, the nature of war is unlikely to change, but its character continues to evolve and so must the Alliance's approach to warfare. The new reality is a highly dynamic strategic environment that we need to understand every moment and whose immediate trends we can deduce to confront them with our own strategic vision.

In warfare, I define this *new reality* as an unprecedented level of speed, intensity, and agility that is changing the character of conflict and threatening traditional notions of security. It is characterized by three words: more, faster, and everywhere.

More refers to the proliferation and abundance of advanced technologies that are reshaping the global security landscape as well as the exponential growth of data fueled by the digital revolution. More also refers to conventional military capabilities, as Russia's war in Ukraine challenges the ability of our production models to support high-intensity attrition and consumption. More refers to the confirmed return of hard power as a credible and viable option for an expansionist Russia. In response, the Allies must have strong military capabilities that provide effective deterrence and defense.

A credible, modernized nuclear deterrent remains the cornerstone of NATO's security strategy, not only to deter aggression but also to underpin the Alliance's unwavering resolve to preserve peace and stability and to defend its members and their shared values.

For us, confronting more hard power also means having more conventional capabilities while maintaining an intelligent balance between offense and defense.

It also means being able to play the full range of available options, combining them in a mix of hard and soft power and managing the dynamics of escalation.

Faster emphasizes the speed at which actions and reactions occur in this new reality. Hypersonic weapons, for example, pose significant challenges to existing defense systems, reducing response times and compressing decision windows. The emergence of quantum computing offers unprecedented processing power, potentially enabling adversaries to break encryption, compromise secure networks, and disrupt critical infrastructure.

Everywhere reflects the expanding reach and impact of these new technologies, and the boundless and simultaneous consequences of the induced threats, in the wake of the deliberations on "hybrid warfare" that had led up to the Wales Summit in 2014. The traditional domains of land, sea, and air are converging and expanding into space, a new arena for competition and even confrontation. Furthermore, conflict zones are no longer confined to physical battlefields; they are extending into the information and cyber domains, where state-sponsored hacking, ransomware attacks, and disinformation campaigns can have far-reaching consequences. The interconnectedness of global systems, including transportation, energy, and communications networks, increases the potential for cascading effects and disruptions on a global scale.

So what can NATO do to face the new reality? Certainly, the combination of more advanced technologies, faster capabilities, and ubiquitous reach requires innovative approaches to security. In addition, for our democracies—those of NATO and its partners—there is the added challenge of addressing the ethical implications of emerging technologies and developing robust common decisionmaking mechanisms that can keep pace with the ever-increasing agility of potential adversaries, who do not play by the same rules.

Ultimately, this complex set of needs and capabilities must be condensed into a tool for managing escalation and de-escalation dynamics in service of political leadership, so that NATO is able to manage the level of tension using all the levers at its disposal.

Multidomain Operations

In response to the evolving global security challenges characterized by the new reality of speed, intensity, and agility, NATO has recognized the need to adapt and maintain its edge by heading toward a multidomain operations (MDO)-enabled Alliance. This approach will enable NATO to effectively address multiple threats across the five operational domains of land, sea, air, space, and cyberspace, while synchronizing the military instrument of power (MIoP) with others. In short, Allied forces must become stronger and more agile, ready, mobile, and interoperable. Today's conflicts and threats transcend traditional boundaries and require a multidimensional response. The introduction of MDO will give NATO greater credibility in deterring and defending. By integrating capabilities, information, and decisionmaking across domains and environments, NATO can project a more comprehensive and robust posture to shape and contest. MDO will also enable NATO to synchronize its efforts and exploit synergies among activities, with more agile and effective decisionmaking that presents political leaders with response options capable of creating dilemmas for adversaries.

To complete this multidomain approach, it is important that NATO constantly learns from what is happening. In Ukraine, for example, we have been impressed by the resilience that the men and women, both civilian and military, are demonstrating daily. Likewise, NATO recognizes the importance of building resilience, to anticipate, absorb, resist, adapt, and recover from shocks and disruptions. First, the Alliance must enhance its collective resilience by strengthening the strength of its individual members. This includes protecting critical infrastructure, improving cyber security, and fostering societal cohesion and preparedness. Then, we need to consolidate the Alliance's resilience by deepening NATO's cooperation with members' and partners' organizations, industry, and academia. Tomorrow, NATO will have to strive for antifragility—that is, not only withstand adversity but also embrace change and thrive in an uncertain environment. We must turn challenges into opportunities. We must become an Alliance that uses these challenges and opportunities as catalysts for growth and adaptation.

NATO Warfighting Capstone Concept

Layered resilience is one of NATO's five Warfare Development Imperatives, along with cognitive superiority, influence and power projection, cross-domain command, and integrated multidomain defense. These imperatives serve as the strategic pillars that guide NATO's transformation efforts. They are set out in the NATO Warfighting Capstone Concept, a strategic document endorsed in 2021 by Allies at the highest level of political leadership.[1] *Layered resilience* describes the role that armed forces can play in each layer (military, civilian, and civil) of resilience. *Cognitive superiority* emphasizes the need for NATO to thoroughly understand the operating environment, including adversaries' intentions to target the human brain and "hack" our perceptions and to deny them to do so. *Influence and power projection* involves positively shaping the operating environment while creating dilemmas for adversaries. *Cross-domain command* enables Alliance commanders to integrate capabilities across domains quickly and effectively, ensuring efficient decisionmaking and synchronized operations. And *integrated multidomain defense* emphasizes the protection of NATO's integrity and freedom of action. By integrating defense capabilities and strategies across all domains, NATO aims to deter and defeat potential threats to its member nations, ensuring the Alliance's ability to maintain security and respond decisively.

Taken together, these five Warfare Development Imperatives provide a comprehensive framework for NATO to

U.S. Navy F/A-18 Super Hornets and Greek F-16 Fighting Falcons conduct air-to-air training over Ionian Sea during Neptune Strike 2022, February 3, 2022 (U.S. Navy, courtesy French Armed Forces/Malaury Buis)

enhance its capabilities, adapt to emerging challenges, and ensure the security and resilience of its member states in the context of the new reality.

Implementation of the NATO Warfighting Capstone Concept requires extensive collaboration with nations, including deep cooperation with the United States, where the JWC's central idea of expanded maneuver and some of its key tenets, such as integrated command, agile control, global fires, information advantage, and resilient logistics, complement NATO's warfare development agenda.

In this respect, Allied Command Transformation (ACT)'s location in the United States, close to the Pentagon, is a major asset. For the past month, ACT's teams have been working with those of the Vice Chairman of the Joint Chiefs of Staff and have found many areas of commonality in concepts; experimentation; wargaming; lessons learned; doctrine, training, and education; and capability development.

Fluid and Agile: A New Approach

The new approach to NATO's transformation promoted by ACT aims to create a more fluid, "water-like" military instrument of power. Just as water adapts to any container, NATO's MIoP must have the inherent fluidity and flexibility to adapt and respond effectively to different contexts, threats, and tensions. This adaptability should enable the Alliance to navigate the dynamic and ever-changing nature of international security. As water is incompressible because its molecules are close and strongly bonded, NATO's MIoP must draw on its unity and resilience to assert its presence and maintain its freedom of action. Just as water has formidable energy, from raging torrent to steam to sharp ice, the Alliance must project the protean strength and power necessary to ensure credible deterrence and defense. Finally, like the water that gives life, NATO's MIoP must foster growth, cooperation, and shared values. NATO must cultivate an environment that fosters cooperation, solidarity, and the common pursuit of progress. By nurturing these foundations, the Alliance can build resilience, cohesion, and trust among its members.

NATO will achieve its transformation by embracing digital transformation, which serves as a pathway to MDO. NATO's digital transformation will allow us to harness the power of technology, optimize the use of data, and foster collaboration among academia, the private sector, and member states and partners.

One of the critical challenges in this journey is the secure sharing of data. NATO is sitting on a formidable treasure trove—a vast amount of data produced by each of the Alliance's 31 nations, each of which manages it according to a proprietary logic that must be overcome if we are to make efficient use of it. NATO must establish robust protocols and frameworks to ensure the seamless, secure exchange of sensitive information. By implementing technologies that already exist in many nonmilitary domains—such as data-centric security and quantum resistant encryption—NATO can protect the integrity and confidentiality of data while enabling optimal collaboration and information-sharing at all levels.

Alongside the benefits, however, there are also challenges associated with the vast amount of data generated in the digital age. NATO must contribute to debate on privacy, ethics, and governance. Finding the right balance between the use of data and the protection of individual privacy rights is crucial for democracies. NATO will engage further in the development of robust policies and frameworks to ensure responsible data management, transparency, and accountability in accordance with legal and ethical standards.

In the rapidly evolving technological landscape, there is a widening gap between the pace of technology development by the private sector (and its adoption by governments) and by the Alliance. To bridge this gap, NATO needs to manage innovation, particularly open innovation. We need to harness the knowledge, expertise, and capabilities of external actors—such as academia, industry, think tanks, and research institutions—to drive innovation within the Alliance. It will allow us to tap into a wider pool of ideas, technologies, and solutions that may not be readily available within the traditional defense industry framework.

We must foster a culture that embraces and encourages innovation at all levels of NATO's organization. This means nurturing a mindset that promotes

openness, curiosity, and continuous learning. The Alliance should probably scale up what has been initiated by the ACT Innovation Hub 10 years ago—an environment that encourages risk-taking and experimentation through an incremental approach. DIANA, our Defense Innovation Accelerator for the North Atlantic, provides a great opportunity for this endeavor. With this resolutely modern and motivating mindset, NATO can attract and retain talent and create an ecosystem conducive to the generation of new ideas and solutions.

Likewise, ACT experiments and advocates the need for a new approach to capability and, especially, software development. It is a bold and incremental approach supported by experimentation, wargaming, modeling and simulation, and value analysis, which addresses risk aversion.

By adopting an incremental approach, NATO can iteratively develop and refine capabilities, allowing for continuous feedback, testing, and improvement. By conducting experiments and simulations, the Alliance can assess the feasibility and effectiveness of potential capabilities, reducing the risks and costs associated with full-scale implementation. Wargaming helps identify vulnerabilities, test strategies, refine operational concepts, and assess potential emerging and disruptive technologies for new opportunities. Wargaming is also a powerful way to improve NATO's decisionmaking processes.

The objective is to maintain a virtuous circle of strategic foresight, concepts and doctrine, capabilities, and talents. Strategic foresight allows anticipating emerging trends, risks, and opportunities in the global security environment. By analyzing geopolitical dynamics, technological advances, and societal changes, NATO can identify potential threats and develop proactive strategies to mitigate them. Strategic foresight provides a solid foundation for informed decisionmaking and the formulation of long-term goals and priorities.

Concepts and doctrine play a critical role in this virtuous circle by facilitating the exchange of best practices, aligning member states, and establishing common norms and standards for joint military action and beyond. This alignment ensures interoperability, enhances cooperation, and strengthens NATO's collective defense. Capabilities and talents are the practical manifestation of the virtuous circle. The Alliance must continually develop and maintain robust military capabilities, taking advantage of advances in technology and innovation. By encouraging investment in research and development, modernizing equipment and infrastructure, and improving training and education, NATO can ensure that its members have the tools and skills they need to stay ahead. By attracting and retaining skilled personnel and providing opportunities for career growth and advancement, NATO can capitalize on the talents of its human resources to better anticipate future challenges.

Despite a general increase in NATO defense budgets, and declarations by heads of state and governments indicating their determination to meet their budgetary commitments, the Alliance's resources are limited. It is therefore important to conduct a value analysis to prioritize investments based on their strategic relevance, operational impact, and cost-effectiveness. Fostering a culture that tolerates calculated risk is equally essential. NATO has been able to take advantage of the peace dividends to create a robust, attractive organization with the utmost respect for rules of all kinds. Technology must now be used to allow us to move faster while maintaining these high standards. This is not an option but an imperative if we are to keep pace with technological developments. For example, software and hardware development require different approaches because of their inherent characteristics. Software development, often characterized by rapid iteration and frequent updates, benefits from agile methodologies and flexible development processes. Hardware development, on the other hand, may require longer lead times and stricter quality control measures. We should adapt accordingly, tailoring the development process to the specific requirements of each domain.

Developing partnerships with relevant actors who share the values of the Alliance, such as the European Union (EU), is paramount to positively influence the operating environment. The EU's role as a normative power is important in shaping international norms, values, and standards. With its emphasis on multilateralism, human rights, and the rule of law, the EU contributes to the promotion of a rules-based international order. By deepening

Meeting of NATO–Ukraine Council at level of heads of state and government, including Sweden; left to right: Turkish President Recep Tayyip Erdogan; Ukrainian President Volodymyr Zelensky; United Kingdom Prime Minister Rishi Sunak; and U.S. President Joe Biden, at NATO Summit in Vilnius, Lithuania, July 12, 2023 (NATO)

cooperation and coordination, NATO and the EU can leverage their respective strengths and capabilities to achieve common goals. Twenty-two countries are members of both NATO and the EU (23 members once Sweden joins NATO). Building a strong NATO-EU partnership also means addressing areas of potential overlap or duplication, ensuring complementarity, and avoiding unnecessary competition. Clear delineation of roles, responsibilities, and areas of specialization is essential to promote effective cooperation and synergy.

Partnership with the private sector is certainly promising: just look at what the private sector is bringing to Ukraine in terms of civilian and military capabilities, from Amazon Web Services to Starlink. NATO needs to give itself the means to be connected to private-sector innovation and research and development, so it can always know what is out there and train with it. The same logic applies to academia. For industry, it is a win-win partnership because—as ACT has been doing for several years—we enable them to test new ideas and capabilities in a real-world operational environment for rapid development that meets military needs while creating business opportunities.

Transformation and Interoperability

ACT's area of expertise is interoperability. It is a much more complex concept than it appears. It starts with a common operational culture among Allies. A common operational culture ensures that NATO forces can work together seamlessly, regardless of their national backgrounds. It involves the development and adoption of common concepts and doctrines that guide military operations and processes. These common concepts provide a shared understanding of how Alliance forces should operate, enabling effective coordination and cooperation in joint missions and operations and fostering trust and predictability. Education and training are essential components in achieving interoperability. Allies invest in such programs to ensure that their personnel are familiar with NATO procedures, practices, and command structures. By providing standardized training and education, NATO enhances the ability of its forces to work together seamlessly. In addition to cultural aspects, interoperability encompasses technical compatibility. This means ensuring that Alliance forces can operate together at all levels, from common munitions standards to securely federated capabilities that enable any NATO warfighter or decisionmaker, at any level, from any nation, in any domain, to share and consume any data with and from anyone else in near real time.

Interoperability requires the development and integration of compatible and complementary assets. However, it goes beyond capabilities to include processes and organizational structures and can be described as the development of an operational ecosystem that enables the creation of convergent effects from different assets. Wargaming and experimentation play a crucial role in ensuring the effectiveness and efficiency of the operational ecosystem. Wargaming allows NATO to simulate and test different scenarios and operational concepts, providing insight into the strengths, weaknesses, and interdependencies of the operational ecosystem. Wargaming is also an important means of developing our ability to manage escalation dynamics. Through experimentation, NATO can identify innovative approaches, validate concepts, and refine capabilities, fostering continuous learning and improvement.

The operational ecosystem must bring flexibility for NATO to rapidly

integrate new technologies and exploit emerging operational concepts. By fostering this interoperable operational ecosystem, NATO enhances its ability to operate across multiple domains. To support this ecosystem, we need to refine some of our tools and find new ones—for example, by adapting our processes, including procurement. The Alliance needs to be agile and responsive in the acquisition and integration of new capabilities and technologies. This means streamlining procurement processes and adopting new acquisition models that facilitate the rapid and efficient development and fielding of capabilities. The NATO Defense Planning Process (NDPP) is the vehicle for transforming NATO and developing its toolkit. The NDPP is a comprehensive and iterative process that guides Allies in the development of defense plans and capabilities. It ensures that NATO's collective defense requirements are met through a coordinated and collaborative approach. The NDPP involves a series of steps and provides a framework for member states to align their defense efforts, share burdens and responsibilities, and enhance interoperability. Most important, NDPP is flexible enough to integrate new inputs and evolving situations, such as regional plans.

Embrace Change or Lose

Former Chief of Staff of the Air Force General Charles Q. Brown, Jr., makes frequent reference to the need to "accelerate change or lose." For NATO, it captures the imperative of transforming to remain effective and relevant in the face of the new reality and turning challenges into opportunities. At the Madrid Summit in June 2022, heads of state and governments agreed to "expedite our digital transformation." Since then, we have accelerated with the adoption of a *Digital Transformation Vision* in October 2022 and a *Digital Transformation Implementation Strategy* in July 2023.

While Ukraine is in many ways a war of the digital age, the war we are seeing in Ukraine is not the war NATO will face in the future. To move forward, we need to focus on accelerating interoperability, and we need to apply digital transformation to capability development to become agile. We also need to digitalize our people and our mindset, and we need to accept a little risk and learn to fail by developing our toolkit with innovation, experimentation, wargaming, modeling, and simulation.

These are critical tenets for NATO's ability to navigate an increasingly complex global security environment as we move toward multidomain operations. By proactively embracing change and adapting to new challenges, the Alliance can maintain its operational edge to ensure the collective security of its members and promote global peace and stability. **JFQ**

U.S. Air Force HH-60 Pavehawk drops Swedish air force rangers onto landing zone in simulated rescue mission during exercise Aurora 23, Sweden, May 6, 2023 (NATO)

Note

[1] The NATO Warfighting Capstone Concept approved by the Allies is a classified document. However, a nonclassified version was approved for public release in May 2023. See *NWCC: NATO Warfighting Capstone Concept* (Norfolk, VA: NATO Allied Command Transformation, May 2023), https://www.act.nato.int/wp-content/uploads/2023/06/NWCC-Glossy-18-MAY.pdf.

NDU Press and the NDU Foundation Congratulate the Winners of the 2023 Essay Competitions

NDU Press hosted the final round of judging on May 11–12, 2023, during which 29 faculty judges from 17 participating professional military education (PME) institutions selected the best entries in each category. There were 95 submissions in this year's three categories. First Place winners in each of the three categories appear in the following pages.

Secretary of Defense National Security Essay Competition

The 17th annual competition was intended to stimulate new approaches to coordinated civilian and military action from a broad spectrum of civilian and military students. Essays address U.S. Government structure, policies, capabilities, resources, and/or practices and to provide creative, feasible ideas on how best to orchestrate the core competencies of our national security institution.

1st Place
Lieutenant Colonel Karl Scheuerman, ANG
Eisenhower School
"Weaponizing Wheat: How Strategic Competition with Russia Could Threaten American Food Security"

2nd Place
Lieutenant Colonel Bryony Slaughter, USSF
National War College
"Patrolling the Celestial Narrows: How the United States and Japan Can Shape and Enforce Space Governance"

3rd Place
Lieutenant Colonel Jeffrey Wong, USMCR
Eisenhower School
"Alexa, Write My OPORD: Promise and Pitfalls of Machine Learning for Commanders in Combat"

Chairman of the Joint Chiefs of Staff Strategic Essay Competitions

These annual competitions, in their 42nd year in 2023, challenge students at the Nation's joint PME institutions to write research papers (5,000 words) or articles (1,500 words) about significant aspects of national security strategy to stimulate strategic thinking, promote well-written research, and contribute to a broader security debate among professionals.

Strategic Research Paper

1st Place (TIE)
Lieutenant Colonel Benjamin P. Donham, USA
U.S. Army War College
"It's Not Just About the Algorithm: Development of a Joint Medical Artificial Intelligence Capability"

1st Place (TIE)
Lieutenant Colonel Nathaniel A. Peace, USSF
Air War College
"Space Denial: A Deterrence Strategy"

2nd Place
Lieutenant Colonel Adam Dykstra, ANG
Air War College
"A World Without Truth: How AI and Social Media Are Shaping Disinformation"

3rd Place
Lieutenant Colonel Tony G. Lawrence, USAF
National War College
"Frozen Ambitions: Building U.S. Influence for Greater Arctic Security"

Strategy Article

1st Place
Colonel Robert A. Rodrigues, USA
U.S. Army War College
"Promoting Accountability in Military Sexual Assault Prosecutions"

2nd Place
Lieutenant Colonel Jason R. Wayne, USA
U.S. Army War College
"Urban Wars: The Convergence of Tactics and Strategy"

3rd Place
Major Chad Everett, USAF
Air Command and Staff College
"Quantum Technology"

Joint Force Quarterly Maerz Awards

In its 8th year, the *JFQ* Maerz Awards, chosen by NDU Press staff, recognize the most influential articles from the previous year's four issues. Six outstanding articles were chosen for the Maerz Awards, named in honor of Mr. George C. Maerz, former NDU Press managing editor.

FORUM
James Kwoun
"Design Thinking at the Enterprise Level: Integrating Defense All-Source Analysis"
JFQ 104 (1st Quarter 2022)

JPME TODAY
Zachary Zwald, Jeffrey Berejikian, Samantha Jane Daly, and Jeffrey Hannon
"Challenges to Creative Thinking: Identifying Officer Background Beliefs in Limited Information Environments"
JFQ 104 (1st Quarter 2022)

COMMENTARY
J. Bryan Mullins
"Insights on Theater Command and Control from the Creation of Allied Force Headquarters"
JFQ 106 (3rd Quarter 2022)

FEATURES
Scott C. Apling, Martin Jeffery Bryant, James A. Garrison, and Oyunchimeg Young
"Pivoting the Joint Force: National Security Implications of Illegal, Unregulated, and Unreported Fishing"
JFQ 107 (4th Quarter 2022)

RECALL
Nathan A. Jennings
"Improvised Partnerships: U.S. Joint Operations in the Mexican-American War"
JFQ 105 (2nd Quarter 2022)

JOINT DOCTRINE
Christopher Sims
"The Integrated 'Nonwar' in Vietnam"
JFQ 106 (3rd Quarter 2022)

Distinguished Judges

Twenty-nine senior faculty members from 17 participating PME institutions took time out of their busy schedules to serve as judges. Their personal dedication and professional excellence ensured a strong and credible competition.

Left to right: Dr. John J. Church, NDU Press; Ms. Joanna E. Seich, NDU Press; Dr. John G. Terino, Air Command and Staff College; Dr. David P. Hadley, College of International Security Affairs; Dr. James R. Van de Velde, Eisenhower School; Dr. Brandy Lyn Brown, Marine Corps War College; Dr. Jeffrey A. Turner, Joint Forces Staff College–Joint Advanced Warfighting School; Ms. Kathleen Gallaher, Marine Corps War College; Dr. Donald Stoker, Eisenhower School; Dr. Richard P. Samuels, Air War College; Dr. Mark A. Bucknam, National War College; Dr. Richard DiNardo, Marine Corps Staff College; Dr. Richard D. Killian, Command and General Staff College; Lieutenant Colonel Keith Caldwell, USA, College of Information and Cyberspace; Dr. William T. Eliason, NDU Press; Dr. Amy R. Baxter, Air University Global College of PME; Dr. Jim Chen, College of Information and Cyberspace; Dr. Anna Cairney, U.S. Army War College; Ms. Leigh Caraher, U.S. Army War College; Dr. Andrea Hamlen-Ridgely, Marine Corps War College–Expeditionary Warfare School; Dr. Kevin M. Generous, Joint Forces Staff College–Joint and Combined Warfare School; Dr. Paul J. Springer, Air Command and Staff College; Dr. Dylan Craig, National War College; Dr. Naunihal Singh, U.S. Naval War College; Dr. Charles Chadbourn, U.S. Naval War College; Ms. Caroline V. Schweiter, NDU Press.

Not shown: Dr. Nicholas M. Anthony, Jr., Joint Forces Staff College–Joint Combined Warfighting School; Dr. Donald W. Chisholm, U.S. Naval War College; Captain Alex J. Lega, USAF, Air University Global College of PME; Dr. Matthew Millard, Air University Global College of PME; Dr. Nicholas E. Sarantakes, U.S. Naval War College; Dr. Jeffrey D. Smotherman, NDU Press; Dr. Elizabeth D. Woodward, Air War College.

Mt. Hood and wheat fields near Dufur, Oregon, November 23, 2017 (Courtesy Jim Choate)

Weaponizing Wheat

How Strategic Competition With Russia Could Threaten American Food Security

By Karl A. Scheuerman

In the history of warfare, belligerents have often targeted food supplies to force opponents into submission. However, in America's wars over the last century, threats to domestic food security have been minimal. In many ways, the United States enjoyed insulation from combat conditions overseas that could have otherwise disrupted the country's ability to feed itself. Complacency in relative isolation from disruptive food shocks is no longer a luxury the United States can afford. We are now in an era of increased globalization, where food supply chains span the oceans. In addition, America faces the renewed rise of strategic competition as China and Russia seek to replace U.S. power across the globe. Given these new realities, timely evaluation of potential vulnerabilities to American food production is necessary.

Among rising strategic competitors, Russia has explicitly demonstrated a clear willingness to target food systems. In its current war against Ukraine, the Russian military has relentlessly attacked wheat supplies and production. Yet despite the critical importance wheat plays as the foremost American dietary staple, its production is indeed vulnerable to disruption should Russia choose to act. While a full-scale conventional war with Russia is unlikely because of nuclear

Lieutenant Colonel Karl A. Scheuerman, USAF, wrote this essay while a student at the Dwight D. Eisenhower School for National Security and Resource Strategy. It won the 2023 Secretary of Defense National Security Essay Competition.

deterrence, the Kremlin has repeatedly demonstrated a willingness to disrupt foreign interests over the past several years, from election interference to trade wars. Targeting the U.S. wheat industry could become another preferred option for the Kremlin to wage adversarial competition at a level below the threshold of armed conflict. Given the emerging global security environment, the U.S. Government should reevaluate current policies to ensure the resilience of the wheat industry against this threat.

Wheat Is King in America

Grain plays an enormous role in feeding the world. Approximately 47 percent of all human caloric intake today comes from grains, and the United States is a significant contributor to global grain supplies.[1] According to the United Nations (UN) Food and Agriculture Organization, the United States is the second largest grain producer in the world (behind only China), producing over 450 million metric tons, which represents 15 percent of the worldwide supply.[2] Of all grains the United States produces, Americans consume more wheat than any other, making it the country's most essential food staple.[3] U.S. farmers raise greater volumes of corn and soybeans, but most of those commodities are used for livestock feed and biofuels.[4] Due to wheat's central role in the American food system, consumer demand for products derived from wheat is "relatively stable and largely unaffected by changes in wheat prices or disposable income," according to the U.S. Department of Agriculture (USDA).[5] As shown in figure 1, demand for wheat in the United States continues to grow. Thus, wheat represents a worthwhile case study in evaluating U.S. resiliency to food disruption in the context of strategic competition, specifically with Russia.

Some may find it hard to envision a scenario where the United States would experience wheat shortages. However, recent examples of modern countries suffering significant wheat production losses exist. Russia, the world's largest wheat exporter, suffered extensive drought and wildfires in 2011 and lost one-third of its national wheat crop as a result.[6] China, the global leader in wheat production, suffered wheat crop losses of up to 16 percent between 2000 and 2018 due to pests and pathogens.[7] Another breadbasket of the world, Ukraine, will likely see its 2022–2023 wheat output decline by 41 percent compared to the previous year because of the Russia-Ukraine war.[8]

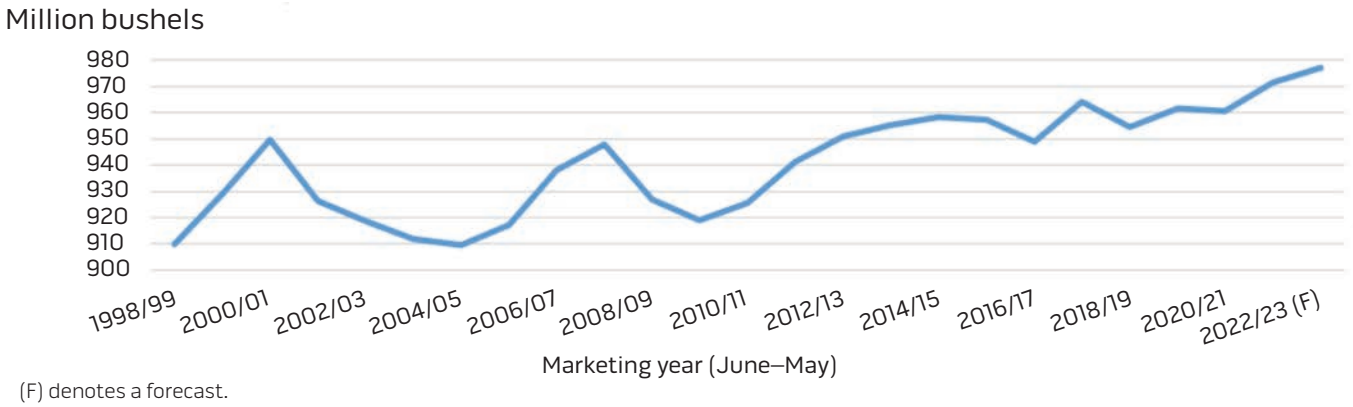
Implications of Domestic Wheat Shortages

If America were to experience wheat shortages, the implications would be significant. As the United States is the third largest wheat exporter on the global market, a drop in U.S. supplies would negatively impact world food prices.[9] Following the decline in Russian wheat exports in 2011, food prices spiked and contributed to dramatic instability in countries dependent on imports, helping give rise to the Arab Spring.[10] Trade partners, including key allies such as Japan and South Korea, who rely on U.S. wheat imports would likely feel the pinch most acutely in countering Russian and Chinese influence.

But significant domestic concerns could pose a greater risk. In 1906, journalist Alfred Henry Lewis presciently stated, "There are only nine meals between mankind and anarchy." Unlike any other commodity, food is the one we cannot survive without. If interruptions to the food supply occurred, the public's confidence in future availability might begin to erode, spreading fear. Those now living below the poverty line would suffer the most, but even the broader citizenry could start losing confidence in the government's ability to provide basic needs, fueling an already tense and polarized domestic political climate.

If disruptions affected U.S. wheat production, food substitutes would play a role in softening the impact. However, given wheat's primacy in our food system, the volume of substitutes needed could pose major challenges. A national grain reserve, similar in concept to the Strategic Petroleum Reserve, would be a logical buffer to mitigate shortages, but unfortunately, no such reserve exists. Despite producing more grain than any other country on earth, China has established a national reserve that reportedly now contains at least 2 years' worth of grain supplies should the country need it.[11] The United States has previously tried establishing a national grain reserve,

Figure 1. U.S. Wheat Food Use, 1998/99–2022/23



(F) denotes a forecast.
Source: USDA, National Agricultural Statistics Service; USDA, World Agricultural Outlook Board.

most recently with the Bill Emerson Humanitarian Trust. However, the trust sold off its commodity holdings in response to food price spikes resulting from the 2008 financial crisis and now only holds cash reserves to help pay for famine relief needs abroad.[12]

Should a worst-case scenario arise where the entire annual U.S. wheat harvest failed, existing stocks would quickly evaporate if current consumption levels remained constant. In the last crop year of 2021–2022, American farmers produced 1,646 million bushels of wheat, while domestic demand (comprised of human food use, animal feed, and seed) for the year totaled 1,117 million.[13] After factoring in exports and the previous year's residuals, the remaining stock of U.S. wheat after the previous crop year was 669 million bushels, and this is expected to decrease further next year to its lowest levels since 2007–2008 (table 1).[14]

Applying a "time-to-survive" analysis to the hypothetical worst-case scenario, which measures the maximum duration that supply could match demand (assuming the previous domestic demand level held constant and exports were canceled), existing domestic wheat stocks would last only about 7 months.[15] Unlike other industries, agriculture does not have the option of surging production when a crisis arises as it is constrained by annual growing seasons. The United States could not replenish its wheat stocks with domestic production until the next summer harvest season.

Food shocks and price spikes resulting from the COVID-19 pandemic and Russia's war in Ukraine have helped Washington realize our food system's fragility. The latest National Security Strategy under President Joe Biden cites food security as one of the top five shared global challenges. It highlights global initiatives the United States is currently leading, including efforts to urge other states to commit to "keeping food and agricultural markets open, increasing fertilizer production, and investing in climate-resilient agriculture."[16] These efforts are worthwhile, but America must ensure its increased focus on global food insecurity does not turn a blind eye to potential vulnerabilities in domestic food production that a disruptive adversary such as Russia could exploit.

Moscow's Increasingly Disruptive Actions

Over the past two decades, while the Russian Federation has enjoyed a resurgence of economic growth and global influence under Vladimir Putin's leadership, the Kremlin has demonstrated a repeated willingness to undermine U.S. interests. The reasons for this approach are rooted in what has become characterized as the Primakov doctrine, which "posits that a unipolar world dominated by the United States is unacceptable to Russia."[17] In operationalizing the Primakov doctrine, Russia has been conducting a hybrid war in part to "foment chaos, create distrust in U.S. institutions, and target the preexisting divisions in the country."[18] Through these actions, Russia has earned a reputation as a perilous threat "with the goal of overturning key elements of the international order."[19]

There is no shortage of examples illustrating why Russia is now characterized this way. The United States has attributed several significant cyber attacks[20] targeting American industry and governmental organizations to Russia in recent decades.[21] The Kremlin has also gone to great lengths to interfere with the democratic process Americans cherish. The clearest example of this approach was during the 2016 Presidential election. According to the U.S. Intelligence Community and Department of Justice investigations, the Kremlin directed extensive information warfare operations to influence the election outcome, resulting in distrust among the U.S. citizenry in the reliability of our electoral system.[22]

Russia is now also seeking to undermine the U.S.-led global economic system. Suffering from unprecedented Western sanctions as punishment for its war in Ukraine, Russia is countering with its own strategies to establish a global economy that excludes the West. Not only have the Russians cut natural gas supplies to Europe, but they are also replacing access to Western marketing by increasing trade with China, India, and other countries. Russia has also been championing its own alternative to the SWIFT international financial messaging system.[23]

These examples demonstrate Russia's repeated attempts to undermine American strength and interests. Outcomes from these efforts have resulted in various levels of success in sowing seeds of domestic chaos to destabilize U.S. society. Should the Kremlin succeed in significantly disrupting Americans' ability to sufficiently access cheap and convenient food, the impact could become far more intense than what Russia has achieved to this point.

Experienced Cereal Killers

While their attempts to disrupt U.S. interests in the post–Cold War era have yet to target food directly, the Russians have found it a preferred tactic elsewhere. In fact, during their current war in Ukraine, attacking wheat storage and production has been a top priority,

Table 1. U.S. Wheat Supply, Crop Year 2021–2022

	Quantity (million bushels)	
Beginning stocks		845
Production		1,646
Imports		95
Total supply	2,587	
Domestic demand		1,117
Exports		800
Total demand		1,917
Ending stocks	669	

Source: Andrew Sowell and Bryn Swearingen, "Wheat Outlook: November 2022," USDA Economic Research Service.

Combine reloads wheat into bunker for further transportation during harvest near Krasne, Ukraine, July 5, 2019 (United Nations Food and Agricultural Organization)

and they have done so with remarkable efficacy. Ukraine is one of the world's most productive breadbaskets, producing over 85 million metric tons of wheat annually.[24] Ukraine was the world's fourth largest wheat exporter on the global market during the 2021–2022 crop year.[25] Recognizing Ukrainian grain as a critical center of gravity, Russian forces have employed a relentless multifaceted strategy to destroy that element of the Ukrainian economy.

The first element of this strategy is the theft of Ukrainian agricultural machinery. Since the early weeks of the war, media outlets have reported multiple instances of Russian forces ransacking Ukrainian grain stocks, shipping their contents back to Russian territory and sending it to Russian cargo vessels for export to global Russian trading partners.[26] Some estimates claim that millions of tons of grain from eastern Ukraine have been seized, triggering nightmares of the Soviet-induced Ukrainian famine of 1932–1933.[27] Russians looted farm machinery dealerships and stole combines, tractors, and implements.

The second component of the Russian strategy to eliminate Ukrainian wheat is destruction. Not only have battles prevented farmers in certain regions of eastern Ukraine from tending to their fields, but Russian forces have also laid waste to Ukrainian cropland by burning vast acreages across the Donetsk, Mykolaiv, and Kherson regions. Russian bombing and missile strikes have destroyed the logistical infrastructure essential to wheat production and delivery, including irrigation systems, grain elevators, and port terminals. Seeking to damage Ukraine's ability to recover from the conflict, Russia went so far as to target Ukraine's National Gene Bank located in Kharkiv, which served as the country's seed bank, housing some 160,000 specimens of plant and crop seeds.[28]

A third pillar of the Russian strategy undermining wheat production in Ukraine has focused on Ukraine's ability to export its grain. In the early days of the war, the Russian naval blockade of Ukraine's Black Sea ports strangled Ukrainian exports, cutting off essential means for Kyiv to participate in global markets. Agricultural commodities are Ukraine's top exports, including $4.61 billion worth of wheat alone in 2020.[29] Blockading the Black Sea ports was painful for Ukraine and the many countries relying on Ukrainian wheat to feed their populations, contributing to damaging global food price spikes and inflation over the ensuing months. Not until August 2022 did Russia agree to lift the blockade, based on a tenuous agreement brokered with assistance from the UN and Turkey. Even since the initial agreement, the Kremlin has unilaterally suspended it once and has threatened not to renew the deal.[30]

Secretary of State Antony Blinken participates in roundtable discussion on food security and Vision for Adapted Crops and Soils with agricultural leaders from public and private sectors, in New York City, August 4, 2023 (Department of State/Chuck Kennedy)

Ukraine's experience during the current Russian invasion reveals the lengths to which Russia is willing to go to intentionally attack wheat production and supplies, even when that grain is a vital component of the local and global food system. Based on this precedent, the United States and its allies must be prepared to defend against the variety of tactics Moscow could employ to attack wheat production elsewhere.

Russia's Emergence as a Global Food Power

Competition between Washington and Moscow that is centered around grain is nothing new. Following the U.S. Civil War in the 1860s, cheap American wheat flooded global markets for the first time, pushing Russian wheat exports out of Europe. The U.S.-Russian grain trade rivalry was a key factor in conditions that ultimately ushered in World War I.[31] Wheat has continued to play a major, albeit behind the scenes role in U.S.-Russian relations ever since.

When Putin became president in 2000, Russia relied on imports to meet half its domestic food needs. Prioritizing food security, the Russian president has since successfully executed initiatives to boost food production, and grain has been a critical focus. By 2017, Russia had become the world's top wheat exporter, and the Kremlin has no plans to cede its pole position. Despite unprecedented sanctions from the West as punishment for its war in Ukraine, Russia still has plenty of buyers for its wheat exports in the Middle East and Asia as it strives to outproduce and outcompete American farmers.[32] Even China began importing Russian wheat this year after previously placing a ban on it due to concerns about the presence of a crop disease (dwarf bunt fungus).[33] The Kremlin's agriculture minister is now on a mission to increase the value of agricultural exports by 50 percent by 2024.[34]

Recent global supply chain disruptions from events such as the war in Ukraine and the COVID-19 pandemic have highlighted Moscow's privileged position in terms of food security. Russia is the world's top exporter of not only wheat but also fertilizer.[35] Given its relative strength in this area and a demonstrated willingness to attack Ukrainian wheat, attacking the domestic American wheat industry could become a viable option in Russia's arsenal of hybrid warfare tactics against U.S. interests. Specific strategies Russia could employ to target U.S. wheat production can be organized into four categories of attack:

- cyber attacks targeting grain storage and transport infrastructure
- restricting fertilizer exports to U.S. and/or global markets
- manipulating international wheat markets
- agricultural biowarfare.

The following sections will explore each of these options in depth.

Disruption Option 1: Cyber Attacks Targeting Grain Infrastructure

Among the cyber-security industry, many consider Russia to be the most capable and stealthiest of America's cyber adversaries. In addition to the notable intrusions mentioned earlier, suspected Russian adversary groups have earned their reputation for several reasons, including developing sophisticated malware that employed novel command and control techniques, exhibiting rapid breakout times, and leading the way in targeting cloud infrastructure.[36]

Cyber attacks crippling the food industry are not unprecedented. For example, suspected criminals successfully compromised the network of JBS S.A., a global meat processing company, hampering livestock slaughter operations and causing wholesale meat prices to spike.[37] Should the Kremlin set its sights on disrupting the U.S. wheat industry via cyber means, a likely approach would be targeting the infrastructure used for grain transport and storage, specifically the grain storage elevators throughout wheat production regions. These facilities comprise an essential component of the Nation's food system, which the Department of Homeland Security (DHS) has identified as 1 of the 16 sectors of critical infrastructure.[38] Farming cooperatives operating grain elevators increasingly leverage automation technologies to handle loading and unloading functions. If an adversary gained remote access to the industrial control system (ICS) network environment, they could shut down operations, preventing grain transportation to trade markets and food processors.

Russian state-sponsored adversaries are known to have successfully targeted a critical infrastructure ICS environment, causing kinetic effects. A cyber unit within the Russian military was responsible for the attack on the Ukrainian power grid, resulting in nearly a quarter-million Ukrainians losing power for about 6 hours.[39] A similar attack chain methodology could disrupt control systems for other sectors of critical infrastructure, such as grain storage facilities.

A less sophisticated means of attack on grain elevators would be to infect the traditional computer networks operating at these facilities in attempts to affect operations. This has already happened on several occasions. Between the fall of 2021 and early 2022, six U.S. grain cooperative elevator facilities experienced ransomware attacks on their business networks that inhibited processing as some were forced to adjust to manual operations. Recognizing the threatening trend, the Federal Bureau of Investigation (FBI)'s Cyber Division issued a Private Industry Notice to assist grain cooperative organizations better prepare their defenses.[40] The FBI's report also noted the potential for an impact on commodities trading and stocks that could result in food security and inflation concerns.

Another potential cyber attack against the wheat industry that could lead to severe outcomes would be a more typical intrusion into agriculture industry business networks. Large agriculture firms have not been immune from network intrusions aimed at stealing intellectual property. Unlike the other attacks mentioned, where the objective is to perform sabotage or shut down a network for ransom, cyber-security firms have noted that intellectual property theft intrusions targeting agriculture firms are on the rise.[41]

Should Russian-aligned adversaries gain access to sensitive agriculture industry data, they could facilitate further disruptive strategies. For example, stolen documents and data could be altered and then leaked publicly, delivering damaging false messages like the hackers who doctored data stolen from Pfizer to undermine public trust in vaccines.[42] Similarly, grain pathology and trade experts note that false claims of wheat crop disease would have dramatic adverse effects on American grain exports.[43] Undermining American interests related to global trade introduces additional options at the Kremlin's disposal for disrupting U.S. wheat production.

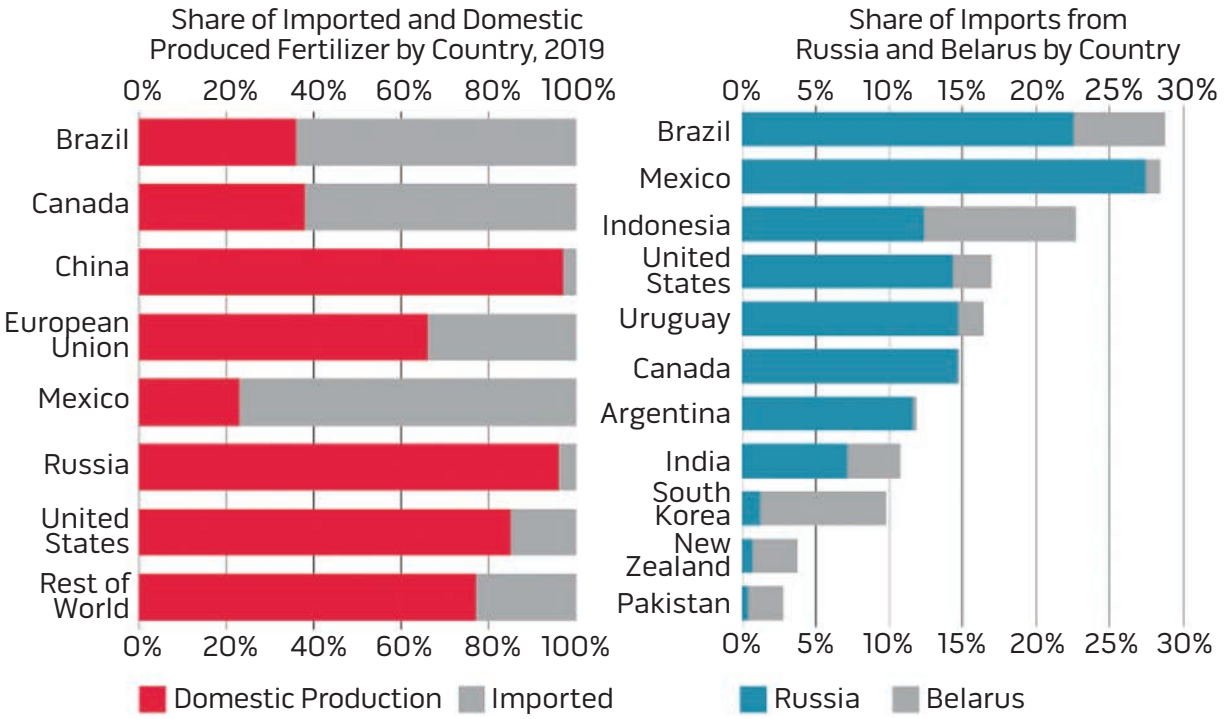
Disruption Option 2: Restricting Fertilizer Exports

The United States is a net exporter of food. As such, some assume the country is self-sufficient in meeting domestic food needs. However, that conclusion is tenuous because American agriculture depends on imports of foreign synthetic fertilizer. Less than 1 percent of U.S. farmland is organic.[44] Farming the remaining 99 percent involves conventional methods. One characteristic of conventional agriculture is the "extensive use of pesticides, fertilizers, and external energy inputs."[45] Despite the United States having a relatively robust fertilizer production industry, it does not currently provide for all domestic farming needs. According to the USDA, "The United States is a major importer and dependent on foreign fertilizer and is the second or third top importer for each of the three major components of fertilizer."[46]

The three primary fertilizer nutrients required to grow crops are nitrogen, phosphorus, and potassium. Nitrogen fertilizer is derived from the Haber-Bosch process, which uses natural gas for fuel to extract nitrogen from the air to form ammonia. Phosphorus fertilizer comes from mining of nonrenewable phosphate rock. Potassium fertilizer is derived from mining nonrenewable potash. As of 2021, the United States imported 12 percent of its nitrogen, 9 percent of its phosphate, and 93 percent of its potash.[47] While America imports these materials from many friendly states, some come from less-trusted trading partners. This is especially true of potash. Russia and its close ally, Belarus, combine to provide 12 percent of America's potassium requirements and more than 15 percent of total U.S. fertilizer imports (figure 2).[48]

Should Russia choose to disrupt wheat production by stopping potash exports, America would need to find ways to ramp up domestic mining and production or close the gap by increasing imports from friendly trade partners such as Canada, which already supplies 83 percent of potash used in the United States. A more significant cause for concern is that Russia is the world's largest fertilizer exporter when considering all fertilizer components and is responsible for over 15 percent of total

Figure 2. Fertilizer Import Dependence by Country



Source: Cited in "Impacts and Repercussions of Price Increases on the Global Fertilizer Market," USDA Foreign Agricultural Service, June 30, 2022, https://www.fas.usda.gov/data/impacts-and-repercussions-price-increases-global-fertilizer-market.

global fertilizer exports.[49] Leveraging that influence, Russia could attempt to manipulate availability on the global market, resulting in worldwide price shocks that would cascade to American consumers and place additional pressure on poorer countries already suffering from food security challenges.

Russian impacts on global fertilizer trade have already contributed to financial instability. Fertilizer prices tripled after the beginning of the war in Ukraine because Russia limited exports. These limits included restrictions on exports of natural gas, which, as noted, is a crucial component for producing nitrogen fertilizer.[50] Russia also shut down an ammonia fertilizer pipeline from its Volga region to a Black Sea port to further restrict global supplies.[51] The USDA characterized the situation as "Putin's price hike on farmers."[52] These events contributed to soaring food costs, leading to the highest inflation rates in the United States in four decades.[53]

In late 2022, the UN warned that if fertilizer prices were not reduced, the world would face a "future crisis" of food availability. UN officials have since worked to convince Russia to increase fertilizer output.[54] Thanks to rebounding global fertilizer production, fertilizer price fears have dampened for the near term.[55] Nevertheless, the situation demonstrates how the Kremlin can leverage its fertilizer superiority to harm the interests of not only the United States but also the world. Unfortunately, fertilizer availability is not the only way Moscow can flex its muscle in undermining American wheat production. Undercutting U.S. grain exports is another area where the American wheat industry is vulnerable to Russian meddling.

Disruption Option 3: Undercutting U.S. Wheat Exports in Global Markets

America's farmers have historically benefited from growing more wheat than the country consumes and being able to sell excess grain to overseas markets. In crop year 2021–2022, the United States exported $7.3 billion of wheat, making it the world's third largest wheat exporter, behind Russia and Australia.[56] According to the USDA, in the early 2000s, the United States was responsible for roughly 25 percent of the world's wheat exports, but that dominance has dwindled now to 13 percent.[57] America's share of global wheat exports has shrunk over the past 20 years as Russia has strengthened its position as the world's wheat superpower.

Increasing international competition in wheat trading has strained U.S. wheat exports in recent years, and this trend is expected to continue. Competition from Russia, especially in African and Middle Eastern markets, poses a significant challenge.[58] Russia has shown it is willing to use food trade as a tool of diplomatic force. When Bulgaria ceased transiting Russian gas to Europe, Turkey agreed to facilitate its transit in exchange for receiving wheat imports from Russia. Elsewhere, Russia sold wheat to Iran as part of a deal to help sell Iranian oil. Moscow willingly

enters commodity trade markets even if it means undercutting its allies, as Iran experienced this year when Russia discounted its steel exports and grabbed Iranian market share.[59] Wheat industry analysts expect Russia to continue pushing boundaries to secure access to wheat export markets, especially in regions with rapid population growth, like southeast Asia.[60]

Waging information warfare would be another scheme the Kremlin could employ to win in export markets. As mentioned, crafting and communicating a hoax that falsely claims American wheat supplies are contaminated with disease would cause buyers to seek alternative sources.[61] Rules over grain disease quarantines can be a sensitive political subject between traders, even without misinformation campaigns. When coupled with stolen and altered data derived from a coordinated cyber intrusion, the United States would have difficulty eliminating concerns about the quality of American wheat stocks.

Complicating the issue is that prior incidents of contaminated U.S. wheat exports could strengthen Russian hoax claims. The Soviet Union and several other countries complained of dirty, rotting, and insect-ridden U.S. grain in the 1980s.[62] In the mid-1990s, the USDA had to institute a regulatory program to certify wheat shipments were free of fungal disease after a Karnal bunt outbreak in the United States.[63] Recent research suggests that the Environmental Protection Agency scientific integrity and transparency failures related to pesticide use have eroded global trust and are undermining U.S. agricultural exports.[64]

If Russia succeeds in taking global wheat export markets from the United States, American farmers will undoubtedly be threatened. With less market access and increasing input costs, the incentive for growing the preeminent American staple crop would dwindle, resulting in lower output and production capacity. Such an outcome, combined with other disruptive options identified in this essay, could accelerate Russian aims of undermining U.S. global power.

Disruption Option 4: Agricultural Bioterrorism

Another vector for attacking U.S. wheat production, and one carrying potentially the broadest impact, would be a Russian attack involving pests or pathogens designed to damage crops. Such an attack would likely be done covertly to provide plausible deniability. Before the Biological and Toxin Weapons Convention of 1972 (BWC), several countries, including the United States, developed and maintained offensive biological weapons research programs.

Many historians and scientists claim that while other signatories to the BWC ceased their offensive biological weapons programs after the convention went into effect in 1975, the Soviet Union secretly continued its program despite being a signatory to the treaty. Research has shown that the Soviet program was the longest and most sophisticated the world has ever seen, beginning in 1928 and lasting until at least 1992. Its scope was massive, involving over 65,000 workers.[65] A specific component of Soviet biological warfare research operated under the code name *Ekologiya* and focused on developing pathogens that would kill animals and plants, including crops such as wheat. It eventually became the largest ever offensive biowarfare project focused specifically on agriculture.[66]

Should the Russians choose to conduct a biological attack against American grain crops, wheat rust could likely be the weapon of choice. Wheat rusts are a type of fungus belonging to the genus *Puccinia* that can affect different parts of the wheat plant. Also known as "the polio of agriculture," it has been the worst wheat disease in history, capable of causing catastrophic crop failures. During the first half of the 20th century, rust destroyed one-fifth of America's wheat crops in periodic epidemics.[67] Before the BWC outlawed offensive biowarfare programs, many countries sought to weaponize wheat rust because of its potent effects in targeting crops. Relative to other biological agents, it remains viable for an extended period of time under cool storage (2 years) and spreads quickly after release.[68] In addition, plant rust fungal spores are easily dispersed, durable to withstand transportation and transmission, and easy to produce in sufficient quantities. If the specific variety of targeted wheat is known, attackers could use tailored strains of wheat rust that would have the greatest likelihood of successfully killing and spreading while protecting their own crop with specific strain-resistant varieties.[69]

According to some claims, the Soviet program did not stockpile anti-agricultural weapons like wheat rust but maintained several facilities "equipped as mobilization capacities, to rapidly convert to weapons production should the need arise."[70] A historian of the *Ekologiya* program described one of the project's main facilities as possessing the world's largest "unique collection of fungal pathogens against wheat."[71] Another facility, the Scientific Research Agricultural Institute in Gvardeyskiy, Kazakhstan, was reportedly a key testing site for newly developed anticrop (including antiwheat) pathogens in greenhouses measuring a total area of 100 square meters.[72] In total, four separate program facilities maintained laboratories focusing on rust species research.[73]

Project *Ekologiya* has several implications for the security of U.S. wheat production today. First, the Russian Federation inherited the offensive Soviet biological weapons program and its decades of research, development, and technological capability. While the Kremlin claims the program ended after the Cold War and that it has since complied with the BWC, the United States argues otherwise. In 2021, the State Department reported the following: "The United States assesses that the Russian Federation maintains an offensive BW program and is in violation of its obligation under Articles I and II of the BWC. The issue of compliance by Russia with the BWC has been of concern for many years."[74]

Not only is there a possibility Russia has maintained a biological weapons program with agricultural components, but a second implication for U.S. national security is that conventional American farming is potentially vulnerable to biological attack because intensive farming,

Wheat fields in midsummer in Ukraine, Oblast Lviv, July 19, 2012 (Courtesy Raimond Spekking)

as practiced today, "involves limited diversification of crop and cultivar genetics over large areas," helping create "an ideal environment" for new pest establishment and spread.[75] As small, diversified farms have been overtaken by today's larger farming operations for the sake of profit and efficiency, the United States has inadvertently made its crops potentially more vulnerable to biological attack. Some experts note that pests and the plant diseases they can carry would be "an ideal means of waging 'asymmetric' war" in scenarios that fall below the threshold of conventional armed conflict.[76]

Exacerbating the problem is that our germplasm seed banks are potentially insufficient in possessing the diversity required to rebound from a devastating biological event. New varieties with resistance would be essential in a successful attack scenario because wheat rust can persist over the winter and remain viable to infect the following year's crop. During the Cold War, germplasm collections were better stocked and more robust to ensure resilience against known pathogens. Those efforts have fallen behind in recent decades.[77] For example, a new strain of wheat stem rust emerged in Uganda in 1998, commonly known as Ug99.[78] Since then, scientists have evaluated roughly 200,000 wheat varieties for natural resistance to Ug99. Less than 10 percent demonstrated adequate resistance.[79] Not until 2017 did researchers discover a gene that provided resistance to Ug99, making it possible to develop wheat varieties naturally capable of surviving the disease.

It should be noted that debate exists around the degree of risk posed by a supposed lack of biodiversity. Some wheat pathology experts argue that concerns of insufficient biodiversity in American wheat crops are overblown. While wheat as a species is a monoculture grown in vast quantities across the United States, there are many dozens of commercial wheat varieties grown today, providing a reasonable degree of genetic diversity within the species to mitigate massive impacts from disease or pest outbreaks.[80]

Although fungi are the most likely form of intentional biological threat to wheat due to the relatively ease with which they can multiply and spread, other pathogens like viruses and bacteria can also affect grain crops. Defending against viruses is problematic. Treatments against viruses are generally not as effective as using chemicals to control fungi and bacteria. Disturbingly, the Soviet biowarfare program reportedly included a facility based in Uzbekistan, the Central Asian Scientific-Research Institute of Phytopathology, that "focused on viral diseases of wheat."[81] These claims are corroborated by a declassified 1977 U.S. Defense Intelligence Agency report stating that the Soviet antiplant biowarfare program conducted work on wheat and barley mosaic streak viruses.[82]

Another intentional wheat industry disruption scenario could involve the malicious introduction of wheat parasites that carry harmful bacteria. For example, *Rathayibacter tritici* is a bacterium that infects wheat via parasitic nematodes to cause a toxic gumming disease.[83] While not currently present in the United States, introducing the associated nematode vectors to American wheat crops could at least result in wheat export quarantines, as trade partners would balk at accepting potentially contaminated grain shipments.[84]

Biological attack against wheat production could also be an attractive objective for an adversary like Russia because of the costs imposed by recovery. Pests and pathogens can disperse and reproduce at dramatic rates, providing the potential to wreak havoc across vast amounts of American farmland. For example, a small outbreak of Karnal bunt in the American Southwest in 1996 resulted in $250 million in damages.[85] In Texas, the cost of mitigating effects on agriculture from nonnative fire ants is

more than $1.2 billion annually. Expenses for protecting crops from a nonnative insect carrying Pierce's Disease that has plagued California grapevines since 1989 are also substantial.[86] Beyond just the recovery costs, pathogen outbreaks could also easily lead to trade embargoes as destination countries resist the risk of importing contaminated U.S. wheat. Thus, a widespread infestation damaging American wheat crops "could lead to potential economic losses of immense proportions."[87] A former member of the Soviet biological weapons program agreed, citing antiagricultural biological weapons as "particularly suitable" for disrupting a target country's economy.[88]

Intentional infestations targeting agriculture for nefarious purposes are not without precedent. Analysts strongly suspect manmade causes behind a debilitating outbreak of the fungus *Moniliophthor perniciosa*, also known as witches' broom disease, among cocoa fields of Bahia, Brazil, beginning in 1989.[89] Potentially motivated by the perpetrator's desire to destroy the chocolate industry to punish its wealthy landowners, the suspected attack nearly exterminated the area's cocoa plantations over the following decade. By 2001, "Brazil went from being the world's third-leading cocoa producer to being the 13th."[90] Given this potential for covert bioterrorism to exact large economic costs to a country's agricultural industry, Russia could consider it as an increasingly attractive option as strategic competition with the United States escalates.

Risk Analysis

Risk is a function of likelihood and consequence and can be mathematically described as *Risk = Likelihood of an Event x Consequence (loss due to the event)*.[91] To aid in measuring likelihood and consequence of the four attack strategies Russia could employ to target U.S. wheat production, an expert survey was conducted. Data was collected from 30 participants in the United States who are professionals with expertise in fields related to the wheat industry, including farming, academia, information technology, and global trade. Due to the potential security concerns of identifying the experts in the survey, it was decided that all participants would remain anonymous. The survey asked each participant to assess the likelihood and consequences of the four Russian disruption scenarios: cyber attacks targeting grain infrastructure, restricting fertilizer exports, undercutting U.S. wheat exports, and agricultural bioterrorism.[92] Participants assessed the likelihood of each scenario using a 5-point Likert scale converted to the following percentages to enable calculations (table 2). Participants assessed consequence using the following 5-point Likert scale based on expected economic losses ranging from less than $1 million to more than $20 billion (table 3). Survey results for likelihood and consequence are captured in figures 3 and 4 and risk scores are presented in figure 5. Calculated mean scores for likelihood

Table 2. Likert Scale With Associated Percentages for Measuring Likelihood

Scale	Likelihood	Percentage Chance
1	Very unlikely	0
2	Unlikely	25
3	Even chance	50
4	Likely	75
5	Very likely	100

Table 3. Likert Scale With Associated Dollar Cost Ranges for Measuring Consequence

Scale	Consequence
1	Less than $1 million
2	$1 million to $100 million
3	$100 million to $1 billion
4	$1 billion to $20 billion
5	More than $20 billion

Figure 3. Survey Results for Likelihood of Disruption Scenarios

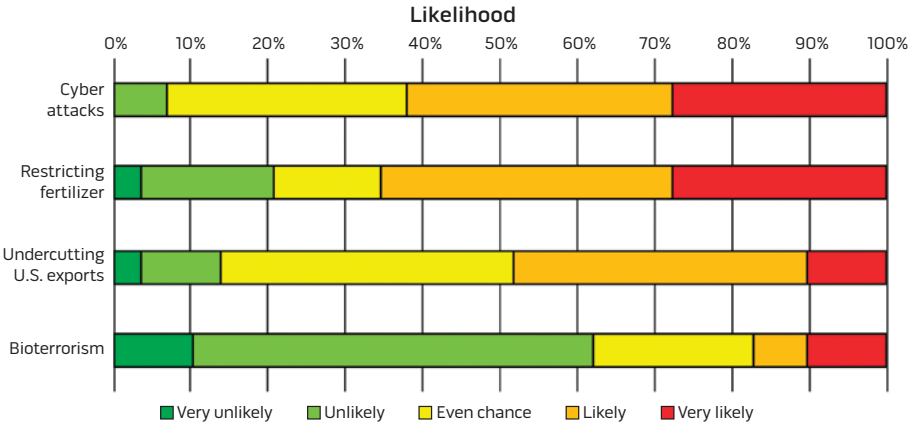
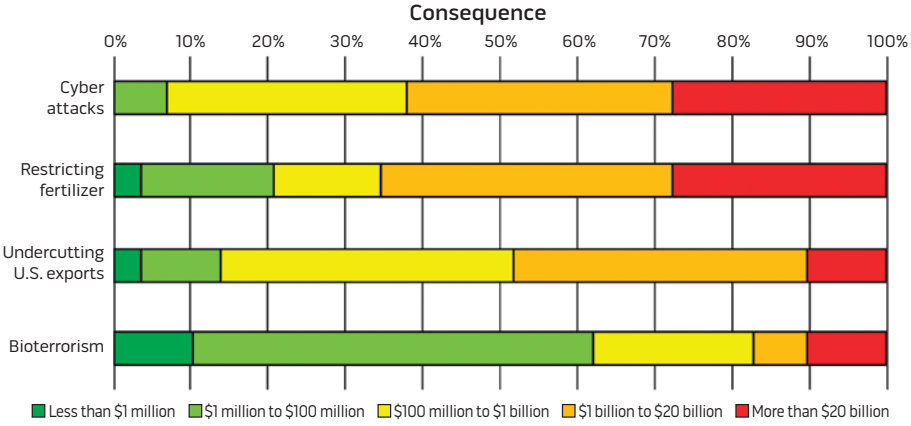


Figure 4. Survey Results for Consequence of Disruption Scenarios



and consequence for each attack scenario are found in table 4.

Further refinement of the results was conducted to ultimately generate a more robust measurement of overall risk for each scenario. To calculate an overall likelihood percentage, the sum of response percentage values (as shown in table 2) was divided by the total available percentage of all responses. To calculate the dollar value associated with the overall consequence score, the mean score for each scenario was assessed as a percentile within the associated dollar range (as shown in table 3).

To then calculate the final risk for each scenario, the calculated likelihood percentage was multiplied by the consequence dollar value to determine the overall amount of risk in terms of dollar cost, as shown in table 5.

Limitations in this study include those intrinsic to Likert scale surveys (for example, not able to capture all opinions, subjective results, etc.) and the small sample size of expert participants. Another limitation of this study is the inherent biases of the participants who come from a range of professional backgrounds related to the wheat industry. Therefore, deeper analysis is needed to provide more robust risk measurements of wheat industry disruption scenarios. Still, results from this survey point to potential prioritization in policy considerations to address the threat of potential Russian disruption of the U.S. wheat industry.

Figure 5. Chart of Disruption Scenario Risk Scores

Table 4. Mean Results of Likelihood and Consequence Responses

Scenario	Likelihood (Mean)	Consequence (Mean)
Cyber attacks	3.83	2.67
Restricting fertilizer	3.69	3.08
Undercutting U.S. exports	3.41	2.96
Bioterrorism	2.55	3.17

Table 5. Calculated Economic Risk Cost for Each Attack Scenario

Scenario	Likelihood	Consequence (millions)	Risk (millions)	Rank
Cyber attacks	0.71	$600	$424	4
Restricting fertilizer	0.67	$1,583	$1,065	2
Undercutting U.S. exports	0.60	$863	$520	3
Bioterrorism	0.39	$3,304	$1,282	1

Note: Numbers are rounded.

Cultivating Resilience

The United States must act to ensure resilience of domestic wheat production, storage, and transportation to mitigate the risks outlined above. First, additional research is needed to measure domestic food security risks more accurately. A Likert survey of experts like the one conducted in this study that encompasses a greater number of experts and uses finer granularity in the scales would be beneficial. A Delphi study could also serve to identify a stronger consensus of risk to the U.S. wheat industry from potential Russian action.[93] Beyond improving the survey, policymakers and wheat industry leaders should consider the following measures, which are listed in prioritized order to address risks from highest to lowest based on the expert survey results shared above.

USDA: Proactively Defend Against Biological Warfare Targeting Crops by Ensuring Sufficient Genetic Diversity of American Grains. Industrial wheat breeding has helped increase yields over the past century, but some argue that this has come at the expense of genetic diversity: "Modern breeding techniques narrowed the genetic base of germplasm used to develop varieties for cultivation."[94] Genetic uniformity in modern wheat crops means greater potential vulnerability to new pathogens. Ensuring a source of genetic variation in wheat is essential for disease resistance. Landrace wheats play a vital role in doing so. Landraces are premodern grains that developed naturally over millennia while adapting to local environmental conditions. Many landraces were lost during the 20th century as farmers abandoned them in favor of modern varieties

championed in the Green Revolution.[95] Due to their wide variety, landraces do not possess the genetic bottleneck of modern hybrid wheats.

Landraces typically produce yields lower than modern wheats, which can seemingly put them at odds with rising global food demands. Nevertheless, they serve a critical role in preserving genetic diversity to ensure American wheat crop resilience should new pathogens wreak havoc on modern varieties. It is also worth noting that landrace wheats are reported to have better yields and higher quality attributes than modern varieties "under organic and low-input farming systems."[96]

Landraces can and have been preserved in seed banks, which is worthwhile, but there are limitations in preserving them this way. Landraces are heterogeneous, meaning that individual specimens of the plant's spikes stored in banks do not necessarily possess all the genetic diversity in the landrace variety. In addition, most biologists agree that active cultivation of landraces is essential to preserve cultivation knowledge.[97] Given these circumstances, USDA should find ways to collaborate with American farmers and researchers to incentivize and ensure sufficient production levels of landrace wheats.

USDA and DHS: Prepare for Adequate Response to Biological Attack Against U.S. Wheat Crops. USDA–National Institute of Food and Agriculture and the Department of Homeland Security established the National Plant Diagnostic Network (NPDN) during growing fears of bioterrorism following 9/11 and the 2001 anthrax attacks.[98] The NPDN serves as a network of diagnostics laboratories across the country that help rapidly identify plant disease and pest outbreaks. Since its establishment, funding and support for the NPDN have begun to erode.[99] As the original sponsoring agencies, USDA and DHS should evaluate the current state of the program to make sure its capabilities are sufficiently resourced to perform adequate early monitoring and detection of a biological attack against domestic crops.

In addition to shoring up early warning capabilities, USDA should also review the agriculture industry's preparedness to respond to bioterrorism. If an outbreak of disease against U.S. wheat crops occurs, agrochemical suppliers will need to deliver treatments to limit damage. However, supply chains for pesticides can be brittle, as was the case during the COVID-19 pandemic.[100] Further analysis of domestic pesticide treatment inventories and supply chains would help identify what is needed to boost the resilience of U.S. farms in a worst-case scenario.

USDA: Pursue and Encourage Alternatives to Conventional Fertilizer. The American wheat industry's reliance on conventional fertilizer has become increasingly challenging due to rising prices, global supply disruptions, and environmental costs. Greater emphasis is needed on adopting renewable fertilizers. While multiple solutions may be required to fill the gap, transitioning American agriculture to a more sustainable and regenerative approach is key.[101] The Biden administration has tried moving on this front and recently announced $500 million in funding for boosting domestic fertilizer production that is "independent, innovative, and sustainable."[102] This effort is worthwhile to help transition the United States off foreign fertilizer dependence. It does not, however, preclude the need to continue transitioning to more sustainable and regenerative agriculture.

One facet of sustainable agriculture that would help provide a viable alternative to synthetic fertilizers is the greater use of cover crops. Growing the same monoculture crop in the same field for years on end, as most conventional U.S. farmers do, damages the soil microbiome as the same nutrients are depleted over time. Conventional agriculture deals with this problem by applying large amounts of synthetic fertilizer to the soil. When cover crops are added to crop rotation, the cover crop plants naturally fertilize and rejuvenate soil health. Furthermore, a growing body of scientific research shows that yields from sustainable agricultural systems are comparable to that of conventional systems.[103]

The downside to cover crops is the inability to grow a desired crop (for example, wheat) for that growing season, which would reduce overall American wheat output. Options exist to compensate for drops in annual grain yields that would result from the broader use of cover crops. Addressing all options is beyond the scope of this essay, but one example is choosing cover crops that can act as cash crops that produce food and simultaneously amend the soil. An example of this would be cover crop legumes, which fix nitrogen to the soil that would be available for the next season's wheat.

Funding is another limiting factor and will be necessary to incentivize American farmers to widely adopt the use of cover crops. Sustainable agriculture receives little government funding compared to industrial agriculture. The most recent Farm Bill (a package of legislation Congress passes every 5 years to support U.S. agriculture) provided less than 7 percent of its funding for conservation practices.[104] USDA can increase funding for cover crop implementation by reducing Farm Bill spending in other areas overdue for adjustment, like conventional corn subsidies.[105]

USDA: Establish a National Strategic Grain Reserve. As previously noted, if Russia succeeded in some capacity to disrupt U.S. wheat production, resulting in domestic grain shortages, no current national wheat reserve exists to reduce the ensuing effects. Given how essential grain is to the U.S. food supply and the increasing probability of climate change's impact on global grain production, a strategic grain reserve makes sense. The need for a reserve has risen in recent times. For instance, droughts in 2012 affected corn production to such an extent that the United States had to import corn from Brazil, a surprising development for America as the world's leading corn producer.[106] Converting any remaining funds within the Bill Emerson Humanitarian Trust into a physical grain reserve and supplementing it by redirecting funding from conventional commodity crop subsidies could provide this much-needed resilience in our national food security.

State and Commerce Departments: Encourage Import-Dependent Countries to Boost Domestic Food Production to

Ukrainian President Volodymyr Zelensky, right, walks with Minister of Infrastructure Oleksandr Kubrakov during visit to Chornomorsk Sea Trade Port to watch Turkish-flagged dry cargo ship *Polarnet* loaded with grain for export, July 29, 2022, in Chornomorsk, Odesa Oblast, Ukraine (Ukrainian Presidential Press Office/Ukraine Presidency/Alamy Live News)

Minimize Exposure to Russian Grain Trade Manipulation. Having export markets available to American wheat not only can be lucrative for farmers and commodity traders but also can undermine efforts in those destination countries to develop greater self-sufficiency in food production. The United States will always need to produce more wheat than it consumes on average because this helps buffer against the effects of unforeseen production shortfalls regardless of the cause. It also assists trade partners in meeting their food requirements when they experience unexpected shortages or find themselves in positions where they cannot realistically become fully self-sufficient in their own food production. However, in a world where Russia is a global food power and can use inputs and commodities as weapons to win concessions, allies and partners should be encouraged to reduce their dependence on foreign food sources. Although this could reduce U.S. wheat exports in the long run, it would, more importantly, mitigate Russia's ability to exploit vulnerable countries to enhance their Great Power status.

DHS: Harden Information and Operational Technology Networks Used for Grain Production, Storage, and Transportation. Cyber security remains a challenge for organizations across all industries, but implications for breaches to critical infrastructure networks such as those in the grain industry are more severe and require greater attention to ensure proper security practices. For wheat industry organizations' information technology and operational technology networks, like other industries, known best practices provide the greatest defense against cyber attacks. However, many businesses fail to implement the full range of best practices due to limitations in understanding and the failure of company executives to invest appropriately in network defense.

Wheat industry leaders can leverage the National Institute of Standards and Technology cyber-security framework for guidance.[107] Taking this proactive approach to network defense will limit exposure to disruptive intrusions like the ransomware attacks that recently plagued Midwestern grain elevators.

Conclusion

As a rival in strategic competition and as the emerging food superpower, Russia is uniquely positioned to disrupt U.S. wheat production, storage, and delivery. Moscow has already demonstrated its intentions to attack U.S. interests in adversarial competition at levels below armed conflict, and future attempts to do so could realistically involve targeting the American wheat industry. As the

most important food staple in America, wheat supply degradation could have significant consequences for domestic food security and, by extension, trust in the U.S. Government. Should Russia pursue such a strategy, its tactics could range from cyber attacks on grain infrastructure to manipulating global fertilizer and wheat export markets to covert antiagriculture biowarfare.

To mitigate these threats, American policymakers should consider a range of policy options. First, further research is needed to measure risks of Russian disruption to the U.S. wheat industry. Results would more accurately prioritize policy considerations. In the meantime, prioritized policy considerations should include:

- improving biodiversity in U.S. wheat production
- ensuring sufficient resourcing for detection and response to a biological attack against U.S. crops
- enhancing sustainable agriculture to reduce dependence on imported fertilizer
- establishing a national grain reserve
- reducing global exposure to Russian grain trade manipulation
- encouraging the improved implementation of cyber security best practices throughout the wheat industry.

With an increased focus on reducing food system vulnerabilities, U.S. leaders and the world's citizens can reap a harvest of improved global security. **JFQ**

Notes

[1] Krishna Bahadur K.C. et al., "When Too Much Isn't Enough: Does Current Food Production Meet Global Nutritional Needs?" *PLoS ONE* 13, no. 10 (October 23, 2018), https://doi.org/10.1371/journal.pone.0205683.

[2] "FAOSTAT: Crops and Livestock Products," Food and Agriculture Organization of the United Nations (FAO), March 24, 2023, https://www.fao.org/faostat/en/#data/QCL.

[3] "Wheat Sector at a Glance," U.S. Department of Agriculture (USDA), May 5, 2023, https://www.ers.usda.gov/topics/crops/wheat/wheat-sector-at-a-glance/.

[4] "Feedgrains Sector at a Glance," USDA, May 17, 2023, https://www.ers.usda.gov/topics/crops/corn-and-other-feedgrains/feedgrains-sector-at-a-glance/.

[5] "Wheat Sector at a Glance."

[6] Steve Baragona, "2011 Food Price Spikes Helped Trigger Arab Spring, Researchers Say," Voice of America, December 13, 2011, https://www.voanews.com/a/article-2011-food-price-spikes-helped-trigger-arab-spring-135576278/149523.html.

[7] Qingqing Zhang et al., "Wheat Yield Losses from Pests and Pathogens in China," *Agriculture, Ecosystems, and Environment* 326 (March 2022), https://doi.org/10.1016/j.agee.2021.107821.

[8] "World Agricultural Production," USDA, July 2022, https://apps.fas.usda.gov/PSDOnline/Circulars/2022/07/production.pdf.

[9] "FAOSTAT."

[10] Baragona, "2011 Food Price Spikes Helped Trigger Arab Spring."

[11] Jamie Critelli and Gustavo Ferreira, "Does China Have Enough Food to Go to War? Practical Indicators for U.S. Military and Policy Makers," *Military Review* 102, no. 4 (July–August 2022), 91.

[12] "The Bill Emerson Humanitarian Trust," U.S. Agency for International Development, https://www.usaid.gov/news-information/fact-sheets/bill-emerson-humanitarian-trust.

[13] The U.S. wheat crop year runs June through May. See Andrew Sowell and Bryn Swearingen, "Wheat Outlook: November 2022," USDA, November 14, 2022.

[14] Ibid.

[15] The "time-to-survive" metric for measuring supply chain resilience is attributable to David Simchi-Levi, William Schmidt, and Yehua Wei. For further details, see David Simchi-Levi, "Find the Weak Link in Your Supply Chain," *Harvard Business Review*, June 9, 2015, https://hbr.org/2015/06/find-the-weak-link-in-your-supply-chain.

[16] *National Security Strategy* (Washington, DC: The White House, October 2022), 29, https://www.whitehouse.gov/wp-content/uploads/2022/10/Biden-Harris-Administrations-National-Security-Strategy-10.2022.pdf.

[17] Eugene Rumer, "The Primakov (Not Gerasimov) Doctrine in Action," Carnegie Endowment for International Peace, June 5, 2019, https://carnegieendowment.org/2019/06/05/primakov-not-gerasimov-doctrine-in-action-pub-79254.

[18] Sarah Jacobs Gamberini, "Social Media Weaponization: The Biohazard of Russian Disinformation Campaigns," *Joint Force Quarterly* 99 (4th Quarter 2020), 10, https://ndupress.ndu.edu/Portals/68/Documents/jfq/jfq-99/jfq-99_4-13_Gamberini.pdf.

[19] *National Security Strategy*, 23–25.

[20] The term *cyber attack* in today's lexicon is vague and holds multiple meanings. For the purposes of this essay, the term refers to computer network intrusions and disruptions. This contrasts with other forms of information warfare, such as influence operations, that leverage communications networks to influence targeted audiences.

[21] *GRIZZLY STEPPE—Russian Malicious Cyber Activity* (Washington, DC: Department of Homeland Security [DHS] and Federal Bureau of Investigation [FBI], December 29, 2016), 4, https://www.cisa.gov/sites/default/files/publications/JAR_16-20296A_GRIZZLY%20STEPPE-2016-1229.pdf; Jason Healey, ed., *A Fierce Domain: Conflict in Cyberspace, 1986 to 2012* (Vienna, VA: Cyber Conflict Studies Association, 2013), 205–207; "Dragonfly: Western Energy Companies Under Sabotage Threat," Symantec, June 30, 2014, https://symantec-enterprise-blogs.security.com/blogs/threat-intelligence/dragonfly-energy-companies-sabotage; Andy Greenberg, "The Russian Hackers Playing 'Chekhov's Gun' With U.S. Infrastructure," *Wired*, October 26, 2020, https://www.wired.com/story/berserk-bear-russia-infrastructure-hacking/; "Tactics, Techniques, and Procedures of Indicted State-Sponsored Russian Cyber Actors Targeting the Energy Sector," Cybersecurity and Infrastructure Security Agency (CISA), March 24, 2022, https://www.cisa.gov/uscert/ncas/alerts/aa22-083a; "Russian SVR Targets U.S. and Allied Networks," National Security Agency, CISA, and FBI, April 2021, https://media.defense.gov/2021/apr/15/2002621240/-1/-1/0/csa_svr_targets_us_allies_uoo13234021.pdf; "Statement by Deputy National Security Advisor for Cyber and Emerging Technology Anne Neuberger on SolarWinds and Microsoft Exchange Incidents," The White House, April 19, 2021, https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/19/statement-by-deputy-national-security-advisor-for-cyber-and-emerging-technology-on-solarwinds-and-microsoft-exchange-incidents/.

[22] *Background to "Assessing Russian Activities and Intentions in Recent U.S. Elections": The Analytic Process and Cyber Incident Attribution* (Washington, DC: Office of the Director of National Intelligence [ODNI], January 6, 2017), https://www.dni.gov/files/documents/ICA_2017_01.pdf; Robert S. Mueller, *Report on the Investigation Into Russian Interference in the 2016 Presidential Election* (Washington, DC: Department of Justice, March 2019).

[23] Alexander Marrow, "Russia's SWIFT Alternative Expanding Quickly This Year, Says Central Bank," Reuters, September 23, 2022, https://money.usnews.com/investing/news/articles/2022-09-23/russias-swift-alternative-expanding-quickly-this-year-says-central-bank.

[24] "FAOSTAT."

[25] "Production, Supply, and Distribution," USDA, https://apps.fas.usda.gov/psdonline/

app/index.html#/app/advQuery.

[26] Declan Walsh and Valerie Hopkins, "Russia Seeks Buyers for Plundered Ukraine Grain, U.S. Warns," *New York Times*, June 5, 2022, https://www.nytimes.com/2022/06/05/world/africa/ukraine-grain-russia-sales.html.

[27] Susanne A. Wengle and Vitalii Dankevych, "Ukrainian Farms Feed Europe and China. Russia Wants to End That," *Washington Post*, September 1, 2022, https://www.washingtonpost.com/business/2022/09/01/russia-attacks-ukraine-farm-economy/.

[28] Ibid.

[29] "Ukraine," Observatory of Economic Complexity (OEC), https://oec.world/en/profile/country/ukr.

[30] Amanda Macias and Gabriel Cortés, "Ukraine Agriculture Exports Top 10 Million Metric Tons Since Ports Reopened Under UN-Backed Black Sea Grain Initiative," CNBC, November 3, 2022, https://www.cnbc.com/2022/11/03/russia-ukraine-war-black-sea-grain-initiative-agriculture-exports-hit-milestone.html.

[31] Scott Reynolds Nelson, *Oceans of Grain: How American Wheat Remade the World* (New York: Basic Books, 2022).

[32] Michael Hogan and Gus Trompiz, "Russian Wheat Sales Climb as Buyers Seek Lower-Cost Options," *Business Recorder*, April 9, 2022, https://www.brecorder.com/news/40166176/russian-wheat-sales-climb-as-buyers-seek-lower-cost-options.

[33] Laura He, "China Lifts Restrictions on Russian Wheat Imports," CNN, February 25, 2022, https://www.cnn.com/2022/02/25/business/wheat-russia-china-intl-hnk/index.html.

[34] Nastassia Astrasheuskaya, "Russia Starts to Sow Seeds of 'Wheat Diplomacy,'" *Financial Times*, September 2, 2021.

[35] "Wheat," OEC, https://oec.world/en/profile/hs/wheat; Joana Colussi, Gary Schnitkey, and Carl Zulauf, "War in Ukraine and Its Effect on Fertilizer Exports to Brazil and the U.S.," *Farmdoc Daily* 12, no. 34 (March 17, 2022), https://farmdocdaily.illinois.edu/2022/03/war-in-ukraine-and-its-effect-on-fertilizer-exports-to-brazil-and-the-us.html.

[36] Alex Drozhzhin, "Russian-Speaking Cyber Spies Exploit Satellites," *Kaspersky Daily*, September 9, 2015, https://usa.kaspersky.com/blog/turla-apt-exploiting-satellites/5945/; Adam Meyers, "First-Ever Adversary Ranking in 2019 Global Threat Report Highlights the Importance of Speed," *CrowdStrike*, February 19, 2019, https://www.crowdstrike.com/blog/first-ever-adversary-ranking-in-2019-global-threat-report-highlights-the-importance-of-speed/; *CrowdStrike 2022 Global Threat Report* (Austin, TX: CrowdStrike, 2022), 25, https://irp.cdn-website.com/5d9b1ea1/files/uploaded/Report2022GTR.pdf.

[37] Jacob Bunge and Jesse Newman, "Ransomware Attack Roiled Meat Giant JBS, Then Spilled Over to Farmers and Restaurants," *Wall Street Journal*, June 11, 2021, https://www.wsj.com/articles/ransomware-attack-roiled-meat-giant-jbs-then-spilled-over-to-farmers-and-restaurants-11623403800.

[38] "Food and Agriculture Sector," CISA, https://www.cisa.gov/food-and-agriculture-sector.

[39] "Russian State-Sponsored and Criminal Cyber Threats to Critical Infrastructure," CISA, May 9, 2022, https://www.cisa.gov/uscert/ncas/alerts/aa22-110a; Andy Greenberg, *Sandworm: A New Era of Cyberwar and the Hunt for the Kremlin's Most Dangerous Hackers* (New York: Doubleday, 2019), 52–53.

[40] Jonathan Reed, "Ransomware Attacks on Agricultural Cooperatives Potentially Timed to Critical Seasons," *Security Intelligence*, September 14, 2022.

[41] "Hacking Farm to Table: Threat Hunters Uncover Rise in Attacks Against Agriculture," *CrowdStrike*, November 18, 2020, https://www.crowdstrike.com/blog/how-threat-hunting-uncovered-attacks-in-the-agriculture-industry/.

[42] Sergiu Gatlan, "Hackers Leaked Altered Pfizer Data to Sabotage Trust in Vaccines," *Bleeping Computer*, January 15, 2021, https://www.bleepingcomputer.com/news/security/hackers-leaked-altered-pfizer-data-to-sabotage-trust-in-vaccines/.

[43] Peter Mutschler et al., *Threats to Precision Agriculture*, 2018 Public-Private Analytic Exchange Program (Washington, DC: DHS and ODNI, 2018), https://doi.org/10.13140/RG.2.2.20693.37600; Dr. Douglas G. Luster, interview by author, November 16, 2022.

[44] "Organic Farming: Results from the 2019 Organic Survey," USDA, October 2020, https://www.nass.usda.gov/Publications/Highlights/2020/census-organics.pdf.

[45] "Sustainable Agriculture," USDA, https://www.nal.usda.gov/legacy/afsic/sustainable-agriculture-definitions-and-terms.

[46] "USDA Announces Plans for $250 Million Investment to Support Innovative American-Made Fertilizer to Give U.S. Farmers More Choices in the Marketplace," USDA, March 11, 2022, https://www.usda.gov/media/press-releases/2022/03/11/usda-announces-plans-250-million-investment-support-innovative.

[47] Colussi, Schnitkey, and Zulauf, "War in Ukraine and Its Effect on Fertilizer Exports to Brazil and the U.S."

[48] Ibid.

[49] Daniel Workman, "Top Fertilizers Exports by Country," *World's Top Exports*, 2022, https://www.worldstopexports.com/top-fertilizers-exports-by-country/.

[50] Jackie Northam, "How the War in Ukraine Is Affecting the World's Supply of Fertilizer," NPR, September 28, 2022, https://www.npr.org/2022/09/28/1125525861/how-the-war-in-ukraine-is-affecting-the-worlds-supply-of-fertilizer.

[51] Emma Farge, "UN Pushes for Global Fertilizer Price Cut to Avoid 'Future Crisis,'" Reuters, October 3, 2022, https://www.reuters.com/markets/commodities/un-pushes-global-fertilizer-price-cut-avoid-future-crisis-2022-10-03/.

[52] "USDA Announces Plans for $250 Million Investment."

[53] "Global Inflation Forecast to Rise to 7.5% by the End of 2022, Driven by Food, Fuel, Energy, and Supply Chain Disruption, Observes GlobalData," *GlobalData*, July 29, 2022, https://www.globaldata.com/media/business-fundamentals/global-inflation-forecast-rise-7-5-end-2022-driven-food-fuel-energy-supply-chain-disruption-observes-globaldata/.

[54] Farge, "UN Pushes for Global Fertilizer Price Cut."

[55] Russ Quinn, "Global Fertilizer Market Update," *DTN Progressive Farmer*, March 8, 2023, https://www.dtnpf.com/agriculture/web/ag/news/crops/article/2023/02/28/usda-ag-outlook-changes-coming.

[56] "Production, Supply, and Distribution."

[57] "Wheat: Overview," USDA, April 3, 2023, https://www.ers.usda.gov/topics/crops/wheat/.

[58] "Wheat 2021 Export Highlights," USDA, https://www.fas.usda.gov/wheat-2021-export-highlights.

[59] "Iran Sees No Benefit from Ukraine War as Russia Undercuts It on Steel and Oil," *Middle East Eye*, June 23, 2022, http://www.middleeasteye.net/news/iran-russia-ukraine-no-benefit-from-war-undercut-oil-steel.

[60] Astrasheuskaya, "Russia Starts to Sow Seeds of 'Wheat Diplomacy.'"

[61] Michael O. Pumphrey, interview by author, November 15, 2022.

[62] "Soviets Say U.S. Grain Exports Are Dirty, Decaying, and Insect-Ridden," *Los Angeles Times*, June 2, 1985, https://www.latimes.com/archives/la-xpm-1985-06-02-fi-15167-story.html.

[63] Gary Vocke, Edward W. Allen, and J. Michael Price, *The Economic Impact of Karnal Bunt Phytosanitary Wheat Export Certificates* (Washington, DC: USDA Economic Research Service, August 2010), https://www.ers.usda.gov/webdocs/outlooks/39643/8713_whs10h01_1_.pdf?v=1741.

[64] Nathan Donley, "How the EPA's Lax Regulation of Dangerous Pesticides Is Hurting Public Health and the U.S. Economy," Brookings Institution, September 29, 2022, https://www.brookings.edu/research/how-the-epas-lax-regulation-of-dangerous-pesticides-is-hurting-public-health-and-the-us-economy/.

[65] Milton Leitenberg, Raymond A.

Zilinskas, and Jens H. Kuhn, *The Soviet Biological Weapons Program* (Cambridge, MA: Harvard University Press, 2012), 698–700.

[66] Anthony Rimmington, *The Soviet Union's Agricultural Biowarfare Programme: Ploughshares to Swords* (Cham, Switzerland: Palgrave Macmillan, 2021).

[67] "Rust in the Bread Basket," *The Economist*, July 1, 2010.

[68] Rimmington, *The Soviet Union's Agricultural Biowarfare Programme*, 26.

[69] Dr. Don Huber, interview by author, November 11, 2022.

[70] Kenneth Alibek, "The Soviet Union's Anti-Agricultural Biological Weapons," *Annals of the New York Academy of Sciences* 894, no. 1 (1999), 18–19.

[71] Rimmington, *The Soviet Union's Agricultural Biowarfare Programme*, 49.

[72] Ibid., 84.

[73] Ibid., 144.

[74] "2021 Adherence to and Compliance with Arms Control, Nonproliferation, and Disarmament Agreements and Commitments," Department of State, April 15, 2021, https://www.state.gov/2021-adherence-to-and-compliance-with-arms-control-nonproliferation-and-disarmament-agreements-and-commitments/.

[75] Don M. Huber et al., *Invasive Pest Species: Impacts on Agricultural Production, Natural Resources, and the Environment*, Issue Paper No. 20 (Ames, IA: Council for Agricultural Science and Technology, March 2002), https://www.iatp.org/sites/default/files/Invasive_Pest_Species_Impacts_on_Agricultural_.htm.

[76] Jeffrey A. Lockwood, *Six-Legged Soldiers: Using Insects as Weapons of War* (New York: Oxford University Press, 2009), 242.

[77] Huber, interview.

[78] The term *Ug99* is now used in a more generic sense to include the original variant along with new associated genetic variants ("races").

[79] Ravi P. Singh et al., "The Emergence of Ug99 Races of the Stem Rust Fungus Is a Threat to World Wheat Production," *Annual Review of Phytopathology* 49, no. 1 (September 8, 2011), 465–481.

[80] Dr. Tim Murray, interview by author, March 7, 2022.

[81] Rimmington, *The Soviet Union's Agricultural Biowarfare Programme*, 50.

[82] Ibid., 126.

[83] Jungwook Park et al., "Comparative Genome Analysis of *Rathayibacter Tritici* NCPPB 1953 with *Rathayibacter Toxicus* Strains Can Facilitate Studies on Mechanisms of Nematode Association and Host Infection," *The Plant Pathology Journal* 33, no. 4 (August 2017), 370–381, https://doi.org/10.5423/PPJ.OA.01.2017.0017.

[84] Murray, interview.

[85] Lila Guterman, "One More Frightening Possibility: Terrorism in the Croplands," *The Chronicle of Higher Education*, October 26, 2001, https://www.ph.ucla.edu/epi/bioter/croplandsterrorism.html.

[86] Lockwood, *Six-Legged Soldiers*, 245–248.

[87] Rimmington, *The Soviet Union's Agricultural Biowarfare Programme*, 3.

[88] Alibek, "The Soviet Union's Anti-Agricultural Biological Weapons," 219.

[89] Marcellus M. Caldas and Stephen Perz, "Agro-Terrorism? The Causes and Consequences of the Appearance of Witch's Broom Disease in Cocoa Plantations of Southern Bahia, Brazil," *Geoforum* 47 (June 2013), 147–157.

[90] Joanne Silberner, "A Not-So-Sweet Lesson from Brazil's Cocoa Farms," NPR, June 14, 2008, https://www.npr.org/2008/06/14/91479835/a-not-so-sweet-lesson-from-brazils-cocoa-farms.

[91] Ortwin Renn, "Concepts of Risk: An Interdisciplinary Review," *GAIA—Ecological Perspectives for Science and Society* 17, nos. 1–2 (March 2008).

[92] Participants were provided with the following additional clarification: "Cyber attacks targeting grain storage/transport infrastructure could include the following actions: ransomware attacks against grain cooperative or port business networks; intrusions into industrial control systems networks involved in grain storage or transport." Participants also were provided: "Undercutting U.S. wheat exports in global markets could include the following actions: short-term price manipulations or subsidies to domestic wheat production to make Russian wheat exports more competitive in global markets; applying further diplomatic pressure on potential trade partners; spreading false claims about the health and quality of U.S. grain."

[93] The Delphi method is a structured technique used to achieve consensus among experts by conducting multiple rounds of questions. For further information, see Bernice B. Brown, *Delphi Process: A Methodology Used for the Elicitation of Opinions of Experts* (Santa Monica, CA: RAND, 1968), https://www.rand.org/pubs/papers/P3925.html.

[94] John Lidwell-Durnin and Adam Lapthorn, "The Threat to Global Food Security From Wheat Rust: Ethical and Historical Issues in Fighting Crop Diseases and Preserving Genetic Diversity," *Global Food Security* 26 (September 2020).

[95] The full extent of the landrace variety loss since the Green Revolution is unknown. For further explanation, see Maria R. Finckh et al., "Cereal Variety and Species Mixtures in Practice, With Emphasis on Disease Resistance," *Agronomie* 20, no. 7 (November 2000), 813–837.

[96] Abdullah A. Jaradat, *Wheat Landraces: Genetic Resources for Sustenance and Sustainability* (Washington, DC: USDA Agricultural Research Service, n.d.), https://www.ars.usda.gov/ARSUserFiles/50600000/products-wheat/AAJ-Wheat%20Landraces.pdf.

[97] Lidwell-Durnin and Lapthorn, "The Threat to Global Food Security from Wheat Rust."

[98] For more information about the National Plant Diagnostic Network, see https://www.npdn.org/.

[99] Murray, interview.

[100] Tom Polansek, "'Off the Charts' Chemical Shortages Hit U.S. Farms," Reuters, June 27, 2022, https://www.reuters.com/markets/commodities/off-charts-chemical-shortages-hit-us-farms-2022-06-27.

[101] According to the USDA, *sustainable agriculture* is defined as practices that "are intended to protect the environment, expand the Earth's natural resource base, and maintain and improve soil fertility." For more information, see "Sustainable Agriculture," USDA, https://www.nifa.usda.gov/topics/sustainable-agriculture.

[102] "Biden-Harris Administration Makes $500 Million Available to Increase Innovative American-Made Fertilizer Production," USDA, September 27, 2022, https://www.usda.gov/media/press-releases/2022/09/27/biden-harris-administration-makes-500-million-available-increase.

[103] For a summary of this research, see *The Fertilizer Trap: The Rising Cost of Farming's Addiction to Chemical Fertilizers* (Minneapolis: Institute for Agriculture and Trade Policy, November 8, 2022), 11, https://www.iatp.org/the-fertiliser-trap.

[104] "Farm Bill Spending," USDA, https://www.ers.usda.gov/topics/farm-economy/farm-commodity-policy/farm-bill-spending/.

[105] Tara O'Neill Hayes and Katerina Kerska, "PRIMER: Agriculture Subsidies and Their Influence on the Composition of U.S. Food Supply and Consumption," *American Action Forum*, November 3, 2021, https://www.americanactionforum.org/research/primer-agriculture-subsidies-and-their-influence-on-the-composition-of-u-s-food-supply-and-consumption/.

[106] Howard Schneider, "In Sign of Growing Clout, Brazil's Corn Helps Hold Up U.S. Market," *Washington Post*, November 18, 2012.

[107] For more information, see "Cybersecurity Framework," National Institute of Standards and Technology, https://www.nist.gov/cyberframework.

Navy Hospital Corpsman Second Class Jeffrey Ortberg, center, with Marine Medium Tiltrotor Squadron 265 (Reinforced), 31st Marine Expeditionary Unit, asks for assistance on simulated casualty during mass casualty exercise aboard amphibious assault ship USS *America*, Pacific Ocean, June 19, 2023 (U.S. Marine Corps/Christopher R. Lape)

It's Not Just About the Algorithm

Development of a Joint Medical Artificial Intelligence Capability

By Benjamin P. Donham

Recent advances in artificial intelligence (AI) have highlighted the sophisticated potential of this technology to drastically improve all aspects of medicine. As the joint force prepares for large-scale combat operations, the number of anticipated casualties will greatly exceed available medical resources. Artificial intelligence has the promise of significantly improving many aspects of combat casualty care, including maximizing the impact of limited medical capabilities. However, because of the military's unique operating environment, the military health system cannot rely on civilian medicine to develop AI capabilities that will be directly applicable to combat casualty care. Given this, the military health system needs to develop a strategic

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approach to the generation of a medical AI capability for the joint force.

To accomplish this, the military health system first needs to establish a medical AI cross-functional team, which would set the conditions for future capability development. This cross-functional team would then need to develop a common data dictionary and assist the military health system in its transition into a digital organization that passively collects a large amount of high-quality data. Once this infrastructure is established, the focus should then shift toward developing algorithms to support evacuation platform choices, geographic allocation of medical units, predictive Class VIII resupply, and the critical development of a high-quality mass casualty triage algorithm. Implementation of a dedicated strategy to develop a medical AI capability has the potential to significantly improve combat casualty care and reduce strategic risk to the joint force.

Hypothetical Vignette

It is the year 2028, and a large-scale combat operation has broken out between the United States and a hostile force. A U.S. Marine infantry platoon is maneuvering to attack an enemy objective. Hovering above the Marines are autonomous loitering munitions also known as armed drones. Using artificial intelligence, these drones rapidly identify the platoon and recognize them as Marines. Then, without a human in the decisionmaking cycle, multiple loitering munitions strike the platoon, critically wounding 40 Marines. The lone uninjured corpsman, far from medical assistance, is overwhelmed by the number of casualties. Whom should the corpsman treat, and in what order? Who can go back to the fight, and who needs to be evacuated? Humans can only effectively manage and retain four to seven items of information in their working memory at a time.[1] *Given this, it is no surprise the overwhelmed corpsman is unable to effectively prioritize, triage, treat, and evacuate the wounded. Multiple Marines with potentially survivable wounds succumb to their injuries because of a lack of treatment. This scene is captured via high-definition video by a remaining drone conducting battle damage assessment. As part of the enemy's psychological operations campaign, this video is rapidly disseminated via social media to the American public with the intent of weakening U.S. strategic resolve.*

While this hypothetical vignette is jarring, it reflects the battlefield capability of current times. The recent development of powerful AI tools offers the potential to fight back. It also has the potential to revolutionize battlefield medicine, improve casualty care, and reduce the joint force's strategic risk from many casualties during large-scale combat operations.

Background

The convergence of increased computer processing power, ubiquitous data collection, and increased sophistication of computer science has led to the fourth industrial revolution. The distinguishing feature of this revolution is the merging of physical and digital systems resulting in the creation of intelligent and autonomous systems. A key component of this revolution is *artificial intelligence*, which is defined as the ability of systems to acquire their own knowledge, as opposed to relying on hard-coded knowledge, by extracting patterns from raw data.[2] As a central component of the fourth industrial revolution, AI is already impacting all aspects of society, from art to politics.

The strength of artificial intelligence is that it can process vast amounts of data quickly and accurately. This allows AI to identify patterns too complex for humans to identify, and, in certain domains, AI's decision quality is surpassing that of humans. For example, in 2016 an AI system called AlphaGo defeated the world champion in the ancient Chinese board game Go.[3] Prior to this, many believed that because of the game's complexity, Go was an unbeatable game for machines.

Artificial intelligence also has the potential to significantly improve health care by improving many aspects of medicine, including drug development, radiological interpretation, patient monitoring, documentation, and more. Artificial intelligence can already accurately interpret chest radiographs,[4] and the potential of AI in image interpretations is so great that some have even speculated that it might end the specialty of radiology, which is responsible for medical image interpretations.[5] Also, AI can speed up the drug discovery process by analyzing vast amounts of data to identify potential drug candidates and predict their efficacy.[6] Furthermore, AI-powered wearables/remote monitoring systems can track patient vital signs and alert healthcare providers to potential health issues before they become critical.[7] Last, AI can automate administrative tasks such as scheduling appointments, managing medical records, and handling insurance claims, freeing up healthcare professionals to focus on patient care.[8]

While AI has the potential to transform medicine, it also presents some distinct challenges, such as data privacy, algorithmic bias, and ethical considerations of an algorithm making high-consequence decisions. Even so, with proper regulation and oversight, AI has the potential to improve patient outcomes and improve healthcare delivery. Given this exciting scenario, it is critical that the military health system establish the infrastructure required to take advantage of this emerging technology.

The major challenge facing the military health system during future conflicts will be how to apply a limited medical capability to an overwhelming number of casualties. Central to optimizing the use of limited medical assets during large-scale combat operations will be greater use of AI. Artificial intelligence could assist with decisionmaking across a range of medical capabilities. While AI is not a panacea to solve all problems, and even though several barriers remain before this concept can become reality, AI has great potential to optimize medical operations at scale.

Operational Environment

Given the high lethality and precision of current munitions, large-scale combat operations are expected to generate far more casualties than the military's medical system can treat. For example, current estimates predict that an Army corps of 90,000 Soldiers would face about 50,000 casualties over 8 days of

fighting.[9] For context, a corps has an organic medical brigade with about 350 hospital beds. Even when one considers additional Role I–II capacity (battalion aid stations/medical company) and potential augmentation with Reserve medical units, it is clear the demand for medical capability, both beds and medical assistance, will vastly exceed capacity. The central problem facing the military health system is scale; the number of casualties requiring treatment will outstrip the capacity of available medical resources.

This fundamental mismatch will lead to significant strategic risk. If operational units are inundated with casualties they cannot evacuate, there is a higher likelihood these units will no longer be able to perform offensive operations. Additionally, the American public has become conditioned to believe that every injured Servicemember will receive high-quality medical care. The strategic will of the public could be shaken by images of injured Servicemembers dying before receiving medical care. For example, antiwar protests in the United States significantly increased in 1968 after the Tet Offensive. At this point in the Vietnam conflict, the United States had taken 30,484 fatalities, which, for context, is about 20,000 fewer deaths than expected after 8 days of combat for an Army corps–size element during large-scale combat operations.[10] Taken together, the potential lack of quality battlefield care could lead to significant strategic risk to both the mission and the force.

Overview

Artificial intelligence has been around for decades, but in the last 5 years, its ability to solve complex problems has improved markedly. Recent advances in computing power, combined with massive increases in data collection, have facilitated rapid advances. One of AI's emerging strengths is its ability to decipher large, complex problems that are difficult for humans to solve. For example, Google developed an AI algorithm using 128,000 retinal photographs that could not only diagnose diabetic retinopathy more accurately than fellowship-trained ophthalmologists[11] but could also accurately predict the risk of cardiovascular events.[12] To the surprise of the Google engineers who design AI algorithms, it could accurately predict a patient's sex.[13] This highlights AI's ability to find patterns in data that, because of scale, humans cannot perceive.

Artificial intelligence is a generic term that encompasses many related but different techniques. At its basic level, all AI finds patterns and answers questions. It is designed to take input data, apply an algorithm, and then produce output data, often predicting the probability of a specific outcome. At one end of the AI spectrum are expert systems designed to mimic decisions a human expert would make. At the other end are the most sophisticated, powerful, and complex AI technologies, including machine learning, deep learning, and neural networks. Because of this complexity, deep learning models require massive amounts of data and computing power to develop. Manual data entry systems typically cannot keep up.

For example, many of the most common deep learning models of image classification use the ImageNet database, which contains 14 million labeled images and is 150 gigabytes in size.[14] Frequently, deep learning models use transfer learning, in which a model incorporates knowledge gained from training on a different but related task to decrease the data required to learn a new task. Even with the use of transfer learning, however, deep learning algorithms demand gigabytes of data. For context, one of the most famous deep learning models, ChatGPT, was trained using a 570-gigabyte data set.[15] In comparison, the entire Joint Trauma System Department of Defense (DOD) Trauma Registry, including 15 years of patient data, is only 0.017 gigabytes.[16] This is orders of magnitude less data than what is needed for the simplest deep learning algorithm developed using transfer learning.

Air Force medics treat simulated patient during Medic Rodeo at Melrose Air Force Range's Training Area 3B, New Mexico, August 23, 2023 (U.S. Air Force/Elora J. McCutcheon)

Army Captain Ashley Sarlo, critical care nurse attached to 240th Forward Resuscitative Surgical Detachment, simulates experimental postoperative critical care at Camp Grayling, Michigan, August 12, 2023, during Northern Strike 2023 (U.S. Air National Guard/Jacob Cessna)

Establishing a Cross-Functional Medical AI Team

Because of the unique combination of specialties required to develop AI, DOD should develop a cross-functional team dedicated to facilitating the development of medical AI. The team should be composed of a data scientist, a provider experienced in battlefield medicine, and a computer scientist with expertise in AI. In addition to skills in algorithm development, this team needs expertise in fields relevant to operationalizing this technology and therefore should include individuals with expertise in the joint communications infrastructure.

Artificial intelligence's potential to improve decisions in casualty care and medical resource allocation is broadly applicable across each Service's medical department. Although each Service will have unique AI capability needs, establishing baseline medical AI capability has the potential to significantly benefit the entire joint force. Each Service is struggling with how to distribute limited medical resources most effectively to an overwhelming number of casualties expected during large-scale combat operations. A cross-functional team would help coordinate efforts across Services and reduce redundancy. The Defense Health Agency is the most appropriate location for such a team, given that it is responsible for executing the Defense Health Program appropriation.

Several organizations, including the Defense Advanced Research Projects Agency; MIT Lincoln Laboratory; U.S. Army Natick Soldier Systems Center; Joint Program Executive Office for Chemical, Biological, Radiological, and Nuclear Defense; and others are working on medical AI capability. However, no single organization is responsible for coordinating and synchronizing this development effort. The establishment of a common medical data infrastructure would have a synergistic effect on the development of medical AI capability and would benefit all organizations working this problem set.

Data Infrastructure and Collection

Developing an effective AI model requires high-quality data. The adage "garbage in, garbage out" highlights the necessity for AI development of trustworthy data specific to the problem of interest. There is simply no substitute.

To generate high-quality data, the joint medical community first needs to develop a common and standardized medical data infrastructure to establish a framework for future medical AI development. Commonly referred to as a data dictionary or schema, this data infrastructure would standardize data collection and allow different data sets to be interoperable. Essentially, such a schema would provide a common language among data sets that would contain a structured description of the data, including its format, meaning, relationships, and other attributes. Such a data dictionary is an essential tool to ensure that data is used consistently and accurately. For example, the terms *chest tube*, *tube thoracotomy*, and *chest drain* are all commonly used to describe the same battlefield procedure. However, without a common data dictionary that defines their equivalence, the interoperability between different data sets using different terms for the same procedure would be significantly limited. Establishing a clear and structured understanding of the relationship among different data sets as part of a data schema is critical for establishing the foundation of future effective medical AI development.

Once a coordinated data scheme is developed, the military health system must transition from industrial-age manual data entry practices to those of the digital age, which allow data to be passively and continuously collected. Currently, most of the data the military health system collects is entered by hand. For example, if a deployed Servicemember were injured today, his or her clinical information would be recorded by hand into DD Form 1380, "Tactical Combat Casualty Care." Additional clinical information would be manually entered into the Armed Forces Health Longitudinal Technology Application–Theater (AHLTA-T). Other information, such as medical logistics resupply requirements, hospital bed status, and available units of blood, are entered manually into legacy products such as Excel or PowerPoint.

Moving beyond this antiquated system will require developing and investing in a system of passive and continuous digital data collection from the bottom up, so human data entry is not required. For example, instead of manually inputting medical supply inventories into the Medical Materiel Mobilization Planning Tool, an AI image-recognition algorithm could use video of Class VIII storage to automatically update quantities of medical supplies on hand in the system of record. Future replacements for DD Form 1380 and AHLTA-T could be designed to passively record heart rate, blood pressure, and oxygen saturation.

A particularly important aspect of building this data infrastructure relies on developing wearable technology. Wearables are small electronic devices that track physiologic parameters such as heart rate, sleep, and movement. Collecting individual physiologic data is critical for understanding Servicemember baselines, which allows for optimization of performance and medical treatment. Currently, DOD is developing the Health Readiness and Performance System (HRAPS) to provide actionable information regarding the operational physiology of troops to their unit leadership. Although this program focuses primarily on human performance and injury prevention, it is based on technology that has the potential to be a powerful facilitator of AI and medical care.

Collection of real-time physiologic data for each individual could create a physiologic baseline in the event of an injury and could use AI analysis to assist in medical care. Collectively, this data could be used to rapidly identify mass casualty events, recognizing, for example, the nature and impact of chemical or biological weapons use. The collective physiologic data could also be used to inform the medical common operating picture by using AI to predict where to optimally place medical resources.

Establishing this medical data infrastructure will not be easy. Healthcare data privacy concerns, operational security requirements, and communications constraints will provide barriers. But these important constraints can be, and must be, overcome for the military health system data infrastructure to take advantage of the full potential of AI. The military health system data system needs to be transformed into something like Amazon, a system that passively collects large amounts of high-quality data and then uses an AI model to provide accurate predictions facilitating high-quality decisions. This in turn reduces waste and maximizes the impact of limited resources.

Algorithm Development

Once an appropriate data infrastructure is in place, multiple operationally specific AI algorithms could be developed to address the multitude of challenges facing the military health system during large-scale combat operations. These potential future applications of AI are described in *Army Futures Command Medical Concept 2028*:

> *AI-enabled MEDCOP* [Medical Common Operating Picture] *will rapidly receive, organize, analyze, interpret, and display contextually relevant information and generate risk-informed recommendations that comprehensively consider the use of Army and UAP* [Unified Action Partners] *capabilities. . . .*
>
> *AI-enabled collaboration, decision-support, and casualty management systems enable medical regulating forward of the division rear boundary and the identification of expected MEDEVAC arrival, area medical capabilities and statuses, and expected arrival of medical resupply.*[17]

While there are many potential beneficial uses of AI to assist with combat casualty care, the priority should be to develop a clinical algorithm to assist with point of injury mass casualty triage. Given large-scale combat operations' limited medical assets, it is imperative that we are able to accurately triage wounded Servicemembers. This would not only improve critical medical care but also allow Servicemembers to return to duty after the lowest level of appropriate care. This would be a cultural change from the global war on terror, during which those with minimal injuries were evacuated to limit their risk.

The scale of triage needed after future battles is likely to be so large that human decisionmaking will fall short. AI will speed and sharpen this decisionmaking process, and it will allow medical officers to accurately determine medical evacuation priorities. In certain instances, it may be necessary to adjust the risk acceptance of the algorithm so that commanders conserve as much combat power as possible, even at higher risks. Risk acceptance in combat is not static, and users will need the ability to adjust the risk acceptance of a triage algorithm.

We know that clinicians can make accurate triage decisions based on the appearance of a patient and other limited data.[18] We also know that AI is particularly effective with image and voice data. Given this knowledge, there is a high likelihood that an accurate triage algorithm could be developed using short audio/video recordings combined with vital sign data from wearables. Optimally, this could be developed by civilian partners who frequently see a high volume of trauma patients. It could be collected with time-dependent outcome data. This algorithmic development could occur concurrently with the development of the medical data infrastructure. One could envision a Servicemember at the point of injury quickly taking audio/video recordings of

Army Soldiers from 16th Combat Aviation Brigade, 7th Infantry Division, conduct medical evacuation training during exercise Super Garuda Shield 2023, in Puslatpur, Indonesia, August 30, 2023 (U.S. Army/Wyatt Moore)

multiple injured troops. His or her Nett Warrior device (an integrated dismounted leader situational awareness system), equipped with an AI algorithm, could then rapidly inform him or her who can return to duty, who requires evacuation, and the location where they need to be evacuated.

Special Considerations With AI Development

The AI community is currently struggling with several issues of particular importance to military health care. These include the transparency and bias of algorithms, the level of AI autonomy in high-consequence decisions, and who ultimately assumes the risk if AI fails while making a high-consequence decision. It is important to keep these in mind while building a future AI infrastructure.

A transparent AI system should be explainable, interpretable, and understandable to human users. However, some of the most advanced AI models, such as ChatGPT and DALL-E, are developed using deep learning neural networks, which are complex and highly interconnected systems that can be difficult to interpret. These deep neural network AIs are considered "black box" AI because they operate in an opaque or "hidden" manner. These systems' decisionmaking processes are not easily understood or explained by humans. In a black box AI system, input data is fed into the system, and output is generated without any clear understanding of how the system arrived at its decision or conclusion. This lack of transparency can be a major problem in high-consequence medical decisions because it can make it difficult to identify errors or biases. It is therefore critical to invest in developing techniques to make even the most complex AI systems more transparent and interpretable.

In addition to transparency, bias in AI requires special consideration. Bias in AI refers to the tendency of algorithms to produce results that systematically and consistently discriminate against certain individuals or groups. The majority of AI systems are trained using a technique called supervised learning where AI uses data that includes predictors and responses to learn about a specific topic. If the data used to train AI contains biases or reflects social inequalities, then the AI system will learn and perpetuate those biases. For example, AI trained to detect melanoma using imaging data sets that only include light-skinned patients will be biased and less effective detecting melanoma in individuals with a darker skin color.[19] The military needs to scrutinize the AI it develops to ensure it is not encoding existing bias. The high consequence of medical decisions demands that the military holds its medical AI to a higher standard than other fields.

The use of AI in medicine is different from other fields where AI is used because of the high consequence of medical decisions. AI systems can be categorized into different levels of autonomy based on the degree to which they operate independently of human input and supervision. The spectrum of autonomy can range from partial autonomy, with humans still in the loop, to fully autonomous systems that operate without any direct human interaction. It is still an open question how much autonomy to grant AI to make high-consequence medical decisions. Many authors believe that for high-consequence decisions, AI should never be fully automated, but should be used to inform the decisions of humans who remain in control. This form of partial automation is commonly referred to as Centaur AI, half-human/half-machine.

Airman with 96th Medical Group provides aid to simulated victim during scenario for Tactical Combat Casualty Care training, November 17, 2022, at Eglin Air Force Base, Florida (U.S. Air Force/Samuel King, Jr.)

Additionally, the military must decide who owns the risk when AI fails. Just like any new technology, AI will not work perfectly at its inception. Given the difficulty of replicating battlefield injury conditions, the military likely will face a large learning curve when it first uses AI on the battlefield. One can envision a scenario in which an isolated, overwhelmed junior medic performing mass casualty triage would defer to a partially automated AI algorithm. If that happens and lives were lost because of an error in an AI system, who would be held responsible? The commander, the Servicemember, the Defense Health Agency, or DOD? These are difficult and complex questions that the military has not fully thought through.

Last, the U.S. Government needs to own these algorithms because AI systems will require rapid adjustments. If the development of medical AI algorithms is contracted out to a nongovernmental company, the military health system will not be able to adjust this technology with the speed and flexibility needed. In general, statement of work changes on government contracts go through a formal process that involves several steps, and this process can take anywhere from a few weeks to several months or more. Effective AI requires iterative development, and the algorithms require constant updating. The speed required for effective AI development is on the order of hours to days, not weeks to months. Because of this, development needs to be owned by the U.S. Government, even if it is developed by contracted personnel. While this might be more time-consuming up front, the speed and flexibility this approach enables are critical to the overall success of developing a military medical AI capability.

Communications Synchronization

Once medical AI systems have been developed, they still need to be incorporated into the joint communications infrastructure. For instance, in a battlefield mass casualty event, tactical sensors would gather patient data and send it to a medic's Nett Warrior. The medic could then use an AI triage algorithm to analyze the data. Then the cumulative data from the mass casualty would be transmitted into the medical common operating picture where AI could be used to predict which medevac assets are needed, where to position additional medical capacity, and how to predictively push Class VIII resupply. At any point in this communications chain, an effective AI algorithm could easily malfunction due to a lack of a data transfer. Given this, it is critical that AI infrastructure development be fully nested within the established joint communications infrastructure.

Without seamless integration with the overall joint communications and data infrastructure, AI will not be effective. Additionally, bandwidth will be limited in large-scale combat operations, so it is critical that low-bandwidth data solutions are explored. One solution might be edge computing, in which a distributed computing paradigm brings computation and data storage closer to the sources of data. For example, it might exist on the physiologic sensor such as the HRAPS itself, instead of relying on centralized cloud servers. Edge computing is a powerful tool that could help the joint force operate in contested communications environments, enabling faster, more secure, and more efficient data processing and analysis at the edge of the network. Because of this, edge computing options should be explored and incorporated into the overall medical AI infrastructure.

Alternate Ending to Hypothetical Vignette

It is 2028, and large-scale combat operations have broken out again. However, the military health system took advantage of the last 5 years and aggressively developed AI capabilities, improving the ability to take care of wounded Servicemembers. After the initial casualty event, the corpsman releases several small unmanned aerial vehicles. These drones use onboard sensors to identify wounded personnel and collect physiologic, movement, audio, visual, and location data on them. This information is combined with individual physiology data, including physiologic baseline from wearable sensors, and sent to the corpsman's

body armor–mounted Nett Warrior phone. An AI algorithm then takes that data and instantly triages the injured Marines, rapidly identifying those Marines who require lifesaving interventions. While the corpsman is treating those Servicemembers with the most time-sensitive injuries, the cumulative data is being transmitted back to the joint operations center. There, additional AI algorithms determine the type and number of evacuation platforms needed to evacuate the wounded. Other algorithms are used to determine where to reposition available medical assets on the battlefield to respond effectively. Class VIII expenditure also is predicted by AI, and resupply is pushed to units in need before any request is received. Through the effective use of this new technology, limited medical assets are effectively applied to a large number of casualties. This limits battlefield morbidity/mortality and also reduces the impact of casualties on maneuver forces, facilitating the additional combat power that is critical during large-scale combat operations.

Artificial intelligence has the potential to drastically improve military medicine's ability to care for combat casualties during large-scale combat operations. To take full advantage of this technology, the military health system needs to take a comprehensive approach to developing its infrastructure. First, a cross-functional team with data scientists, computer scientists, communications experts, and providers with domain expertise in battlefield medicine needs to be established to set the conditions for the development of future medical AI capability. Once this cross-functional team is established, it needs to develop a common data dictionary that will allow standardization of data sets and facilitate consolidation of different data sets. Concurrently, the military health system needs to transition from analog data organization into digital organization where high-quality, passively collected medical data is fully incorporated into joint communications systems. Once this underlying data infrastructure is established, it will set the conditions for the development of a wide variety of medical AI capabilities. Although there are many applications where medical AI could improve battlefield medicine, including decision support for evacuation platform choices, geographic allocation of medical units, and supply of medical equipment and consumables, a special emphasis should be placed on developing a high-quality mass casualty triage algorithm. This algorithm is critically needed during large-scale combat operations to maximize the impact of medical care and to aggressively return Servicemembers to duty at the lowest echelons of care. Implementation of these elements would greatly increase the joint force's ability to take advantage of the powerful potential of AI, significantly improve combat casualty care, and reduce overall strategic risk. **JFQ**

Notes

[1] G.A. Miller, "The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity for Processing Information," *Psychological Review* 101, no. 2 (April 1994), 343–352.

[2] Ian Goodfellow, Yoshua Bengio, and Aaron Courville, *Deep Learning* (Cambridge, MA: MIT Press, 2016).

[3] David Silver et al., "Mastering the Game of Go with Deep Neural Networks and Tree Search," *Nature* 529, no. 7587 (January 28, 2016), 484–489.

[4] Paras Lakhani and Baskaran Sundaram, "Deep Learning at Chest Radiography: Automated Classification of Pulmonary Tuberculosis by Using Convolutional Neural Networks," *Radiology* 284, no. 2 (August 2017), 574–582.

[5] Katie Chockley and Ezekiel Emanuel, "The End of Radiology? Three Threats to the Future Practice of Radiology," *Journal of the American College of Radiology* 13, no. 12, pt. A (December 2016), 1415–1420.

[6] Nariman Noorbakhsh-Sabet et al., "Artificial Intelligence Transforms the Future of Health Care," *The American Journal of Medicine* 132, no. 7 (July 2019), 795–801.

[7] Daniele Ravi et al., "Deep Learning for Health Informatics," *IEEE Journal of Biomedical and Health Informatics* 21, no. 1 (January 2017), 4–21, https://doi.org/10.1109/JBHI.2016.2636665.

[8] Noorbakhsh-Sabet et al., "Artificial Intelligence Transforms the Future of Health Care."

[9] Matthew Fandre, "Medical Changes Needed for Large-Scale Combat Operations," *Military Review*, May 2020, 36–45, https://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/May-June-2020/Fandre-Medical-Changes/.

[10] "Vietnam War U.S. Military Fatal Casualties Statistics," National Archives and Records Administration, https://www.archives.gov/research/military/vietnam-war/casualty-statistics.

[11] Varun Gulshan et al., "Development and Validation of a Deep Learning Algorithm for Detection of Diabetic Retinopathy in Retinal Fundus Photographs," *JAMA* 316, no. 22 (December 13, 2016), 2402–2410, https://doi.org/10.1001/jama.2016.17216.

[12] Ryan Poplin et al., "Prediction of Cardiovascular Risk Factors from Retinal Fundus Photographs via Deep Learning," *Nature Biomedical Engineering* 2, no. 3 (March 2018), 158–164.

[13] Bjorn Kaijun Betzler et al., "Gender Prediction for a Multiethnic Population via Deep Learning Across Different Retinal Fundus Photograph Fields: Retrospective Cross-Sectional Study," *JMIR Medical Informatics* 9, no. 8 (August 2021), https://doi.org/10.2196/25165.

[14] Jia Deng et al., "ImageNet: A Large-Scale Hierarchical Image Database," in *2009 IEEE Conference on Computer Vision and Pattern Recognition*, Miami, FL, June 22, 2009, 248–255.

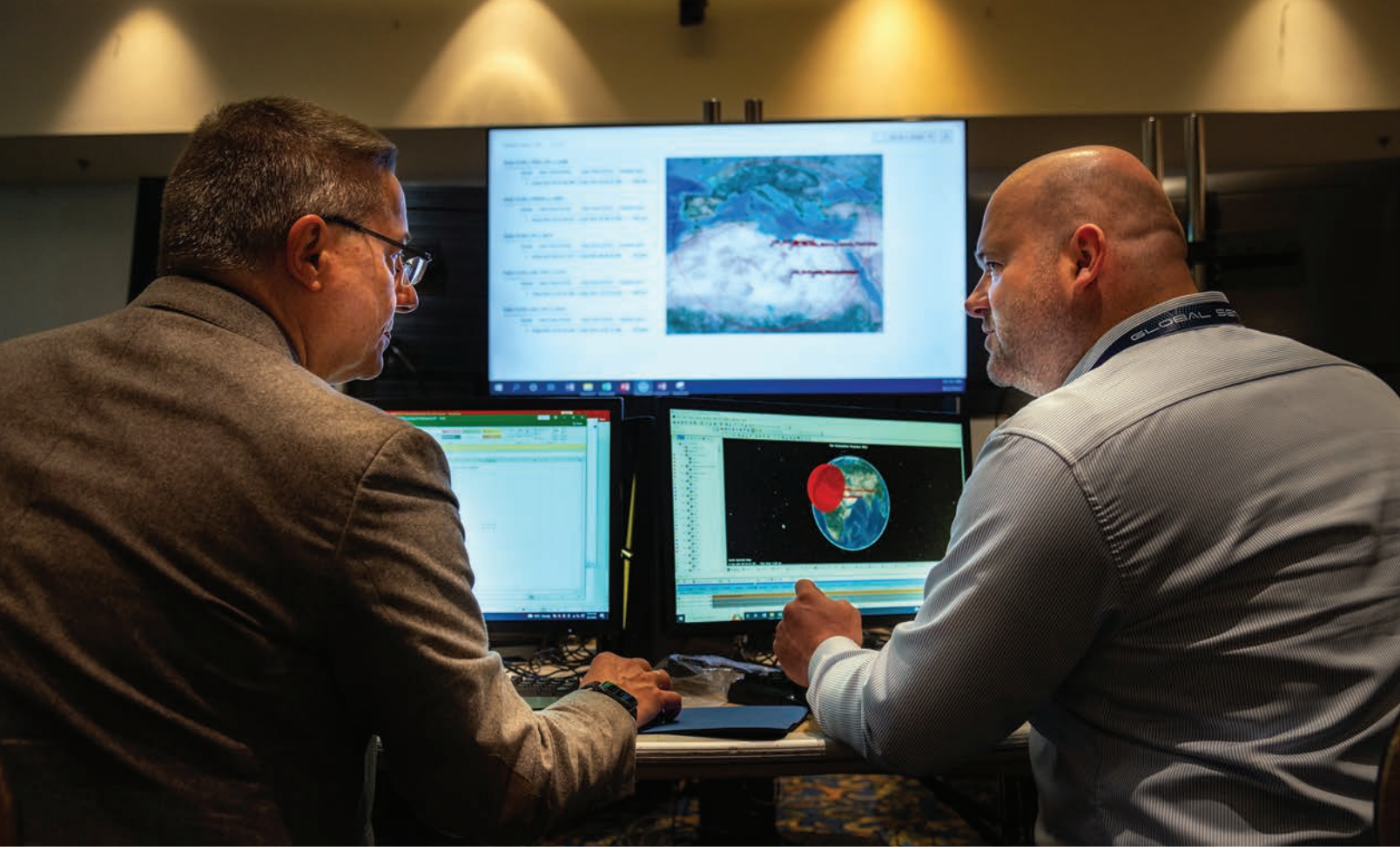
[15] Alex Hughes, "ChatGPT: Everything You Need to Know About OpenAI's GPT-4 Tool," *BBC Science Focus*, June 6, 2023, https://www.sciencefocus.com/future-technology/gpt-3/; "GPT-4 Is OpenAI's Most Advanced System, Producing Safer and More Useful Responses," *OpenAI*, https://openai.com/gpt-4.

[16] Nicholas D. Drakos, personal communication with author on size of the Joint Trauma System Department of Defense Trauma Registry, n.d.

[17] Army Futures Command Pamphlet 71-20-12, *Army Futures Command Concept for Medical 2028* (Washington, DC: Headquarters Department of the Army, March 4, 2022), 11.

[18] Jeffrey Wiswell, "'Sick' or 'Not-Sick': Accuracy of System 1 Diagnostic Reasoning for the Prediction of Disposition and Acuity in Patients Presenting to an Academic ED," *American Journal of Emergency Medicine* 31 (2013), 1448–1452.

[19] Giona Kleinberg et al., "Racial Underrepresentation in Dermatological Datasets Leads to Biased Machine Learning Models and Inequitable Healthcare," *Journal of Biomed Research* 3, no. 1 (2022), 42–47.



Participants from Germany Space Situational Awareness Centre monitor, track, and assess simulated antisatellite weapon attack along with resulting space debris during 7th and final day of Global Sentinel 2022, Vandenberg Space Force Base, California, August 2, 2022 (U.S. Space Command/John Ayre)

Space Denial
A Deterrence Strategy

By Nathaniel A. Peace

Space assets are strategic and crucial to U.S. national security in maintaining military superiority across the land, maritime, air, and cyber domains. Space-based capabilities offer support in areas such as missile warning; nuclear detection warning; secure communications; intelligence-gathering; terrestrial and space weather forecasts; positioning, navigation, and timing; and data transport for the joint warfighter. Integral to joint force operations is space power's core competency of information mobility that delivers "timely, rapid, and reliable collection and transportation of data across the range of military operations in support of tactical, operational, and strategic decisionmaking,"[1] enabling lethality and effectiveness and providing the United States with an unrivaled military advantage.

U.S. adversaries recognize this advantage and intend to challenge American interests in space. The conventional belief that outer space constitutes a peaceful global domain has been debunked, as China, Russia, and India have demonstrated their capabilities to target and destroy a satellite. The 2020 Defense Space Strategy explicitly calls Russia and China the "greatest strategic threat due to their development, testing, and deployment of counter space capabilities."[2] Air Force Secretary Frank Kendall stated in March 2022, "Our general posture has been to assume essentially impunity in space . . . that era is over."[3] As the leading space powers continue to enhance their direct-ascent capabilities, the United States must adopt a deterrence strategy through

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building robust constellations, optimizing satellite placement, and integrating U.S. Government–owned sensors on allies, strategic partners, and commercial satellites.

This article first provides an overview of how we got here by examining five direct-ascent demonstrations since 2007 that ended the 13-year moratorium and altered the status quo. Second, it explores John J. Mearsheimer's conventional deterrence theory and how the adversary's perception of the probability of success versus failure determines whether deterrence is upheld. Third, the structural deterrence model is explained, and its framework is used to operationalize Mearsheimer's conventional deterrence theory. Fourth, this operationalized deterrence framework is applied to support the argument for a deterrence-by-denial strategy against direct-ascent weapons systems examining robust constellations, optimized satellite placement, and hosted payload concept using allies, partners, and commercial entities. The conclusion summarizes the deterrent advantages and characteristics defined by the model to support the argument.

How We Got Here

This section recounts the five direct-ascent demonstrations that have altered the status quo since 2007, explaining how we arrived at this point. The first demonstration is China's 2007 direct-ascent demonstration against a defunct weather satellite, followed by the U.S. 2008 direct-ascent antisatellite military operation that destroyed a tumbling National Reconnaissance Office satellite after a failed launch. Next, China's 2013 mobile ground-based hit-to-kill direct-ascent demonstration, which showed the country's capability to target satellites in low, medium, and geostationary Earth orbit, is examined. Finally, there was India's 2019 fixed ground-based demonstration and Russia's 2021 Nudol test, the two most recent direct-ascent antisatellite demonstrations in low Earth orbit.

On January 11, 2007, China launched an SC-19 ballistic missile from the Xicheng space facility in Sichuan Province. The SC-19 targeted an aging Chinese weather satellite deployed in a low Earth orbit at an altitude of 864 kilometers (536 miles),[4] demonstrating a fixed ground-based hit-to-kill direct-ascent capability. China's 2007 antisatellite test ended a 13-year antisatellite moratorium (1994–2007) that the United States and Russia abided by as an agreed international norm and reflected a status quo change in testing direct-ascent antisatellite missiles.

Nearly a year after the Chinese antisatellite test, the United States faced an uncontrolled reentry to Earth of a National Reconnaissance Office satellite that malfunctioned following launch. On February 20, 2008, the United States executed Operation *Burnt Frost*, launching a Standard Missile–3 (SM-3) from the *Aegis*-class cruiser USS *Lake Erie* operating several hundred miles northwest of Hawaii. The missile intercepted the uncontrolled satellite traveling 17,000 miles per hour with an unpredictable course trajectory and carrying 1,000 pounds of hazardous hydrazine rocket fuel.[5] President George W. Bush authorized this military operation due to the threat to human life and terrestrial safety posed by the hydrazine possibly reaching the ground near population centers.[6]

Russia and China did not perceive Operation *Burnt Frost* through the lens of humanitarian intentions. A 2022 RAND study exploring Chinese and Russian native-language publications stated that the two countries viewed it as another example of the American intention to militarize space.[7] Intentionally or unintentionally, the United States changed the status quo by demonstrating land, sea, and air capability. Before *Burnt Frost*, the United States validated its direct-ascent antisatellite capabilities by land and air between 1959 and 1986.

In May 2013, China launched a rocket identified as a spacecraft for space exploration research. While China denied the launch had any antisatellite application, the Pentagon categorized it as an antisatellite missile test based on the launch profile that "reached an altitude of over 6,000 miles, and possibly 20,000 miles" before reentering the atmosphere while not inserting "any objects into orbit."[8]

China's antisatellite test was significant for three reasons. First, the antisatellite missile was shy of the 22,236 miles in space at which U.S. satellites are in geosynchronous orbit—including military strategic missile warning and communications satellites.[9] Second, China showed it could hold multiple orbital regimes at risk from a direct-ascent capability. Finally, an in-depth analysis report by Secure World, a nonprofit organization dedicated to space sustainability, stated that "the available evidence strongly suggests that China's May 2013 launch was the test of the rocket component of a new direct-ascent [antisatellite] weapons system derived from a road-mobile ballistic missile."[10]

China's mobile direct-ascent capability changes the deterrence calculation for potential future antisatellite operations. This has reinstated the element of surprise that was lacking in fixed ground-based systems due to the presence of imagery satellites. While China's modus operandi is limited in acknowledgment following antisatellite tests, which restricts insight into political and military intentions, this test reveals an ability to move, hide, and launch antisatellite missiles across large swaths of territory within China. Given the perceived imbalance in direct-ascent capability among China's leadership and the success of Operation *Burnt Frost*, this test was likely to demonstrate China's ability to counter the U.S. direct-ascent global response options by land, sea, and air. The next logical step for China is to exhibit direct-ascent air and sea capabilities like the United States.

On March 27, 2019, India became the fourth country to successfully demonstrate a direct-ascent antisatellite capability. This well-planned demonstration used a ballistic missile interceptor against an Indian military imagery satellite, Microsat-R, launched nearly 2 months prior on January 24. The successful hit-to-kill intercept occurred at 282 kilometers (175 miles) above the Indian Ocean.[11] The Indian government emphasized the test's importance in a March 27 fact sheet stating that "the test was done to verify that India has the capability to safeguard our space assets. It is the Government of India's responsibility

Single modified tactical Standard Missile–3 launches from USS *Lake Erie*, successfully impacting nonfunctioning National Reconnaissance Office satellite approximately 133 nautical miles over Pacific Ocean, February 20, 2008 (U.S. Navy)

to defend the country's interests in outer space."[12] Furthermore, former Indian Foreign Secretary Kanwal Sibal expounded on the need for the antisatellite demonstration in an editorial published in the *Hindustan Times* on April 4, stating that India "preferred a kinetic kill instead of 'fly-by tests' and jamming to prove the precision of our capability and exclude any ambiguity."[13] India's successful ground-based antisatellite test has raised international concerns regarding the proliferation of direct-ascent capabilities and possibly was an additional factor that spurred the Russian Nudol test in 2021.

On November 15, 2021, Russia conducted a direct-ascent antisatellite test against a defunct Cosmos satellite in low Earth orbit, creating a debris field of more than 1,500 trackable orbital objects.[14] The collision occurred 310 miles above the Earth's surface and 50 miles above the space station's orbit, posing a risk to manned space flight.[15] The Kremlin acknowledged the test on November 16 and reiterated that it did not violate the 1967 Outer Space Treaty despite condemnation from the United States and North Atlantic Treaty Organization Secretary General Jens Stoltenberg. Russia's antisatellite test employed its first official intercept with a mobile antisatellite system designated as the Nudol. It demonstrated a hit-to-kill capability of a moving object in low Earth orbit.

Conventional Deterrence: Adversary's Perception of Success Versus Failure

Deterrence theory, which posits that the threat of retribution and/or strategy of denial can deter an adversary from engaging in undesirable behavior, has been a prominent component of international relations and security studies since World War II. It has evolved to encompass nuclear and conventional forces. Nuclear deterrence theory gained prominence following the 1949 Soviet Union atomic bomb test. As nuclear deterrence theory matured within academia, scholars such as John J. Mearsheimer began to examine how the United States increasingly relied on its conventional forces to deter Soviet aggression, partic-

ularly in Western Europe, starting in the early 1960s.[16] In his seminal 1983 book *Conventional Deterrence*, Mearsheimer proposed a conventional deterrence proposition that is here applied to the direct-ascent antisatellite problem in the contested space domain.

Mearsheimer states, "Deterrence—a function of costs and risks associated with military action—is most likely to obtain when the attacker believes that his probability of success is low and that the attendant costs will be high."[17] Mearsheimer's argument implies that an actor's calculus regarding perception and probability of success versus failure determines if deterrence upholds. Figure 1 demonstrates an algebraic way of viewing Mearsheimer's conventional deterrence argument.

Figure 1. An Algebraic View of Mearsheimer's Conventional Deterrence

(Gs) x (Ps) – (Lu) x (Pf) < or equal to 0
Success Failure

The left side of the minus sign represents the product of the actor's perception of success. *(Gs)* denotes gains won if successful, and *(Ps)* denotes the probability of success. The right side of the minus sign represents the product of the actor's perception of failure. *(Lu)* denotes losses incurred, and *(Pf)* denotes the probability of failure. If the actor perceives success as low and failure as high, the value of the equation becomes less than zero, and the actor is deterred. On the other hand, if the actor perceives success as high and failure as low, the value of the equation becomes zero or greater, and the actor is undeterred.

Deterrence Structural Model

Before applying Mearsheimer's conventional deterrence formula to the direct-ascent antisatellite problem, a framework is needed. Figure 2 is a structural model based on a 2014 Air University Blue Horizon study that evaluated 20 scholarly works depicting nuclear and conventional deterrence theory characteristics and their relationship.[18] Deterrence is grounded on a two-pronged strategy approach—fear/retribution and denial—concepts that emerged in the formative stages of nuclear deterrence theory development.

The left side of the model is deterrence by fear/retribution. The characteristics underneath are what an opponent uses to convince an attacker of the unavoidable and unacceptable losses that will ensue if military actions are taken. The right side of the model is deterrence by denial. The characteristics underneath are what an opponent uses to discourage an attacker from taking undesirable actions by convincing him that his military objective or goal is impossible to attain.

An important underlining assumption of Mearsheimer's conventional deterrence theory is that the actor is rational. For deterrence by fear or retribution (figure 1, left side), a rational actor will evaluate the costs and benefits of its actions when making decisions, as long as attribution can be made. To dissuade an attacker from hostile acts, the defender must demonstrate military strength and willingness to use force. The attacker will consider the risks of engaging militarily and determine if the costs outweigh the benefits. A rational actor will withdraw from its aggressive posture if the costs exceed the benefit.

In deterrence by denial (figure 1, right side), the defender's goal is to affect the probability of success calculation for all potential adversaries. Attribution is unnecessary under this deterrence strategy. The defender aims to convince a rational actor that its attack will be ineffective or unsuccessful based on the defender's resiliency to withstand and/or recover from an attack. Both deterrence strategies presume that a rational actor will make a decision based on its best interests.

Deterrence by Denial: What It Looks Like

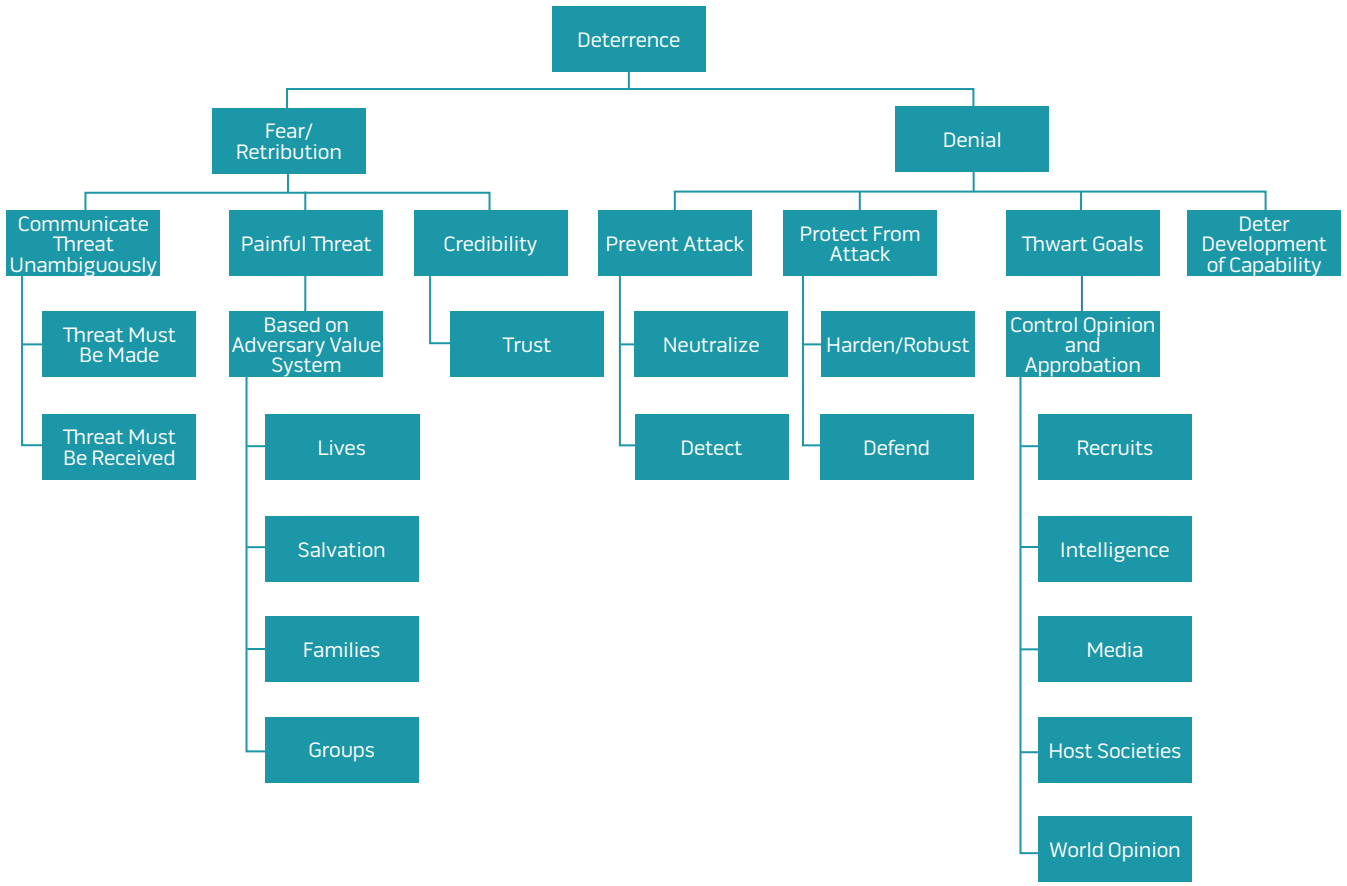
Robust Constellations. Direct-ascent missiles can destroy a satellite within minutes in low Earth orbit, leaving satellite operators little maneuver time, even if indications and warnings are present through bureaucratic rhetoric, diplomatic communiques, and intelligence reports. Prime Minister Narendra Modi stated that the intercept's flight time to collision in the 2019 Indian antisatellite test was 3 minutes in duration.[19] While the U.S. missile warning capability would detect an antisatellite launch, keeping custody of the missile's flight path and determining the targeted satellite among the thousands orbiting the Earth would be extremely difficult at best.

A robust denial strategy is necessary to counteract an attacker's advantage of short missile ascent time and the limited opportunity for the defender to establish a chain of custody following a direct-ascent missile launch. Satellite constellations are a vital component of this strategy due to their redundancy and distributed nature, making them more challenging to target. The redundancy of functionality that comes with a greater number of satellites ensures that if one satellite is destroyed, the others can continue to function, enhancing the constellation's robustness. Robustness in the structural deterrence model is a defensive tactic a defender can employ to protect from an adversary attack by demonstrating the ability to withstand kinetic strikes and continue operations.

In the context of a robust satellite constellation, increasing the number of satellite targets could alter the attacker's perception regarding the probability of success in dismantling the constellation and achieving his battlefield objectives. Starlink's extensive satellite network provides a prime example of how a numerical advantage benefits the defender and deters the attacker. Starlink uses 28 orbital planes among the 2,000 satellites orbiting the Earth as of February 2021.[20]

Interconnecting thousands of satellites around the Earth increases the resiliency of the satellite constellation, enabling it to withstand multiple direct-ascent attacks without completely disabling the network. Moreover, the extensive constellation model used by Starlink has demonstrated its potential

Figure 2. Structural Model of Deterrent Theory



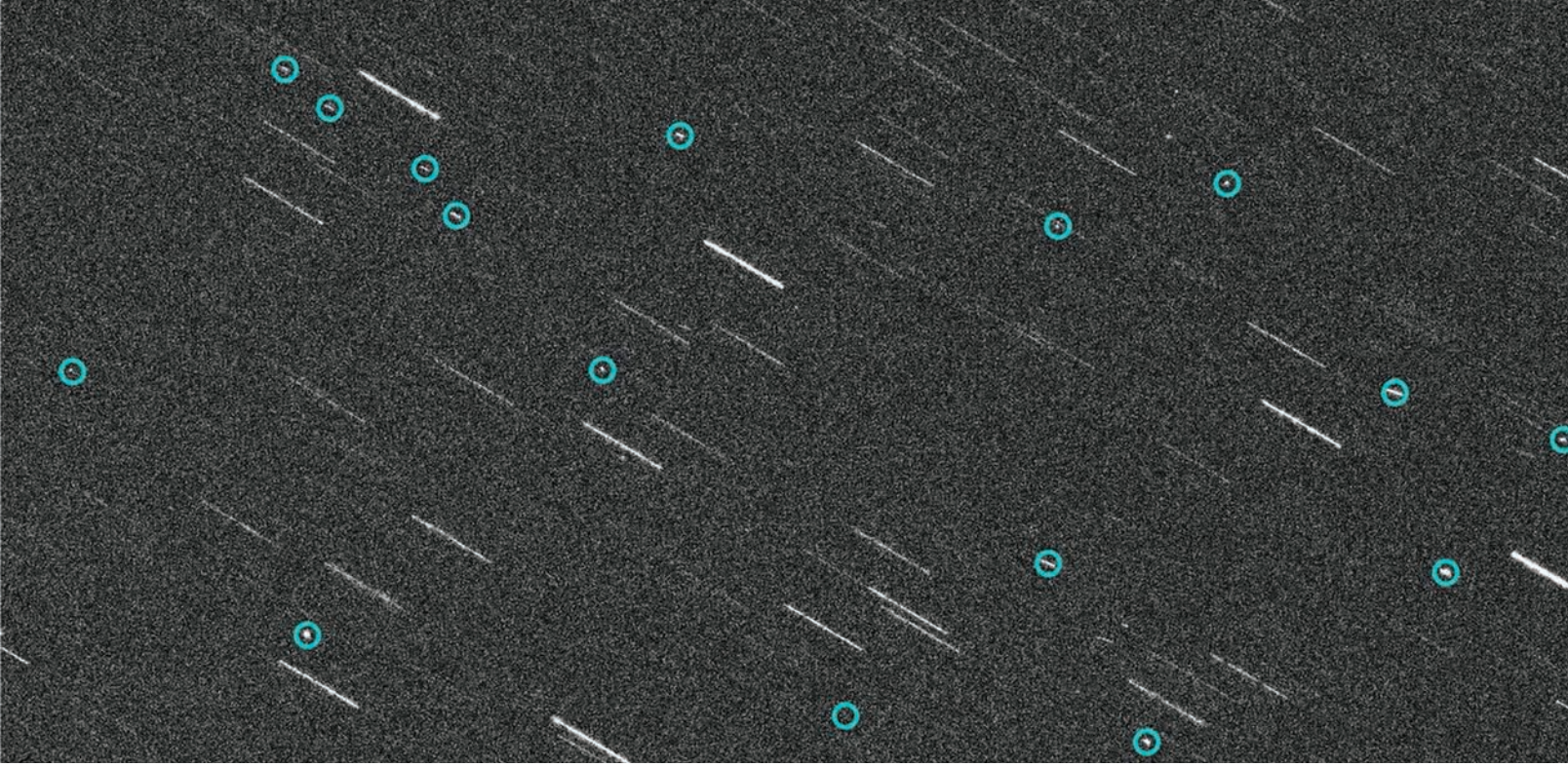
Source: John P. Geis et al., *Blue Horizons IV: Deterrence in the Age of Surprise*, Occasional Paper 70 (Maxwell Air Force Base, AL: Air University Press, 2014), 27.

as an effective denial strategy in times of military conflict. In response to the Russian invasion of Ukraine on February 24, 2022, Starlink began providing free Internet service to support the Ukrainian civilian population. This service has indirectly supported Ukrainian military operations by enabling secure communications and weapons system employment against Russian forces. In October 2022, Russia's Foreign Ministry stated at a United Nations forum that Starlink's actions "constitute indirect participation in military conflicts" and made veiled threats against the constellation, implying that "quasi-civilian infrastructure" could become legitimate targets for retaliation.[21]

Despite demonstrating its Nudol capability to destroy a low Earth orbit satellite in November 2021, Russia has not employed this capability against Starlink. As Space Development Agency director Derek Tournear stated, "The fact that Russia hasn't taken down any Starlink satellites speaks to the power of a proliferated constellation to deter attacks."[22] The implication that Russia may have been deterred from employing a direct-ascent weapon following a veiled threat of a retaliatory strike indicates that a satellite constellation can function as a denial strategy.

In addition to Starlink, other commercial companies, such as OneWeb, have demonstrated the feasibility of constructing and deploying a constellation of smaller, capability-driven satellites at a relatively low cost compared to the U.S. acquisition model of producing a satellite in the hundreds of millions of dollars. For instance, Starlink's manufacturing costs per satellite are estimated to range between $250,000 to $500,000, based on a 2020 projection.[23] OneWeb, on the other hand, can manufacture a satellite for about $1 million.[24]

The lower costs for satellite production and launches have created a condition in which a direct-ascent missile could exceed the cost of one targeted satellite. In November 2018, the U.S. State Department approved the SM-3 foreign military sale to Japan to secure the Japanese homeland and American personnel stationed in the region. The sale was valued at $561 million, with Japan estimated to spend over $26 million per missile.[25] In this regard, a robust satellite constellation, such as Starlink or OneWeb, renders a direct-ascent attack cost prohibitive to an adversary. A defender can now impose a high financial cost on an attacker trying to dismantle a large constellation of smaller, capability-driven satellites. This paradigm shift in the cost-benefit equation could serve as a deterrence to potential adversaries undertaking the costly option of launching direct-ascent attacks against a robust satellite constellation.



Telescope image shows satellite Kosmos 1408 debris (circled) shortly after destruction by Russia's A-235 "Nudol" antisatellite weapon, November 15, 2021 (Courtesy Numerica Corporation)

In summary, robust constellations are an effective denial strategy based on their ability to withstand an attack. Russia's decision to refrain from using a direct-ascent weapon after making a veiled retaliatory threat lends support to this notion. Moreover, conducting such an attack requires hundreds of costly missiles to destroy satellites that would be relatively inexpensive to replace. Robust constellations demonstrate that they can elevate an attacker's perceived likelihood of failure, raising the possibility of deterrence holding.

Optimal Satellite Placement. If a constellation is not feasible, the opponent can change the adversary's cost-benefit calculation by adjusting its satellite orbital placement to decrease the adversary's probability of success. To increase the risk of space debris fratricide, the opponent should ideally place its satellite near, above, or below the adversary's valuable satellite. By being closer to the attacker's satellite, the opponent gains an advantage in deterring a direct-ascent attack.

Understanding space debris cloud orbital mechanics is an important military advantage an opponent can exploit regarding optimal satellite placement. First, the space debris created after a kinetic attack will affect more than the defender's satellite; the attacker must consider the debris collision risks to other sovereign nations' satellites and the effect on their space operations. The 2021 Russian Nudol direct-ascent test is a stark reminder of the threat that space debris can pose to satellites, as evidenced by the more than 50 satellites from other nations that faced daily collision risks. This necessitated frequent orbital adjustments to counteract the expansion of the debris cloud within their respective orbital planes.[26]

Second, the adversary must consider the significant military disadvantage of altering its satellite's orbital parameters before launching a direct-ascent attack. Such modifications can impede the satellite's ability to accomplish its intended functions. A change in altitude can lead to a reduction in communications coverage and imaging resolution, while adjustments in inclination can hinder communications with ground stations. Additionally, altering the orbital period can jeopardize the satellite's capability to maintain a stable position over a specific location on Earth. These changes require fuel, which shortens the satellite's lifespan and results in unintended consequences.

Finally, an attacker that alters its satellite's orbital parameters provides vital indications and warnings, significantly reducing the element of surprise, particularly if the opponent has advanced space domain awareness capabilities. This enables the opponent to anticipate and respond proactively rather than react after the fact. As a result, these factors increase the perceived military risk for the attacker, leading to a greater assessment of the likelihood of failure.

In summary, optimal satellite placement by a defender can create a complex dilemma for an attacker intending to target its satellite, allowing deterrence to hold. Should the defender opt to position its satellite near a satellite of the attacker, the attacker must consider debris fratricide in the aftermath of a kinetic attack. The attacker may have to consider modifying its satellite's orbital parameters, which could impede its intended operations. Moreover, the movement of the attacker's satellite may provide the defender with advance warning of an imminent kinetic strike, especially when correlated with other sources of intelligence. When viewed in its entirety, optimal placement of a defender's satellite can significantly reduce an attacker's anticipated likelihood of success while concurrently increasing the likelihood

India's Defence Research and Development Organisation successfully launches Ballistic Missile Defence Interceptor missile in antisatellite missile test "Mission Shakti," engaging Indian orbiting target satellite in low Earth orbit in "hit to kill" mode from Dr. Abdul Kalam Island, off coast of Odisha, India, March 27, 2019 (Indian Ministry of Defence)

of failure, contributing to thwarting an attacker's battlefield objective.

Hosted Payloads with Allies, Partners, and Commercial Entities. An additional denial strategy to robust constellations and optimal satellite placement is integrating government-owned sensors on allied, strategic partner, and commercial entity satellites, utilizing a hosted payload concept. The Department of Defense defines a *hosted payload* as "an instrument or package of equipment—a sensor or communications package, for example—integrated onto a host satellite, which operates on orbit making use of the host satellite's available resources, including size, weight, power, or communication."[27] A hosted payload approach allows the U.S. military to avoid the vulnerability associated with government-owned spacecraft, which are prime targets due to their specific capability requirements, size, and government ownership.

A hosted payload distributes space-based capabilities across U.S. ally, partner, and commercial entity satellites, constructing a robust and resilient international space architecture. This increases the number of potential and diverse targets, complicating the attacker's ability to achieve its objectives against the United States. As former Air Force Secretary Heather Wilson stated at the 2018 National Space Symposium, "When you can complicate the decisionmaking of an adversary, particularly in a crisis, you have a greater deterrent effect because they have to think about consequences in different

ways."[28] Spreading capabilities across multiple satellites or a constellation within an international space architecture complicates the attacker's decisionmaking cycle, decreasing its perception of success while simultaneously enhancing the resilience of U.S. military assets in space and better enabling them to withstand enemy attacks.

A recent Government Accountability Office report concluded that hosting U.S. sensors and communications packages on commercial satellites can achieve on-orbit capability faster and more affordably and could facilitate the proliferation of payloads in orbit, making it more difficult for an adversary to defeat a space capability.[29] While this government study focused on the commercial aspect, similar conclusions apply to the hosted payload concept with allies and partners as acknowledged by the U.S. Space Force (USSF) Enhance Polar Systems–Recapitalization (EPS-R) program. The U.S. Government agreed to host the EPS-R payload concept for the Norwegian Arctic Satellite Broadband Mission, saving the USSF more than $900 million and delivering a satellite communications capability to the polar region 3 years faster than a traditional satellite acquisition program.[30] EPS-R provides an international framework for countries to collaborate on space-based capabilities and share the costs and risks associated with space operations, particularly military space threats coming from China and Russia.

Additionally, when targeting a hosted payload satellite, an adversary must consider the subsequent world opinion and the harm it would inflict on its prestige and legitimacy. According to political scientist Frank Rusciano, *world opinion* is the "moral judgments of observers which actors must heed in the international arena or risk isolation as a nation."[31] World opinion is a denial strategy that aims to prevent undesirable behavior by depriving the attacker of the benefits or legitimacy it seeks. Suppose an attacker perceives that the international community will strongly condemn its military action. In that case, the negative consequences of such an attack could outweigh any potential benefit for an attacker, making it a less attractive option.

The notion of a hosted payload introduces new complexity to an adversary's assessment of its likelihood of success, as it generates supplementary ramifications within the international community. Hosted payloads substantially increase the unattractiveness of physically destroying a satellite, while strengthening the political and economic bonds within the space domain. Allies or partners incorporating technologies among each other's spacecraft change the attacker's calculus to consider its capabilities and those of the allied partnership, recognizing that the targeted defender may not be decisively defeated. It also signals that coalition nations are committed to protecting shared assets and that the attacker will likely pay a steep price from multiple state actors. Coordinated responses could include strong diplomatic démarches, economic sanctions, and military retribution through multidomain operations. The strategic implication creates a greater likelihood of a coordinated international community response. With greater cooperation among nations with shared space capabilities, trust can lead to more effective collective action.

In summary, a hosted payload strategy can establish a robust international architecture that enables faster and more cost-effective on-orbit capabilities than conventional space-based acquisition processes. Consequently, this enhances the resilience of space capabilities, rendering it more challenging for an adversary to neutralize. Furthermore, since hosted payload satellites strengthen political and economic bonds with allies and strategic partners, an adversary must also consider world opinion before committing kinetic attacks. Therefore, the attacker's strategic calculations may lead it to conclude that a defender using a hosted payload framework cannot easily be defeated, thus heightening the perceived likelihood of failure and bolstering deterrence.

Conclusion

Space-based capabilities are pivotal to maintaining U.S. military dominance across all warfighting domains. Satellites are fragile and have predictable trajectories, which make them difficult to defend from antisatellite attacks.[32] In the event of an armed conflict, China or Russia will exploit this predictability to diminish the military and informational advantages the United States possesses. This is evidenced by their demonstrated direct-ascent antisatellite tests, which suggest their intent to challenge the space domain. Furthermore, there is not an internationally recognized "antisatellite taboo" to restrain a sovereign state from using a direct-ascent weapon in the way Richard Price and Nina Tannewald describe the "nuclear taboo" for nuclear deterrence.[33]

To neutralize an adversary's offensive advantage in space, the United States must develop a denial strategy that invests in robust constellations, optimal satellite placement, and implementation of a hosted payload concept. This layered approach absorbs the first movement of an attack, thereby nullifying the attacker's battlefield objective.

When operationalized with the structural deterrence model, Mearsheimer's deterrence theorem explains how robust constellations, optimal satellite placement, and the hosted payload concept can offset the attacker's perceived advantage in space. First, a robust constellation ensures the defender has redundant capabilities that can continue functioning even if some satellites are destroyed. This reduces the impact of an attacker's offensive moves, making it more difficult for it to achieve its military objectives. Second, optimal satellite placement by a defender can complicate an attacker's decisionmaking cycle to target its satellite, reducing its perceived probability of success. And finally, by hosting military payloads on allied, partner, and commercial entity satellites, the United States can increase the number of satellites in orbit, complicating the attacker's targeting calculus and increasing its perceived probability of failure.

Because satellite orbits in space are predictable, the attacker has an advantage over the defender. A denial strategy empowers defenders to alter the attacker's calculus, decreasing the first movement attack advantage in space and increasing the probability of deterrence holding. **JFQ**

Notes

[1] *Spacepower: Doctrine for Space Forces* (Washington, DC: Headquarters U.S. Space Force, June 2020), 34, https://www.spaceforce.mil/Portals/1/Space%20Capstone%20Publication_10%20Aug%202020.pdf.

[2] *Defense Space Strategy Summary* (Washington, DC: Department of Defense, June 2020), 1, https://media.defense.gov/2020/Jun/17/2002317391/-1/-1/1/2020_Defense_Space_Strategy_Summary.pdf.

[3] Chris Bassler and Tate Nurkin, "A Comprehensive Triad for Space Resilience—More Than Just Numbers," *Space News*, May 9, 2022, https://spacenews.com/op-ed-a-comprehensive-triad-for-space-resilience-more-than-just-numbers/.

[4] Ashley J. Tellis, *Punching the U.S. Military's 'Soft Ribs': China's Antisatellite Weapon Test in Strategic Perspective*, Policy Brief 51 (Washington, DC: Carnegie Endowment for International Peace, June 2007), 1, https://carnegieendowment.org/files/pb_51_tellis_final.pdf.

[5] Norman Polmar, "U.S. Navy—First Among the Best," U.S. Naval Institute *Proceedings* 140, no. 1 (January 2014), 86, https://www.usni.org/magazines/proceedings/2014/january/us-navy-first-among-best.

[6] Nicholas L. Johnson, "Operation Burnt Frost: A View From Inside," *Space Policy* 56 (May 2021), 2.

[7] Alexis A. Blanc et al., *Chinese and Russian Perceptions of and Responses to U.S. Military Activities in the Space Domain*, RR-A1835-1 (Santa Monica, CA: RAND, 2022), 31, https://www.rand.org/pubs/research_reports/RRA1835-1.html.

[8] Craig Murray, "China Missile Launch May Have Tested Part of a New Anti-Satellite Capability," U.S.-China Economic and Security Review Commission, Staff Research Backgrounder, May 22, 2013, 1, https://www.uscc.gov/sites/default/files/Research/China%20Missile%20Launch%20May%20Have%20Tested%20Part%20of%20a%20New%20Anti-Satellite%20Capability_05.22.13.pdf.

[9] Elbridge Colby, *From Sanctuary to Battlefield: A Framework for a U.S. Defense and Deterrence Strategy for Space* (Washington, DC: Center for a New American Security, 2016), 6.

[10] Mike Gruss, "Pentagon Says 2013 Chinese Launch May Have Tested Antisatellite Technology," *Space News*, May 14, 2015, https://spacenews.com/pentagon-says-2013-chinese-launch-may-have-tested-antisatellite-technology/.

[11] Ashley J. Tellis, "India's ASAT Test: An Incomplete Success," Carnegie Endowment for International Peace, April 15, 2019, https://carnegieendowment.org/2019/04/15/india-s-asat-test-incomplete-success-pub-78884.

[12] "Frequently Asked Questions on Mission Shakti, India's Anti-Satellite Missile Test Conducted on 27 March, 2019," Ministry of External Affairs, Government of India, March 27, 2019, https://www.mea.gov.in/press-releases.htm?dtl/31179.

[13] Kanwal Sibal, "The A-SAT Test Restores the India-China Strategic Balance," *Hindustan Times* (New Delhi), April 4, 2019, https://www.hindustantimes.com/analysis/the-a-sat-test-restores-the-india-china-strategic-balance/story-jkn9FsMQE3OqNdD7edCIAO.html.

[14] Ankit Panda, "The Dangerous Fallout of Russia's Anti-Satellite Missile Test," Carnegie Endowment for International Peace, November 17, 2021, https://carnegieendowment.org/2021/11/17/dangerous-fallout-of-russia-s-anti-satellite-missile-test-pub-85804.

[15] Shannon Bugos, "Russian ASAT Test Creates Massive Debris," Arms Control Association, December 2021, https://www.armscontrol.org/act/2021-12/news/russian-asat-test-creates-massive-debris.

[16] John J. Mearsheimer, *Conventional Deterrence* (Ithaca, NY: Cornell University Press, 1983), 13.

[17] Ibid., 23.

[18] John P. Geis et al., *Blue Horizons IV: Deterrence in the Age of Surprise*, Occasional Paper 70 (Maxwell Air Force Base, AL: Air University Press, January 2014), 27.

[19] Andrew J. Abraham, "Evaluation of the 27 March 2019 Indian ASAT Demonstration," *Advances in the Astronautical Science* 171 (2019).

[20] Ulrich Speidel, "Everything You Wanted to Know about LEO Satellites, Part 2: Constellations, Gateways, and Antennas," *APNIC*, May 27, 2021, https://blog.apnic.net/2021/05/27/everything-you-wanted-to-know-about-leo-satellites-part-2-constellations-gateways-and-antennas/.

[21] Joel Gehrke, "Russia Threatens Elon Musk's Starlink Satellites," *Washington Examiner*, October 27, 2022, https://www.washingtonexaminer.com/policy/defense-national-security/russia-musk-satellites.

[22] Sandra Erwin, "Starlink's Survivability in War a Good Sign for DOD's Future Constellation," *Space News*, October 25, 2022, https://spacenews.com/starlinks-survivability-in-war-a-good-sign-for-dods-future-constellation/.

[23] Brian Wang, "SpaceX Starlink Satellites Could Cost $250,000 Each and Falcon 9 Costs Less than $30 Million," *Next Big Future*, December 10, 2019, https://www.nextbigfuture.com/2019/12/spacex-starlink-satellites-cost-well-below-500000-each-and-falcon-9-launches-less-than-30-million.html.

[24] Christian Davenport, "The Revolution in Satellite Technology Means There Are Swarms of Spacecraft No Bigger Than a Loaf of Bread in Orbit," *Washington Post*, April 6, 2021, https://www.washingtonpost.com/technology/2021/04/06/small-satellites-growth-space/.

[25] There does not appear to be an accurately defined cost in open-source reporting of the modified DF-21 ballistic missile (SC-19) China used in its 2007 direct-ascent demonstration; the Standard Missile–3 (SM-3) used in the U.S. Operation *Burnt Frost*; India's ballistic missile interceptor; and Russia's Nudol missile (PL-19). However, the foreign military sale of the U.S. SM-3 missile provides insight into a possible cost baseline when comparing antisatellite missile costs among China, Russia, and India. See "Japan—Standard Missile–3 (SM-3) Missiles," Defense Security Cooperation Agency (DSCA), November 19, 2018, https://www.dsca.mil/press-media/major-arms-sales/japan-standard-missile-3-sm-3-missiles. Of note, this DSCA news release does not suggest that the United States sold Japan an antisatellite missile or the technology to do so. The author chose this news release because an SM-3 missile was successfully employed in Operation *Burnt Frost* and provided insight into the cost per SM-3 sold to Japan.

[26] Daniel Oltragge et al., "Russian ASAT Debris Cloud Evolution and Risk," 3rd IAA Conference on Space Situational Awareness, Madrid, Spain, 2022, 10.

[27] Government Accountability Office (GAO), *Military Space Systems: DOD's Use of Commercial Satellites to Host Defense Payloads Would Benefit from Centralizing Data*, GAO-18-493 (Washington, DC: GAO, July 2018), 3, https://www.gao.gov/assets/gao-18-493.pdf.

[28] Marcus Weisgerber, "U.S. Air Force to Put Sensors on Allies' Satellites," *Defense One*, April 21, 2018, https://www.defenseone.com/threats/2018/04/us-air-force-put-sensors-allies-satellites/147622/.

[29] GAO, *Military Space Systems*, 1.

[30] "USSF's EPS-R Program on Schedule for Historic Polar Mission," U.S. Space Force, December 20, 2021.

[31] Frank Rusciano, "Global Opinion Theory and the English School of International Relations," *New Global Studies* 4, no. 2 (2010), 5, https://doi.org/10.2202/1940-0004.1097.

[32] Bruce DeBlois et al., "Space Weapons: Crossing the U.S. Rubicon," *International Security* 29, no. 2 (Fall 2004), 62, https://doi.org/10.1162/0162288042879922.

[33] Richard Price and Nina Tannenwald, "Norms and Deterrence: The Nuclear and Chemical Weapons Taboos," in *The Culture of National Security Norms and Identity in World Politics*, ed. Peter J. Katzenstein (New York: Columbia University Press, 1996), 138.

An Interview with Michael E. Langley

Joint Force Quarterly: *With the national focus on pacing and acute challenges in other theaters, how is the African continent strategic terrain for today's joint force?*

General Langley: It is an honor to convey the USAFRICOM message in this publication; *Joint Force Quarterly* is an important forum for strategic discussion.

Africa is both key strategic and geopolitical terrain due to its physical geography, wealth of resources, and fast-growing populations. These attributes make Africa an increasingly contested environment as strategic competitors, violent extremist organizations [VEOs], and transnational criminal organizations collectively seek to exploit African nations for their gain. At the same time, African nations are facing new challenges that threaten to destabilize already fragile democracies. Climate change is increasing desertification, causing crop failures, and increasing tensions between historic herding and farming communities. VEOs are expanding and taking advantage of ungoverned spaces while strategic competitors exploit natural resources. The lack of good governance and the humanitarian crisis created by interstate conflicts results in migration that transnational criminal organizations exploit for human trafficking and other sources of profit. The lack of stability in Africa puts pressure on our allies and partners, causing them to focus time and resources on NATO [North Atlantic Treaty Organization]'s southern flank at a time when those resources are needed to support challenges in other theaters.

JFQ: *Based on this assessment of the strategic importance of Africa, how does a commander in a posture-limited theater balance the need for resources to meet the Command's priorities within the globally integrated construct?*

General Langley: DOD [Department of Defense] has a prioritization process for resource allocation that is aligned to match NDS [National Defense Strategy] priorities. With that said, the pool of DOD resources is increasingly limited because of the Service modernization and future readiness required to meet pacing and acute threats. From my perspective, the threats posed by strategic competition, transnational crime, and VEOs in Africa are growing in lethality and expanding across the continent, requiring both an expanded posture and increased resourcing to limit and prevent further spread.

USAFRICOM's campaign plan relies on a whole-of-government, "3D" approach—diplomacy, development, defense—to partner engagement. We use an African-led, U.S.-enabled framework to conduct operations focused on shared security challenges. Helping countries

General Michael E. Langley, USMC, is Commander of U.S. Africa Command.

Nigerian navy and police force personnel conduct visit, board, search, and seizure training during exercise Obangame Express 2023, in Lagos, Nigeria, January 25, 2023 (U.S. Navy/Andrea Rumple)

solve their security challenges, working through established regional frameworks, promotes stability.

Our limited posture means that we rely on allies and partners as regional security exporters. USAFRICOM does not give our African partners us-or-them ultimatums; Africa needs partners of all kinds, especially for investment and infrastructure.

In West Africa, we are working an initiative called the Combined Joint Interagency Coordination Group–West Africa that seeks both to utilize countries' existing intelligence structures and to build sharing pathways to enable regional security. Coupled with some key security cooperation funding, we think building these types of partner-led, regional approaches to security will make headway on preventing the spread of VEOs into the littorals and combating illegal, unreported, and unregulated fishing in the Gulf of Guinea.

I think that senior leadership in the State Department, DOD, and Congress recognizes the strategic importance of Africa and that they will take that into account when they make tough resourcing decisions.

JFQ: *At a year in command, what have you learned and how have your views and approaches to Africa changed, and how have they remained the same?*

General Langley: I've referred to my first year in command as my "campaign of learning," and after many trips to the continent and engagements with African leaders, I think the most important thing I have learned is the importance of being a good partner. African countries want to be our partner; they want America present in their countries standing by their side helping them work through their problems. They want African solutions to African problems, enabled by U.S. training and resources for the areas where we share congruency with them.

The more I learn about the diversity and complexity of Africa, the more I appreciate the wealth of issues these countries must deal with. We need to help African countries move toward good governance, which is *the* key to stability. That's what America needs in Africa to deter our strategic competitors. Good

governance doesn't come from military security cooperation, although the more we can decrease the VEO threat the better it enables countries to focus on governing their people. The interagency community must work together to achieve unified action in Africa, and how to do that is the thing I continue to focus on learning and teaching to my staff at USAFRICOM.

I've learned that no crises are ever the same in Africa. We need to be resourced to respond to a variety of issues from support for pandemics and disease outbreaks to challenges to democracy and humanitarian relief.

JFQ: *On the topic of defense diplomacy, how is USAFRICOM reinforcing Department of State country plans for diplomacy and development? Does that effort include the U.S. Agency for International Development (USAID)?*

General Langley: Through our 3D [diplomacy, development, defense] approach, USAFRICOM is lashed tight with the interagency community. In Africa, USAFRICOM honestly plays a supporting role to interagency efforts. The chiefs of mission in our Embassies across the continent are the ones calling the shots and setting the pace on security support. The nature of that support is diverse because it must be tailored to over 50 nations with unique needs and political environments.

Every time I travel to a country in Africa, my first stop is to meet with the Country Team at the Embassy. I engage constantly with our Ambassadors and senior officials in the State Department so that we can speak with one voice. We also welcomed Ambassador Robert Scott to the team this summer as my new deputy for civil and military affairs. He brings a wealth of experience to the staff, and I rely on his knowledge and connections with the State Department as we work through the complexities of understanding the variety of African engagements.

I appreciate that you mentioned USAID because otherwise I would have. They are a key interagency partner. The security challenges facing Africa run deep, and military solutions don't get at the root of issues such as governance, infrastructure, jobs, education, and food and water security. For example, USAFRICOM regularly supports Somali soldiers in the field against al-Shabaab, but it's USAID that comes in and really makes sustainable, practical improvements to people's lives. It is only by combining USAID's development effort

with the State Department's diplomacy along with USAFRICOM's defense enablers that will give viable support to Somalia and all our African partners.

JFQ: *In recent years, several African countries have experienced military coups or democratic backsliding. How does USAFRICOM reinforce the ideals of democracy, civilian governance, and human rights?*

General Langley: This is a timely question, given the events unfolding in Niger and Gabon. I am honest with our African partners; democracy takes time and it's hard. However, democracy is the only system that codifies the rights and freedoms of the people, by the people, and for the people. When African military officers attend our schools, they see firsthand what right looks like for civilian control of the military. These officers need to exercise tactical and strategic patience and allow the rest of their whole of government to come online and to reach the full advantages and endstates of democracy. I use this as part of my narrative in all engagements and reinforce that coups will never achieve the freedom and prosperity that these countries so desperately desire.

JFQ: *What is your vision for USAFRICOM interaction with neighboring geographic combatant commands, including U.S. Space Command* [USSPACECOM]*?*

General Langley: We have strong relationships with all the functional combatant commands regardless of whether they are our geographic neighbors or not. Globally integrated operations are a team event, and we must work together to achieve common goals.

Since Africa straddles the geographic seams of four other commands, it's important that we understand how Africa fits into their operations. There are politically powerful issues, such as migration and transnational crime, that occur in Africa but affect Europe. Strategic competitor activities like illegal, unreported, and unregulated fishing and exploitation of natural resources have implications in the Pacific. We share posture locations and resources with our fellow commands and over time have developed agreements that support equitable sharing and teaming, especially to get after seam issues. For example, we have shared intelligence, surveillance, and reconnaissance with USEUCOM [U.S. European Command] throughout the Ukraine crisis as the I&W [indications and warning] they provide on Russian activities informs our campaign in Africa.

The embedded LNOs [liaison officers] from USSOCOM [U.S. Special Operations Command], USTRANSCOM [U.S. Transportation Command], and NSA/USCYBERCOM [National Security Administration/U.S. Cyber Command] are critical to campaigning in Africa because we rely so much on these commands for support. These commands also enable our activities and provide us with the ability to respond to crises. We could not have evacuated the U.S. Embassy in Sudan earlier this year as rapidly and safely as we did without the capabilities that these commands brought to bear.

I'm glad you mentioned USSPACECOM. With the DOD pivot to space-based capabilities as the next modernization milestone, we're working with them to integrate space in support of strategic goals. USSPACECOM's embedded Joint Integrated Space Team and the soon-to-be established Space Force component are a critical resource for security cooperation and crisis response. One of the most important lessons we learned during the evacuation of the U.S. Embassy in Sudan was how much space-based solutions can enhance our C2 [command and control].

JFQ: *Are our security cooperation efforts in Africa, such as the State Partnership Program that leverages the U.S. National Guard—particularly in the Sahel region—winning friends and helping build effective states?*

General Langley: The State Partnership Program [SPP] is one of the most successful and popular programs in Africa, with 16 nations participating. African nations build enduring and deep relationships with their National Guard partners, who bring unique perspectives and capabilities to various security cooperation efforts and shared security challenges. This year marks the 20th anniversary of the SPP relationship between Morocco and Utah as well as South Africa and New York, the oldest SPP partnerships in the command. The effect of the program is clear at all our exercises, military-to-military engagements, and conferences.

JFQ: *How does USAFRICOM currently assess the threat of terrorism in Africa as a national security risk?*

General Langley: Africa-based terrorism is growing; the continent is increasingly seen as the center of gravity for global terrorism. We are seeing the so-called Islamic State and al-Qaeda affiliates increase attacks, expand their operating areas, and be featured in global propaganda. These groups threaten U.S. personnel and interests across Africa, hinder our diplomatic missions, and undermine partner-led, U.S.-enabled operations.

Somalia-based al-Shabaab is al-Qaeda's largest and wealthiest global affiliate. We've seen high-profile al-Shabaab attacks in the past, including against the Dusit D2 Hotel in Nairobi in 2019 and against U.S. and Kenyan forces at Manda Bay Airfield in 2020. Al-Shabaab maintains the intent and capability to conduct high-profile operations outside of Somalia and wants to replicate their past successes if we give them the opening to do so.

While the so-called Islamic State poses less of a direct threat to the homeland, they are concerning because of their rapid expansion across the continent due to their ability to co-opt and leverage existing groups. I'm specifically concerned about their expansion in West Africa, as they are poised to take advantage of the ungoverned space created by the current crisis in Niger.

U.S. Army Soldiers assigned to Task Force–Tomahawk conduct airfield clearance during base defense exercise at Cooperative Security Location Manda Bay, Kenya, August 4, 2023 (U.S. Air Force/Dhruv Gopinath)

JFQ: *How is Great Power competition playing out on the African continent with specific concerns, such as confronting Russia's Wagner Group or expanding China's economic influence?*

General Langley: We see strategic competitors take advantage of poorly governed spaces and the conflict created by VEOs to expand their access and influence. Strategic competitors actively exploit African countries' resources and populations, and I stress during engagements with African leaders that their proposals are never a "good deal" due to the strings attached.

The PRC [People's Republic of China] already has one naval base on the continent, and we think they are looking to expand basing into other parts of Africa. The PRC are predatory lenders, and we have seen them set investment traps through things like Safe City Smart City, the Belt and Road Initiative, or foreign military sales. Their illegal, unregulated, and unreported fishing in the Gulf of Guinea and other locations has a huge economic impact on African populations, especially those that rely on fish as their primary source of nutrition.

Russia and the Wagner PMC [private military company] have been increasing ties with African nations in recent years, and we have seen several African nations, most recently Mali, turn away from the West and to Wagner to solve their security cooperation needs. We're still assessing what the death of [Yevgeny] Prigozhin means for future Wagner activities on the continent, but I'm convinced that the Russians have invested in Africa and that they mean to remain there and expand their foothold.

JFQ: *What is your assessment of the evolving global integration process, and, if you see the need for enhancements, what would you suggest doing?*

General Langley: The joint force is continuously improving and streamlining global integration, but unity of actions is a difficult problem to solve because of the inherent limitations of our current joint force structure. Our competitors are global actors that require a globally integrated response. Unified Campaign Plan boundaries and lack of Joint Staff authority to fully integrate the joint force against global problem sets result in largely regional solutions that don't achieve the type of unity of action required for strategic competition.

Each Joint Staff directorate, OSD [Office of the Secretary of Defense], CSFG/RSI [China Strategic Focus Group/Russia Strategic Initiative], and CCMD CA [combatant command coordinating authority] leads some aspect of global integration. The coordination between the integrators is a point that could be improved. At various points in the past, combatant commands participated in multiple overlapping and seemingly uncoordinated integration efforts across the various product lines.

Most of the redundancy has worked its way out of the system, but global integration could benefit from a single overarching OSD or Joint Staff–led global integration process that includes plans, operations, and assessments. **JFQ**

Benin navy Maitre Major Hermann Hungije addresses Benin navy and police force personnel and U.S. Coast Guard personnel from Law Enforcement Detachment 403 as they conduct close-quarters combat training during Obangame Express 2023, in Lagos, Nigeria, January 25, 2023 (U.S. Navy/Cameron C. Edy)

Guardian of the Seams

U.S. Africa Command at the Intersection of Diplomacy, Development, and Defense

By Melissa A. Stafford, Benjamin A. Okonofua, William J. Campbell, and Garth H. Anderson

By its constitution, programs, and ethos, U.S. Africa Command (USAFRICOM) is committed to the idea that knowledge should unify rather than fragment actions, concepts, and relationships. The commander of USAFRICOM, General Michael E. Langley, USMC, charged us in this article and the two that follow to explore the concept of *seams* and challenged us to identify and address the disparities that potentially undermine the effectiveness of U.S. engagements with African partner forces—whether these differences are interagency relationships, resources, rules and authorities, priorities, objectives, data, or something yet unidentified.

The central dynamic of the seams concept is the fragmentation of knowledge among the collection of ongoing efforts that hampers the capacity of USAFRICOM to respond to current and future challenges. Although this

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collection of articles discusses the active engagement of stakeholders who contribute in many ways to increase the effects of the command's engagements on the continent despite the seams, USAFRICOM looks toward a new agenda to promote consensus, collaboration, and unity of effort in reducing seams. We cannot overemphasize the need for a deliberate and coordinated effort to bridge the existing divides that could undermine the command's mission.

For the joint force, a *seam* is an operational or capability junction requiring synchronization or planned mitigation. Seams are generally inevitable in any institution large enough to require an administrative hierarchy, and their effects can have tragic consequences. In the early 1980s, for instance, poorly managed seams among the military Services led to a series of failures, highlighted primarily by the failure of Operation *Eagle Claw* in 1980, linked to the lack of interoperability of equipment, communications, doctrine, planning, and unity of command. The limited distribution of intelligence and differential measurement methods among engineering teams led not only to the failure of NASA's *Mars Climate Orbiter* but also to the September 11 terrorist attacks.

The net outcome of this confluence of seams is that crises increase and intensify, creating a complex operational environment that can further limit the joint force's ability to navigate the seams among military Services, other U.S. agencies, allies, partner nations, and multilateral organizations. Because of this fragmentation, USAFRICOM may be engaged in activities to build African partners' defense capabilities but, unfortunately, to the detriment of genuinely deepening or maturing the relationships.

Today, as the joint force implements its defense strategy in support of the National Security Strategy, seams have the potential to reproduce in each generation of the workforce, the institutions, and knowledge creation methods, becoming intransigent and degrading the effectiveness of the 3D approach of diplomacy, development, and defense. Most would readily identify seams and criticize their facilitation and persistence, but who is completely immune from them? Who has not, in some sense, been on a different track when consensus or collaboration was needed? The counterweight to seams is creating open discussions.

The United States invests billions of dollars each year to close seams internationally through the United Nations (UN), World Bank, International Monetary Fund, G7 Summit, and Embassies, to name just a few. The U.S. contribution to the UN alone exceeded $12.5 billion in 2021.[1] Defense coordination between and among allies requires similar investment, with the American investment in the North Atlantic Treaty Organization nearly $600 million in 2023.[2]

This begs the questions: If seams are inevitable in a complex environment, why bother investing in closing them? Could efforts to close one seam create another? With the challenges the joint force faces, is it counterproductive to attempt the Sisyphean task of closing seams among diplomacy, development, and defense?

Failure to address seams will incur even higher costs for the joint force, including limiting U.S. regional access and the ability to collaborate with partner forces, anticipate changes in the operating environment, and effectively counter adversaries exploiting partner vulnerabilities to assert or expand their influence. It may also degrade American influence with regional partners by making U.S. doctrine development, training, detection, standoff, and precision firepower—from which African partners have historically desired and benefited—redundant. It could also increase areas of the environment that lie outside the visibility or reach of the joint force but are dominated by U.S. rivals, which limits the joint force's awareness and readiness to operate, exercise, and train.

Fortunately, through implementing a modest and sustainable approach, the joint force can reduce seams for global campaigning and global problem sets. USAFRICOM is pioneering a model that leverages a time-tested, reduced-risk model from Wall Street: the retirement savings model. This model focuses on modest and consistent investments applied over time that take advantage of compounding interest and, most important, learn and adjust based on interim results. Rather than saving up and hoping for a single "big win," the USAFRICOM looks to modest, sustained investments over time and across a diversified portfolio of 3D engagement and effort. Watching the operating environment and understanding trends still play a role, but the focus on long-term objectives and consistency in actions over time allows the investor to achieve outsized, risk-managed results for future security.

The USAFRICOM articles in this issue buttress this model and show the key to implementing this approach within the 3Ds and partner nations: U.S. Africa Command must maintain consistent and modest investments, understand the objectives of all stakeholders, learn from trending outcomes, and adjust moderately. By first addressing the seams, the articles show the incremental steps toward achieving positive outcomes.

This article addresses the concern that despite heavy investments in partner-force capacity-building, the U.S. ability to measure impact is limited mainly by the noncomplementary assessment, monitoring, and evaluation efforts by partners. The diagnosis is a problem of seams: there is a great divide between the U.S. interagency community and the United States and African partners in the ability to assess gaps and solutions, monitor progress toward the achievement of outcomes and objectives, and evaluate impacts. One implication is the risk of (mis)identifying problems and their solutions, leading to flawed capacity-building and institutions. Even more, many stakeholders, often for opportunistic reasons, do not understand whether or how the capabilities they built worked or monitor how they unfolded. If it is not good when USAFRICOM security cooperation planners and programmers misdiagnose problems and misapply solutions, it is even worse when African partners do not know the solutions were misdiagnosed and misapplied or how to manage the investments to achieve the desired outcomes.

The second article discusses the threats to national and international security brought by climate change and how the joint force must face and address these threats. Climate change affects countries differently, but quite often in Africa the results are similar: flooding, drought, and food insecurity drive migration and create vulnerabilities in a population for violent extremist organizations (VEOs) to exploit, in turn creating more instability. The joint force must build staffs that understand the challenges and effects and processes that integrate climate intelligence into planning so that we can help partners address these challenges in the most effective ways.

The third article explores the seams within contracting space. The United States has historically relied on commercial support to meet its national security and national defense objectives. However, divergent perspectives about how to pursue engagements and the attendant risks to national security, when the United States has relied on partner nation contractors, have challenged how these solutions are applied and their impact. Like the other two articles, the diagnosis is also a problem of seams: the United States and its partner nations are often on each end of the spectrum on contracting requirements, objectives, outcomes, and effects. At times, this creates elevated levels of apprehension, suspicion, and antagonism, even challenging the boundaries of the relationship.

The articles are, in large measure, a faithful reflection of how the authors view the 3D enterprise and U.S.-partner nation interaction over time and important contributions that bring out the factors that minimize the seams that encumber U.S. missions and objectives.

Measuring Investments in Africa: A New Approach

Each year the Department of Defense (DOD) invests nearly a billion dollars in security cooperation (SC) programs to develop partnerships that encourage and enable other nations to act in support of U.S. priorities and strategic objectives. As established foreign policy instruments for building defense partnerships and limiting opportunities for adversarial action in the operational environment, SC programs and activities vary from highly visible and often expensive training, equipping, and exercising, to low-key, relatively inexpensive but highly valuable bilateral talks, key leader engagements, and activities to achieve interoperability with partners, among others.[3]

Security cooperation requirements increase every year and combatant commands rely on effective activities to fulfill and maintain their security missions. During U.S. Africa Command's latest Requirements Synchronization and Humanitarian Assistance Working Group, the command validated $550 million in programming for fiscal year 2025, compared to $455 million in fiscal year 2024. Although not all these programs will be funded, the increase of $95 million in validated requirements indicates increasing awareness of partner-nation capacity shortfalls and the importance of U.S. investments to strengthen U.S.-Africa defense partnerships to mitigate these gaps.[4] Despite these massive investments, there is limited insight into how effective the United States is in building partner capacity and whether these efforts are contributing to U.S. strategic objectives. For programs costing hundreds of millions of dollars per year, DOD must seek opportunities to better understand program effectiveness to improve future iterations of security cooperation planning.

The 2017 National Defense Authorization Act (NDAA) prescribed a program of assessment, monitoring, and evaluation to better understand the impact of U.S. security cooperation investments.[5] While this change holds enormous promise, the nonimplementation of comparable programs by African partners limits the likely success of this endeavor. The noncomplementarity of efforts is driven largely by the asymmetry in processes, priorities, and objectives, and drives a wedge between the United States and even willing and motivated partners.

The SC-AM&E Nexus

Security cooperation programs are a proven foreign policy instrument of the United States for building defense partnerships and limiting opportunities for adversarial action in the operating environment. However, resources—financial, time, and capacity—will always be limited, making it difficult to gain a more complete understanding of the real value of U.S. investments.[6] DOD must prioritize programs that will provide the greatest cost-benefit toward U.S. strategic objectives, but understanding the benefits of SC efforts at the operational and strategic levels is not a simple calculation. When the objective is access to key terrain in a time of conflict, for example, it cannot be left to chance whether U.S. partners will say "yes" when it is needed most. DOD must therefore establish a deliberate measurement for these objectives that can be quantified outside of real-world crises to guide prioritization and planning.

To do this, the Secretary of Defense has integrated assessment, monitoring, and evaluation (AM&E) teams into combatant command security cooperation programming through Section 383 of the 2017 NDAA. The section states that the program shall:

- provide initial assessments of partner capability requirements
- monitor implementation to measure progress and outcomes
- evaluate the efficiency and effectiveness in achieving desired outcomes
- recognize lessons learned to improve future security cooperation programs.[7]

Since 2020, AM&E teams across combatant and component commands have supported the prioritization of SC investments, informing program design, monitoring progress toward the achievement of outcomes, and working to isolate the strategic impact. Within a relatively short period, teams have accumulated a substantial amount of data and information to support decisionmaking throughout the enterprise. Conversations about effective investments and the associated theories of change that never could have taken place in the past are now driving decisionmakers toward more effective programs.

The challenge is that the above remains limited to one side of the partnership. African partner forces rarely implement AM&E practices to understand the impact of new capabilities on their objectives, and in many cases lack the institutional expertise to do so. This constrains insights into, for example, the effectiveness of program implementation rather than the level of adoption by the partner nation; the absorptive capacity rather than the integration into partner capabilities; the delivery of equipment rather than the intent to sustain it; and so on. In short, AM&E teams can observe and report on measures of performance but are limited when it comes to the often partner-nation-centric measures of effectiveness. Observations, interviews, and surveys provide insight into the partner's intent and willingness, but DOD will continue to rely on moments of crisis to truly test the building of a partnership, and by then it is too late to be wrong.

The Solution

To close this gap, USAFRICOM and DOD should integrate and implement AM&E programs into its institutional capacity-building offering to partner nations. Capacity-building focuses on building partner institutions through training and advising forces and defense leaders on developing effective policies, programs, and infrastructure. Although often overlooked, when fully adopted by partner nations, it is these institutions that enable long-term, sustainable outcomes. AM&E, as a skill set and process, is a natural fit within the existing capacity-building approach.

This could also set preconditions for designing and implementing effective programs and capturing and sharing usable data between the United States and partners to facilitate the accurate measurement of the engagements. This would increase the partner's willingness and ability to maintain and sustain U.S. investments, improve the partner's ability to interoperate and burdenshare with the United States, and reduce costs and risks to U.S. security priorities.

While there may be many approaches to bringing assessment to the partner, any solution would likely be some combination of demonstration, training, and

U.S. Marine Corps Sergeant Mercedes Klein trains with Ghanaian army soldier Sergeant Joseph Akataaba on marksmanship fundamentals during exercise African Lion, near Daboya, Ghana, June 7, 2023 (U.S. Army/Nathan Baker)

U.S. Air Force B-1B Lancer from 9th Expeditionary Bomb Squadron, Dyess Air Force Base, Texas, flies Bomber Task Force mission alongside two UK and two U.S. F-35 Lightning IIs from UK Carrier Strike Group's HMS *Queen Elizabeth*, over Camp Lemmonier, Djibouti, November 11, 2021 (U.S. Air Force/Michael Cossaboom)

advising. This begins by first demonstrating the value and potential effect of applying these efforts, then evolving to planning and teaching basic skills such as identifying and documenting objectives. This is then expanded to build more complex skills, such as building a theory of change or a roadmap to the desired future state, identifying key indicators, and routinely monitoring progress. Lastly, the partner is trained on how to bring that information back into the planning process to adjust plans as needed to achieve objectives. As appropriate, partners could also receive software and training on data storage, analytics, and communication tools as their information repository grows.

Undoubtedly, one of the key benefits of this solution is that U.S. stakeholders will benefit from implementation, even at the earliest stages. Understanding a partner's objectives and priorities allows the United States to steer the future of the partnership more effectively: Where is there natural alignment? Where are likely friction points? Where might the partner nation more easily align with a competitor? While USAFRICOM conducts regular engagements—including engaging with key leaders from several partner nations and understanding their objectives at the highest levels—it is not uncommon for the presumed objectives to vary across national leaders and even more when it comes to midlevel leadership where many security cooperation initiatives take place. Building a consistent understanding of objectives and priorities will enable the United States to build partner trust, capability, and capacity more effectively and efficiently.

Conversely, on the partner's side, assessment processes will likely strengthen the U.S. relationship by reinforcing

the SC investments through logical monitoring. U.S. SC efforts are in high demand because of the quality and comprehensiveness of the solutions provided. However, they do not implement quickly, with typical lead times of 3 to 5 years. For partners that have immediate needs and short memories, this sours the U.S. reputation and, worse, can make an opening for an adversary to drive a wedge into the relationship. Building processes that document objectives, timelines, and effects counteracts this unease by managing expectations and reinforcing the positive effects of previously implemented efforts.

USAFRICOM's partner nations have already glimpsed DOD assessment processes and potential impacts through the execution of SC programs. A natural curiosity has arisen among the interviews, surveys, and evaluations. Some African partners, including Morocco, Tunisia, and Kenya, have expressed that they want this type of institutional capacity-building to better manage U.S. investments and generate usable and sharable data.

Supporting their efforts with AM&E tool kits can mitigate the knowledge divide and increase interoperability between USAFRICOM and its partners, with the advantage of being economical while facilitating genuine collaboration to ensure the greatest return on investment. When fully implemented, this effort will bring the measurement of outputs, outcomes, and effects across the United States and partner-nation landscapes under one banner to be beneficial to individual nations and to the relationship itself. Used in this way, the program can serve USAFRICOM and African partners as a significant capacity-builder for the future and a broker of empirical knowledge.

Climate Change Investments

Climate change is a threat multiplier, presenting risk to both national and international security. The 2022 National Security Strategy states, "The climate crisis is the existential challenge of our time." The Intergovernmental Panel on Climate Change states, "Multiple African countries are projected to face compounding risks from reduced production across crops, livestock and fisheries, increased heat-related mortality . . . and flooding from sea level rise."[8] Climate effects exacerbate existing threats including political unrest and VEO activity, and they also contribute to increased access by our global competitors, all of which jeopardize U.S. national interests and security.

The joint force faces challenges in addressing these climate security risks. How do organizations build climate-literate staffs and integrate climate intelligence into planning and processes? Where is the strategic key terrain where the demands of climate-induced crises create game-changing conditions? For example, climate effects in Somalia have negatively impacted agriculture, which provides around 70 percent of Somalia's employment, allowing al-Shabaab to build its strength by recruiting among displaced populations.[9] How could our competitors seek advantages?

Over the past decade, for instance, China has increased access and influence by leveraging Africa's growing energy demands and financing renewable energy projects. In 2020, Chinese enterprises completed or planned 4.8 gigawatts of wind and solar projects on the continent.[10] What resources and solutions addressing infrastructure adaptation, security cooperation, and technology will be committed to addressing climate security implications, ensuring continued U.S. strategic access and the ability to respond to crises? For example, in the Port of Djibouti, U.S. Navy engineers are evaluating and upgrading the primary pier that supports the largest U.S. base in Africa to ensure its ability to withstand climate effects such as sea level rise.

To confront these challenges, USAFRICOM conducted a series of workshops and tabletop exercises with interagency and African partners to frame the strategic landscape and identify solutions for climate adaptation. The command is developing a climate common operating picture that integrates existing climate forecasting tools and risk models into existing planning processes. USAFRICOM is also working to make U.S. force posture locations more resilient to climate effects and other disruptions, with adaptable infrastructure and demand reduction through improved operational energy and water technologies and policies. Most important, the command is leveraging its robust security cooperation program to address African climate resiliency, disaster response, and water and natural resource security and management. Early investments now by the United States to make partner nations more self-sufficient reduces both the risk and the scale of a future U.S. crisis response.

Botswana, an emerging U.S. partner that relies heavily on imported electricity (largely from South Africa), is striving to build a climate-resilient infrastructure. This lack of energy independence threatens the capacity of the country's defense

U.S. Reconnaissance Marines with 3rd Force Reconnaissance Company, 4th Marine Division, conduct close quarters tactics with Tunisian regiment commandos marine as part of African Lion 23, in Bizerte, Tunisia, May 25, 2023 (U.S. Marine Corps/Lara Soto)

forces to execute training activities and military airfield requirements in support of regional security missions to counter the so-called Islamic State–Mozambique and other threats. USAFRICOM and the Department of State are helping the Botswana Defence Force to master plan and integrate new resilient energy technologies and facilities. By 2025 they should be able to sustainably generate, store, and consume power for 24/7 training and operations in support of regional peace operations.

USAFRICOM is also conducting workshops with the Kenya Defence Forces (KDF) in 2023–2024 to assess facility climate risks and develop a plan to integrate operational energy systems into shared U.S. and KDF expeditionary bases. Building logistically sustainable resilient facilities increases the ability to operate away from larger bases and deeper into areas of higher VEO activity.

In Chad, climate change is causing more frequent and severe periodic floods, such as the devastating 2022 event that threatened the ability to launch intelligence, surveillance, and reconnaissance operations at a U.S.-Chad cooperative security location. U.S. military engineers are working with their Chadian counterparts to teach and implement flood mitigation measures to protect critical base infrastructure.

In Madagascar, climate change–induced drought has created food and resource insecurity that threatens national and regional stability in the western Indian Ocean. In 2022, USAFRICOM and the U.S. Army Corps of Engineers (USACE) held a workshop with the Madagascar Ministry of National Defence, which leads the nation's disaster response efforts, to discuss their most pressing water resource issues. With other national ministries in attendance, including water, environmental, and agricultural, this event generated a true Malagasy interagency response that identified internal capability gaps and whole-of-government response actions.

USAFRICOM and USACE established a low-cost multiyear program to integrate several water resource and climate risk tools into Madagascar's overall response program that will build their interagency capabilities to respond and adapt to climate change effects, enhancing national and regional security.

Contracting Out for a More Secure Future

The United States has relied on commercial support since the Revolutionary War and that reliance has only grown with time. While the United States must carefully manage its supply-chain risk regarding weapons systems theft and adversarial infiltration, relying on commercial support, especially in developing countries, poses a distinct advantage for the United States and its allies.

In many cases commercial solutions are the most viable, or the only solution, available to fulfill DOD needs. Military operations are often constrained by the number of troops that may be deployed to the host nation. Often there is a local solution readily available that can more efficiently respond to rapid or fluctuating demands. Preexisting relationships with such countries, and the trust in transparent business practices, allow for such immediate applications. Building trust over years enables short-notice commercial solutions without further political guarantees. This enables opportunities for the United States and its allies that are not available to their competitors.

Every nation ultimately looks after its own self-interest first while acknowledging that some have more choices than others. When presented with rapidly expanding populations, economic and educational needs, and limited infrastructure, many will turn to quick and basically reliable solutions that have long-term deleterious effects. The goal should be to provide equally enticing sustainable opportunities, while building—not exploiting—the host nation. Transparent business practices are not only morally right but also provide benefits outside of the mutually agreeable negotiated solution. U.S. commercial engagement is nonpredatory; it helps build the host-nation economy while respecting the host-nation's sovereign rights. Commercial contracts are based on the Uniform Commercial Code, not exploitation.

Such economic engagements build mutual *trust* because they are rooted in mutual *respect*. Most of the time, engagement with host nations is not based on military needs but on diplomacy and development goals: goals that do not exploit, but engage; do not extract, but develop. Adversaries exploit instability by providing weapons to promote further instability; they extract resources with their own workforce without providing a benefit to the country they are exploiting. The United States and its allies are uniquely positioned to use commercial contracting not only to serve the direct purpose of a contract but also to advance diplomacy and development of partner nations within a mutually respectful and beneficial enterprise. Of course, when the population is actively involved in U.S. enterprise, this also fosters local stability, trust in transparency, and respect, which relate directly back to the National Security Strategy and National Defense Strategy objectives. This is a small but deliberate action that when done routinely at the global level will impact strategic objectives.

Modest Investments to Close Seams for a Secure Future

As the joint force moves to a more integrated, whole-of-government 3D approach to an increasingly complex and interconnected security environment, closing seams and gaps to achieve unity of effort at modest cost rises in importance. Modest, sustained investments with a long-term investment strategy provide a fiscal and, by extension, lethal advantage to the joint force, compounding in effectiveness over time. By leveraging existing routine, institutionalized intergovernmental and partner efforts, seams can be closed and differences in organizations can be leveraged as strengths at modest cost as explored in the three previous examples, which leverage investment and engagement from all partners to maximize the effect for a shared, secure future. **JFQ**

Notes

[1] "Funding the United Nations: How Much Does the U.S. Pay?" *Council on Foreign Relations*, March 13, 2023, https://www.cfr.org/article/funding-united-nations-what-impact-do-us-contributions-have-un-agencies-and-programs.

[2] "Funding NATO," North Atlantic Treaty Organization, July 19, 2023, https://www.nato.int/cps/en/natohq/topics_67655.htm.

[3] *Select RAND Research on Security Cooperation: 2006–2019* (Santa Monica, CA: RAND, 2021), https://www.rand.org/pubs/corporate_pubs/CPA614-3.html.

[4] See, for example, Statement of General Steven J. Townsend, USA, Commander, U.S. Africa Command, *Investing in America's Security in Africa: A Continent of Growing Strategic Importance*, Testimony Before the Senate Armed Services Committee, 117th Cong., 2nd sess., March 15, 2022, https://www.armed-services.senate.gov/imo/media/doc/AFRICOM%20FY23%20Posture%20Statement%20%20ISO%20SASC%2015%20MAR%20Cleared.pdf.

[5] Department of Defense (DOD) Instruction 5132.14, *Assessment, Monitoring, and Evaluation Policy for the Security Cooperation Enterprise* (Washington, DC: DOD, January 13, 2017), https://open.defense.gov/portals/23/documents/foreignasst/dodi_513214_on_am&e.pdf.

[6] Christopher Paul et al., *A Building Partner Capacity Assessment Framework: Tracking Inputs, Outputs, Outcomes, Disrupters, and Workarounds* (Santa Monica, CA: RAND, 2015), xiii.

[7] *National Defense Authorization Act for Fiscal Year 2017*, Public Law 114-328, 114th Cong., 2nd sess., December 23, 2016, https://www.congress.gov/114/plaws/publ328/PLAW-114publ328.pdf.

[8] Hans-Otto Pörtner et al., ed., *Climate Change 2022: Impacts, Adaptation and Vulnerability*, Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (Cambridge: Cambridge University Press, 2022), https://report.ipcc.ch/ar6/wg2/IPCC_AR6_WGII_FullReport.pdf.

[9] USAFRICOM J2 Analysis, May 2021.

[10] Frangton Chiyemura, Wei Shen, and Yushi Chen, *Scaling China's Green Energy Investment in Sub-Saharan Africa: Challenges and Prospects* (Cape Town, South Africa: African Climate Foundation, November 2021), https://africanclimatefoundation.org/wp-content/uploads/2021/11/800539-ACF-NRDC-Report.pdf.

Senegalese soldier secures enemy combatant during simulated raid conducted after gathering intelligence in pursuit of malign actors as part of Flintlock 20 scenario, near Atar, Mauritania, on February 26, 2020 (U.S. Army/Conner Douglas)

Defense Diplomacy

Professionalizing the Purple to Gold Pipeline

By Rose P. Keravuori, Peter G. Bailey, Eric A. Swett, and William P. Duval

The Spartan Warrior, immortalized by the story of the 300 at Thermopylae, dominated the ancient Hellenistic world. While many know of the legendary Spartan training regimen, few know they were defeated through the power of Defense Diplomacy. Spartan dominance ended permanently when Epaminondas, a Theban general, used a "grand strategy of indirect approach" to establish capable partners, foster alliances, strengthen non-allied states' defensive abilities, and decimate the "economic roots of [Sparta's] *military supremacy."*

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Epaminondas' use of officer exchanges—Philip II of Macedon, Alexander the Great's father, spent his youth in Thebes during Epaminondas' time and later used his tactics—high level governmental engagements, combined training, security building—the fortified city of Messene, for example—and regional security forums such as the Arcadia Alliance to advance Thebes' interest in ending Spartan dominance—match the activities we currently call Defense Diplomacy.[1]

Defense Diplomacy in Action

In April 2023, war broke out in Khartoum, Sudan. Suddenly, tens of thousands of Sudanese and foreign citizens became trapped between two generals vying for control of the country. Buildings were destroyed, and the streets became death zones as fighters shot at anything moving. Amid this chaos, foreign governments in Sudan, including the United States, scrambled to remove their citizens from Khartoum and the rest of the country.

U.S. Africa Command (USAFRICOM)'s proactive Defense Diplomacy was put to the test, ultimately helping to enable a successful operation for military-assisted departure of designated U.S. personnel and citizens from Khartoum. In support of the Department of State's efforts, the command's highest echelon of leadership began to engage, including the commander of USAFRICOM, General E. Michael Langley, USMC; the deputy commanding general and director of Strategy, Engagements, and Programs (J5), Major General Kenneth P. Eckman, USAF; as well as the director of Intelligence (J2), Brigadier General Jerry Carter, USMC. These three leaders established communications and personally engaged with the opposing Sudanese generals. Their direct efforts helped establish safe corridors and secure permission for the use of an airfield outside Khartoum. They also arranged safe passage corridors through checkpoints and contested territory for numerous multinational convoys from Khartoum to Port Sudan.

Even after most evacuees were safely out of Sudan, Defense Diplomacy continued to enable and support crucial humanitarian and evacuation efforts in coordination with the Department of State. Major General Eckman traveled to Jeddah, Saudi Arabia, to support negotiations with Sudanese delegates from both sides of the conflict to establish safety guarantees for humanitarian efforts and evacuation of noncombatant personnel.

A Core Joint Force Task

Defense Diplomacy has long been a core mission of the Department of Defense (DOD) carried out by senior military officers. Its strategic importance is repeatedly exhibited throughout history, from General George Washington's deft diplomatic management of the colonies' alliance with France to General Dwight D. Eisenhower's expert management of the strong personalities of British Field Marshal Bernard Law Montgomery, French General Charles de Gaulle, and General George S. Patton to create an effective, combined force in World War II.

Congress uses a set of criteria for determining a general or flag officer position, including "official relations with other U.S. and foreign governmental positions."[2] The Joint Force Universal Joint Task List identifies engagement and building partnerships with other U.S. Government departments and agencies, nongovernmental organizations (NGOs), state and local governments, foreign partners, and humanitarian organizations as a core task at all levels of leadership.[3]

DOD identified the need for enhanced Defense Diplomacy professional development, and in 2010 and 2011, Congress directed the study of the "current state of interagency national security knowledge and skills" among the workforce in the National Defense Authorization Act, citing their importance for effective national security efforts.[4] Shortly thereafter, the United Kingdom (UK) published its 2013 International Defence Engagement Strategy, citing engagement by UK defense leaders as critical to achieving foreign policy objectives as a central part of an integrated approach to employ "all the levers of power across government."[5]

Civilian and uniformed defense leaders have long understood the interrelationship among diplomacy, development, and defense—what USAFRICOM refers to as the 3Ds—to conflict prevention and resolution. In 2017, a joint letter signed by 121 three- and four-star generals and flag officers supported the fiscal year 2018 International Affairs Budget, which resourced diplomatic and development efforts as "critical to preventing conflict."[6] When serving as the commander of U.S. Central Command, General James Mattis, USMC, reportedly stated, "if you don't fully fund the State Department, please buy a little more ammunition for me because I'm going to need it" to emphasize the importance of an integrated whole-of-government approach to achieve security outcomes.[7]

The joint force increasingly operates in joint, interagency, intergovernmental, and multinational environments in which Defense Diplomacy knowledge, skills, and behaviors—derived from education and experience—provide a marked advantage.[8] DOD understands the value of diplomatic and interagency experience for midcareer officers assigned to niche interagency and diplomatic specialties such as defense attachés and military advisors, but such training and experience is exceptionally rare across the joint force and among general/flag officers outside of these specialties, creating a learning curve for the vast majority who receive only familiarization-level training.[9] Preparing military leadership for Defense Diplomacy with rudimentary familiarization and on-the-job training invites increased risk and decreased effectiveness of integrated deterrence and global campaigning while progressing through the learning curve of interagency coordination.

Defense Diplomacy in Africa

Defense Diplomacy is particularly beneficial in Africa due to the range of challenges, dispersed U.S. presence, and historical ties that make military-to-military engagements more salient. On official visits, general/flag officers and senior enlisted leaders from USAFRICOM often meet with African counterparts and military, diplomatic, and civil leadership above parity, elevating the level of strategic engagement with the partner country to the ministerial and occasionally presidential levels, reflective of partners' desires for strategic engagement with the United States. As USAFRICOM leaders often play a vital role in state and nonstate negotiations, having training in or familiarity with the nuanced nature of diplomatic and development discussions becomes a necessity.

Defense Diplomacy is also a cost-effective shaping operation in "phase zero," enhancing partner capacity, capabilities, and interoperability while promoting stability through assistance using a 3D approach.[10] To better support this at USAFRICOM, foreign policy and U.S. Agency for International Development (USAID) advisors, embedded interagency representatives, and foreign liaison officers were deliberately built into the core staff to synchronize efforts among agencies and governments at the strategic, operational, and tactical levels.[11]

Increased partner engagement is the focus of the U.S. coastal West Africa and sub-Saharan strategies, and understanding African security concerns helps the United States identify how it can better support its African partners.[12] With ongoing military engagements and presence in these regions—and across the continent—it becomes more important to ensure USAFRICOM and component leadership who meet with partners have the tools and training to navigate Defense Diplomacy opportunities in support of U.S. policy.

While Embassy Country Teams are responsible for coordinating whole-of-government efforts for a particular country, USAFRICOM hosts the annual Africa Strategic Dialogue, which convenes senior leaders from USAID, State, and DOD to develop a holistic 3D approach for African security challenges.[13] In the following months after the Africa Strategic Dialogue, command staff, Country Teams, as well as State and USAID representatives convene for the Africa Strategic Integration Conference to coordinate layered 3D effects for specific regions, subregions, and countries.[14]

Unfortunately, even the best force structure can only marginally buy down the experiential learning curve for any complex task, such as Defense Diplomacy. As a foreign element investing in the development and security of a nation and culture speak the native language. Even the most qualified representatives bring cultural biases, preconceptions, and misunderstandings of effects to the development of the strategic approach for U.S. engagement. More diplomatically experienced senior military officers can quickly leverage State and interagency expertise and effectively engage partner-nation leaders to bridge the perception gap and provide relevant guidance for a more effective and culturally nuanced strategic approach.

Furthering U.S. Security Objectives: Insights From BG Bailey

West Africa is a growing focus for USAFRICOM and a strategic challenge that leaders in Washington, DC, must pay more attention to. From democratic backsliding to increasing expansion of violent extremist organizations (VEOs) southward from the Sahel to general instability caused by the repercussions of climate change—particularly in the Gulf of Guinea—the West Africa security environment is degrading at a dangerous pace.

USAFRICOM shares its regional partners' concerns regarding these security threats and pursues avenues that it can work toward to ensure mutual objectives in a synchronized and complementary manner are met. In my service as the deputy director for Strategy, Engagements, and Programs, I have been particularly struck by how much these aims can be furthered simply by listening and communicating with our partners in an open and frank manner that conveys our respect for the relationship. Open communication lays the foundation for future collaboration, while establishing trust between partners that can lead to unexpected yet welcomed outcomes. It is within this context that I relay my experience working with a partner in the Gulf of Guinea. I hope that in recounting it, readers can internalize the use of transparent dialogue in conjunction with the art of active listening to assist in furthering U.S. strategic security objectives.

I traveled to Guinea in October 2021 to meet with Guinean leaders to discuss growing the longer term security relationship between our two nations, especially looking at what USAFRICOM could do to support Guinean partners. During this visit, I had the honor of meeting with Guinea's minister of defense. The original intent of the meeting was to share our respective views on the security situation within Guinea and the surrounding region—a dialogue that would help inform future security cooperation efforts. It was immediately apparent that the minister took my concerns seriously; at the same time, he waited patiently to steer the conversation in the direction of his choosing once I had made my points. The minister then touched on the historical root causes of regional instability in the Gulf of Guinea, ongoing contributing factors, and what he saw as possible solutions. By the end of the minister's statement, I had received an in-depth analysis of regional instability that was more nuanced and sophisticated than I had ever received. The minister elucidated aspects of the security environment that had their roots in generational grievances that could not be mitigated with a single security cooperation initiative or even a strictly defense approach. An issue we viewed as strictly a security issue was suddenly framed in the broader context it warranted, and it became clear that to truly tackle the problem set, the command's framing and approach to the issue would need a significant recalibration.

The minister and I ended the engagement conveying the importance we both placed on the relationship between the Guinean armed forces and USAFRICOM and promised to engage in the future on a deeper and more regular level. I returned

Ghanaian special forces provide cover while approaching vessel during boarding exercise as part of Obangame Express 2021, March 17, 2021, near Nutekpo, Ghana (U.S. Navy/Fred Gray IV)

to Stuttgart, Germany, with a deeper appreciation for the historical context of the security situation in contemporary Guinea and a message for our command's leadership that our strategic approach to the country would need to change.

This dialogue led to a deeper understanding and appreciation for the Guinean perspective and fundamentally strengthened and changed the nature of the partner relationship—and furthermore helped to refine the priorities and approaches we are taking toward Guinea. USAFRICOM has begun engaging with the country in a more nuanced and, quite frankly, effective manner because of the lessons gleaned from an open and honest dialogue. While this single conversation will not be a panacea for the relationship, it could establish a better foundation to continue to strengthen the relationship as we work toward our mutual security objectives.

It was chance that the minister and I were able to have such an important and rich exchange, and with other individuals in our positions, it may have been different. However, by incorporating a baseline standard of Defense Diplomacy training into the career paths of our senior leaders—and specifically giving them the tools to engage in open communication and active listening when interacting with peers and senior leaders on the continent—we can work toward building stronger relationships and trust with our African partners.

Practicing Intelligence-Driven Defense Diplomacy: Insights From BG Keravuori

The degrading security situation in West Africa has been of significant concern for USAFRICOM and the broader U.S. Government due to the expansion of VEOs from the fragile states in the western Sahel recently affected by political instability and subsequent withdrawal of Western military forces.[15] Political instability and economic decline exacerbated by environmental factors in the Sahel have enabled a gradual southward expansion of VEO activity over the last 2 years, threatening the Gulf of Guinea littoral countries of Benin, Côte d'Ivoire, Ghana, Guinea, and Togo.[16] President Joe Biden's 10-year implementation plan to prevent conflict and promote stability under the Global Fragility Act specifically "seek[s] to break the costly cycle of instability" in these countries, through an "integrated, whole-of-government approach" leveraging "new

Soldier with Battalion Intervention Rapide of Djibouti communicates with team during multinational field training exercise at Justified Accord 23, in Isiolo, Kenya, February 20, 2023 (U.S. Army/Luke Michalski)

and existing diplomatic, defense, and development programs."[17]

USAFRICOM prioritized strategic engagement with coastal West African partners and multinational organizations to understand growing security concerns and VEO threats through the unique lens of each country. By doing so, it became abundantly clear that the most effective approach to regional security is to support our African partner states in developing a coordinated strategy toward clearly defined and shared U.S. and African goals using the entire toolkit of statecraft and not solely defense.[18]

To achieve long-term regional security outcomes with this holistic approach, the U.S. military must suppress its inclination to quickly "solutionize" a problem with a purely defense approach.[19] Alternatively, a simultaneous 3D interagency effort coordinated with European partners to layer effects could facilitate sustainable "clear and hold" efforts of African partners to reduce the threat and root causes of VEOs over time.[20]

Throughout the past few years, USAFRICOM and its interagency partners identified shared security priorities in Africa and formed the Combined Joint Interagency Coordination Group–West Africa (CJIACG-WA) in late 2022. The group's focus is to coordinate the use of DOD intelligence-sharing and training capabilities with unique diplomatic and development investments of other U.S. Government agencies to support partner-led efforts to implement a holistic counter-VEO approach. The group effort, among many others, has come to fruition after years of building a common understanding, trust, and relationships among U.S. agencies.

Applying the 3D approach in Africa starts with building a unity of effort with State Department Country Teams and then bringing in DOD to synergize efforts and reduce friction caused by stovepiped communication and divergent priorities. Working in tandem with diplomatic missions with embedded defense attachés and USAID regional offices, senior-level engagements initiated discussions to address regional security challenges around worrisome trends, the effectiveness of the United Nations (UN) missions such as the UN Multidimensional Integrated Stabilization Mission in Mali, or African-led organizations such as the Economic Community of West African States and the Accra Initiative. The unilateral and multilateral relationships built from consistent senior-level engagements are key to understanding how the United States can support African-led efforts and regional security initiatives with intelligence-sharing, security assistance, and operational support.

Conversations about security concerns and the metastasizing VEO issue with military and civilian leadership in coastal West Africa consistently become a broader examination of root causes of instability. Contributing factors such as governance, services, resources, desertification, corruption, human rights violations, porous borders, land-use governance, and a rapidly changing environment collectively contribute to instability and support VEO recruitment.[21] As a starting point, a sustainable solution needs to address social, economic, diplomatic, and military challenges while encouraging collaboration among the military, government agencies, NGOs, and neighboring states.

Strategic engagements led by senior USAFRICOM leaders and staff to partner countries have spurred greater collaboration between their national civic and military leadership. The interagency representation of visiting U.S. delegations often encouraged attendance by counterparts representing internal security, foreign affairs, humanitarian aid, law enforcement, and legislative affairs. African partner militaries capitalized on the opportunity to coordinate interagency lines of effort with U.S. support, such as increasing investment in education, providing basic services to underserved areas, and mitigating secondary and tertiary effects of land-use legislation potentially causing conflict and displacement. Intelligence directorate–led engagements specifically reinforced the need for information-sharing agreements among agencies and neighboring states and the establishment of systems and processes for efficient information-sharing.

Consistent bilateral engagements with coastal West African partners shaped a crucial subsequent multilateral engagement at the command-hosted African chiefs of defense conference. This unique forum built consensus among regional partners on shared security challenges and the transnational problem of VEO activity. USAFRICOM was trusted as a helpful partner to facilitate a multilateral discussion between coastal West African partners, which was particularly challenging due to the lack of a common language, cross-communication platform, or shared security framework involving the United States. Ultimately, these bilateral and multilateral engagements with coastal West African partners informed the purpose and establishment of CJIACG-WA by a trusted partner to address enduring security challenges in West Africa. Additionally, it contributed to encouraging African partners to "embrace joint, interagency, intergovernmental, and multinational mindsets," something that is happening across combatant commands.[22]

Professionalizing the Purple to Gold Pipeline: Insights from BG Keravuori

My assignment as USAFRICOM's deputy director of intelligence was an example of successful joint force talent management considering the confluence of language proficiency, education, and interagency experience that allowed me to engage with senior African and European civil and military leaders on shared security interests. Serving in command and directing a commander's action group hit my major key development milestones as an Army officer, but it was the broadening and interagency assignments that best prepared me to conduct Defense Diplomacy in Africa.

As French is the lingua franca in West Africa, my fluency in the language enabled more direct and candid discussions with senior African civil and military leaders and the French Armed Forces. The close partnership with France in Africa is made more striking through personal relationships and shared interests. Recently serving as a U.S. liaison to a French Army division and institutional exposure to the French military academy in Saint-Cyr provided me with a practical understanding of French defense strategy, foreign policy, and security efforts in the Sahel. The French military's long history of security efforts in West Africa provides crucial context and insight, and its continued 3D efforts often align with USAFRICOM priorities. Such experiences and relationships prove indispensable to deepening our close partnership with the French Armed Forces in West Africa.

Defense Diplomacy in practice was particularly well-served by my formative experiences as a foreign area officer (FAO), during which I was exposed to the nuances of diplomatic language and culture and the bureaucratic challenges of security assistance. Continued involvement with the FAO community also enables an advantageous link to the defense attaché offices and Country Teams at U.S. Embassies across the continent. An interagency broadening assignment as a FAO at the Department of State provided familiarity with subdepartment level stakeholders and processes that now enable flat communications between USAFRICOM and State for a cohesive U.S. response promoting unity of effort with African partners.

Going Beyond Familiarization

Members of the U.S. joint force often assume significant responsibility for promoting U.S. foreign policy abroad from junior to senior officer levels through partner engagements, security forums, combined exercises, and multinational operations. Preparing military leaders with a foundational understanding of the interagency community is fundamental to integrating efforts across the 3Ds and promotes more immediate integration with partner efforts on common interests to achieve sustained results at a modest, shared cost.

Based on the reflections of Defense Diplomacy practitioners, the joint force is best prepared through formal education and interagency experience. Having institutionalized the concept, training, and experiences to achieve joint integration, it is time for the joint force to likewise institutionalize the same for interagency integration. As famously stated by Carl von Clausewitz in *On War*, "war is not merely a political act but a real political instrument, a continuation of political intercourse, a carrying out of the same by other means."[23] Military officers, through campaigning in peacetime or conflict during wartime, participate in political dialogue. The military has long known the value of training and experience to achieving success, investing hundreds of thousands of dollars into training each

U.S. citizens and others who have requested departure from Sudan prepare to board Military Sealift Command expeditionary fast transport ship USNS *Brunswick* while it moors in Port Sudan, April 30, 2023 (U.S. Africa Command)

Servicemember, building training and experience at each rank.

The same cannot be said for interagency training, where only a small subset in specialty fields receive any experience and training beyond a PowerPoint overview. Professionalizing interagency training and experience to build a bench of 3D officers at field grade ranks and above level can potentially magnify the effects of national security investments in the same way the joint force integration created an advantage over Service-centric militaries.

Gold Gilding the Purple Joint Force

Military leadership during the reforms of the Goldwater-Nichols Department of Defense Reorganization Act of 1986 was adamantly against the proposed changes, and joint opportunities were seen as career-ending assignments.[24] With nearly 40 years of hindsight, the jointness enabled by Goldwater-Nichols is now one of the core strengths of the U.S. military.[25] Services will inevitably be reluctant to weigh interagency experience in career advancement due to institutional pressure, but DOD can shift institutional Service culture to value interagency experience just as it has for joint experience through policy change and evaluation. The U.S. military enjoys an advantage over its adversaries by being able to effectively execute joint operations, and interoperability is the next phase of preparation for military leadership to overcome complex modern security challenges.[26]

The joint force prioritizes joint experience as a requirement for senior military leaders through joint qualification accreditation but currently has no formal requirement or incentive for interagency experience, the importance of which has been repeatedly discussed and advocated for in professional journals over the last two decades. The introduction of an interagency qualification requirement for career advancement would expand acculturation across development, diplomacy, and defense agencies. Elevating the importance of interagency assignments with drivers of U.S. domestic and foreign policy through military broadening assignments at USAID and the Departments of State, Commerce, Treasury, and Energy would reduce the seams in U.S. whole-of-government strategy, policy, and efforts.

Expanding interagency assignments and introducing competitive interagency credit would require refocusing existing resources and add costs for permanent change-of-station moves. To bring costs down, joint credit could be reduced to 2 years to facilitate 1 year of interagency credit, an approach that could allow personnel assigned to joint billets—especially within the National Capital Region—to rotate through 1-year interagency

assignments with minimal resource requirements, avoiding the costs and turbulence of a permanent move.

While not everyone serving in joint assignments would be able to achieve interagency credit using this model, the joint force overall would have a significantly expanded bench of midgrade and senior officers with interagency acculturation and experiences enabling greater 3D integration and more effective Defense Diplomacy efforts in the future.

As Norman Schwarzkopf told a group of Naval Academy graduates in 1991, "the more you sweat in peace, the less you bleed in war." Nowhere is there a lower cost opportunity to increase training to achieve strategic-level effects than advancing from a joint to an interagency force. **JFQ**

Notes

[1] B.H. Liddell Hart, *Strategy* (New York: Praeger, 1954).

[2] Lawrence Kapp, *General and Flag Officers in the U.S. Armed Forces: Background and Considerations for Congress*, R44389 (Washington, DC: Congressional Research Service, February 1, 2019), https://crsreports.congress.gov/product/pdf/R/R44389/7.

[3] Chairman of the Joint Chiefs of Staff Instruction 3500.02C, *Universal Joint Task List Program* (Washington, DC: The Joint Staff, December 19, 2022), https://www.jcs.mil/Portals/36/Documents/Doctrine/training/cjcsi_3500_02c.pdf?ver=DcbU-aEXlhWsm-03av9h4A%3d%3d.

[4] *National Defense Authorization Act for Fiscal Year 2010*, Pub. L. 111–84, 111th Cong., 1st sess., October 28, 2009, https://www.congress.gov/111/plaws/publ84/PLAW-111publ84.pdf.

[5] *International Defence Engagement Strategy* (London: Ministry of Defence, 2013), https://www.gov.uk/government/publications/international-defence-engagement-strategy.

[6] Dan Lamothe, "Retired Generals Cite Past Comments from Mattis While Opposing Trump's Proposed Foreign Aid Cuts," *Washington Post*, February 27, 2017.

[7] James Mattis and Stephen Hadley, "Secretary Mattis Remarks on the National Defense Strategy in Conversation with the United States Institute [of] Peace," Department of Defense, October 30, 2018, https://www.defense.gov/News/Transcripts/Transcript/Article/1678512/secretary-mattis-remarks-on-the-national-defense-strategy-in-conversation-with/.

[8] M. Wade Markel et al., *Developing U.S. Army Officers' Capabilities for Joint, Interagency, Intergovernmental, and Multinational Environments* (Santa Monica, CA: RAND, 2011), https://www.rand.org/pubs/research_briefs/RB9631.html.

[9] Kyle J. Wolfley, "Military Power Reimagined: The Rise and Future of Shaping," *Joint Force Quarterly* 102 (3rd Quarter 2021), https://ndupress.ndu.edu/Media/News/News-Article-View/Article/2679810/military-power-reimagined-the-rise-and-future-of-shaping/.

[10] Hans Binnendijk et al., *Affordable Defense Capabilities for Future NATO Missions* (Washington, DC: Center for Technology and National Security Policy, February 23, 2010), https://ndupress.ndu.edu/Portals/68/Documents/occasional/CTNSP/NATO_Affordable-Defense-Capabilities.pdf?ver=2017-06-16-142145-460.

[11] "About the Command," United States Africa Command (USAFRICOM), https://www.africom.mil/about-the-command.

[12] *The U.S. Strategy to Prevent Conflict and Promote Stability: 10-Year Strategic Plan for Coastal West Africa, Benin, Côte d'Ivoire, Ghana, Guinea, and Togo* (Washington, DC: Department of State, March 24, 2023), https://www.state.gov/the-u-s-strategy-to-prevent-conflict-and-promote-stability-10-year-strategic-plan-for-coastal-west-africa/; *U.S. Strategy Toward Sub-Saharan Africa* (Washington, DC: The White House, August 2022), https://www.whitehouse.gov/wp-content/uploads/2022/08/U.S.-Strategy-Toward-Sub-Saharan-Africa-FINAL.pdf.

[13] *United States Africa Command: The First Ten Years* (Stuttgart: USAFRICOM, 2018), https://www.africom.mil/document/31457/united-states-africa-command-the-first-ten-years.

[14] Ryan McCannell, "At The Nexus of Diplomacy, Development, and Defense—AFRICOM at 10 Years (Part 3)," *War Room*, September 29, 2017, https://warroom.armywarcollege.edu/special-series/anniversaries/forming-africom-part-3/.

[15] Center for Preventative Action, "Violent Extremism in the Sahel," *Council on Foreign Relations, Global Conflict Tracker*, August 1, 2023, https://www.cfr.org/global-conflict-tracker/conflict/violent-extremism-sahel.

[16] Leif Brottem, "The Growing Threat of Violent Extremism in Coastal West Africa," *Africa Center for Strategic Studies*, March 15, 2022, https://africacenter.org/spotlight/the-growing-threat-of-violent-extremism-in-coastal-west-africa.

[17] *President Biden Submits to Congress 10-Year Plans to Implement the U.S. Strategy to Prevent Conflict and Promote Stability* (Washington, DC: The White House, March 24, 2023), https://www.whitehouse.gov/briefing-room/statements-releases/2023/03/24/fact-sheet-president-biden-submits-to-congress-10-year-plans-to-implement-the-u-s-strategy-to-prevent-conflict-and-promote-stability.

[18] William J. Burns, Michèle Flournoy, and Nancy Lindborg, *U.S. Leadership and the Challenge of State Fragility*, Fragility Study Group Report (Washington, DC: United States Institute of Peace, September 2016), https://www.usip.org/publications/2016/09/us-leadership-and-challenge-state-fragility.

[19] Brian Dodwell, "A View From the CT Foxhole: Brigadier General Rose Keravuori, Deputy Director of Intelligence, United States Africa Command," *CTC Sentinel* 16, no. 1 (January 2023), https://ctc.westpoint.edu/a-view-from-the-ct-foxhole-brigadier-general-rose-keravuori-deputy-director-of-intelligence-united-states-africa-command/.

[20] Aneliese Bernard, "Jihadism Is Spreading to the Gulf of Guinea Littoral States, and a New Approach to Countering It Is Needed," *Modern War Institute*, September 9, 2021, https://mwi.usma.edu/jihadism-is-spreading-to-the-gulf-of-guinea-littoral-states-and-a-new-approach-to-countering-it-is-needed.

[21] "Violent Extremism in the Sahel."

[22] Kurt W. Tidd and Tyler W. Morton, "U.S. Southern Command: Evolving to Meet 21st-Century Challenges," *Joint Force Quarterly* 86 (3rd Quarter 2017), https://ndupress.ndu.edu/Media/News/Article/1219106/us-southern-command-evolving-to-meet-21st-century-challenges/.

[23] Carl von Clausewitz, *On War*, trans. J.J. Graham (Ware, UK: Wordsworth Editions, 1997).

[24] James R. Locher III, "Has It Worked? The Goldwater-Nichols Reorganization Act," *Naval War College Review* 54, no. 4 (Autumn 2001), 104, https://digital-commons.usnwc.edu/cgi/viewcontent.cgi?article=2537&context=nwc-review.

[25] Charles Davis and Kristian E. Smith, "The Psychology of Jointness," *Joint Force Quarterly* 98 (3rd Quarter 2020), https://ndupress.ndu.edu/Media/News/News-Article-View/Article/2340620/the-psychology-of-jointness.

[26] Dan Sukman and Charles Davis, "Divided We Fall: How the U.S. Force Is Losing Its Joint Advantage Over China and Russia," *Military Review*, March–April 2020, https://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/March-April-2020/Sukman-Divided.

U.S. Air Force Technical Sergeant Jared Todd, 818th Mobility Support Advisory Squadron Survival, Evasion, Resistance and Escape air advisor, and Tanzania air force command Colonel Ian Haule discuss radio communication techniques at African Partnership Flight Kenya 2019, Laikipia Air Base, Kenya, August 22, 2019 (U.S. Air Force/Renae Pittman)

Convergence of Opportunities

By Opher Heymann and Peter Yeager

President Joe Biden's 2022 National Security Strategy views the world at an inflection point and characterizes the contemporary period as a decisive decade during which the terms of geopolitical competition between the major powers will be set.[1] According to this strategy, the world will either continue to develop as free, open, secure, and prosperous or will succumb to increasing degrees of repression and authoritarianism.[2] This struggle has real consequences. Since the end of World War II, the United States has helped foster the development of a world that is far more peaceful and prosperous than before.[3] These positive trends can be linked to the pillars of Western liberalism, which show that an increasingly democratic and economically interdependent world is wealthier and more peaceful. The efforts of the United States and its allies and partners to advance a free and open international system will be significant determinants of the decisive decade's outcome.[4]

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Africa represents a more intense interest to the United States than is commonly recognized. The President's national security agenda can be substantially advanced through U.S. engagement with African states. In this decisive decade, America's desire to support and advance the open international order could lose ground to authoritarianism and repression. Assisting the economic and political development of African states represents a significant opportunity to improve the global penetration of free market democracy while frustrating the inroads of America's illiberal competitors. One of America's core strengths and geopolitical advantages is its global network of partners and allies. This network can be expanded more meaningfully in Africa than anywhere else in the world. Alongside its diplomacy and development partners, U.S. Africa Command (USAFRICOM) is an important element in the U.S. foreign policy approach to Africa. Still, more must be done if U.S. strategic objectives are to be met.

The Problem

Despite the positive global trends since the end of World War II, prosperity and peace have landed unevenly and unequally around the world. Where liberalism has failed to take root, so too have many of the conditions commonly measured to judge the quality of a person's life. From this standpoint, Africa lags much of the rest of the world. Alongside the Middle East in the 2022 Democracy Index, African states experience the lowest levels of democracy and struggle with some of the highest rates of corruption worldwide.[5] Africa is the poorest continent in the world, representing approximately 2 percent of global gross domestic product despite hosting 12 percent of the world's population.[6] Measured across the continent, African states have the lowest life expectancy at birth,[7] the highest infant mortality rate,[8] the highest maternal mortality rate,[9] and the highest rate of AIDS.[10] Recently, there have been more coup d'états,[11] and the continent's very high rates of violent extremism[12] unsurprisingly bear a positive correlation with the incidence and location of these coups.[13]

Authoritarianism, corruption, and violent extremism are analogous to disease vectors enabling the exploitation of African states by predatory and malign actors. Violent extremism remains a significant problem confronted by many African states. For example, in West Africa and the Sahel, so-called Islamic State (IS)- and al-Qaeda-affiliated violent extremist organizations (VEOs) are expanding their areas of operation and conducting more frequent violent attacks.[14] In East Africa, al-Shabaab is aggressively resisting the new Somali government's counterterrorism campaign while continuing to target locations in close proximity to U.S. forces.[15] In Morocco, the Algeria-backed Polisario Front—a self-described Sahrawi nationalist liberation movement originally formed to resist Spanish rule—continues to test Rabat's control of Western Sahara.[16] In the Democratic Republic of the Congo, a tenuous ceasefire between government forces and the pro-Tutsi March 23 Movement recently broke down after months of fighting that spiked regional and ethnic tensions tied to the 1994 Rwandan genocide.[17] In nearby Ethiopia, forces under the command of Nobel Peace Prize–winning Prime Minister Abiy Ahmed stand accused of widespread human rights violations committed during a 2021–2022 conflict with the Tigrayan People's Liberation Front, one of several regional militias pressing the country's federal government for greater autonomy.[18] And just this spring, the Sudanese Armed Forces and Rapid Support Forces—a paramilitary organization formed from Janjaweed militias that committed atrocities in Darfur—clashed as their leaders jockeyed for power, despite previous collaboration to oust President Omar al-Bashir in 2019 and Prime Minister Abdalla Hamdok in 2021.[19]

China's influence in Africa begins with its economic investments. The People's Republic of China (PRC)'s trade with Africa in 2021 was $254.1 billion ($148.1 billion in exports and $106 billion in imports), nearly four times as large as U.S.-Africa trade, which was just $64.1 billion ($26.6 billion in exports and $37.5 billion in imports).[20] China also holds more African debt than any other state, measuring $73 billion in 2020.[21] Accusations of debt trap diplomacy appear to be overstated, although Chinese lending practices remain opaque and provide scope for corruption on both sides of the transaction.[22] While China is a major producer of infrastructure projects in Africa, concerns over the quality and endurance of these projects are rife, including a $568 million hydropower plant in Uganda that began to show hundreds of defects after only a few years of service.[23]

China continues to court prospective African hosts for military and logistics facilities to augment its first overseas base in Djibouti,[24] and Chinese firms are extracting minerals critical to defense and industrial production, often in a manner that damages local environments and economies.[25] China is also the foremost actor involved in illegal, unreported, and unregulated fishing in the waters around Africa, often using environmentally destructive practices that contribute to African food insecurity and destabilizing migration.[26] The PRC also markets its so-called safe city initiative to African countries, enabling and normalizing the mass surveillance of citizens in a manner consistent with the PRC's domestic efforts to limit political expression.[27]

Russia intentionally exploits the instability caused by VEOs to advance its own geopolitical aims. For example, Russia uses its proxies to nominally defend African states from pervasive VEOs and associated coups, while exploiting the states' weaknesses and vulnerabilities to engage in large-scale resource extraction and sanctions evasion.[28] Kremlin-backed private military company Wagner—bolstered by owner Yevgeny Prigozhin's influence organization and mining firms—is continuously exploring new such partnerships while sustaining deployments in the Central African Republic, Libya, and Mali.[29] Wagner's security activities in particular have been exposed for human rights violations and war

crimes, particularly in the Central African Republic and Mali.[30] While claiming to provide security and seek stability for countries beset by VEOs, some experts project Wagner's long-term impact will lead to greater regional instability.[31] The Russian proxy problem is not isolated to Africa; Wagner's resource extraction in Africa has been directly linked to funding for Russia's war in Ukraine.[32] Russia also has a more instrumental plan for Africa, as it pursues naval access to the Red Sea while seeking supporters for its war in Ukraine and blaming Western sanctions for conflict-induced grain shortages.[33]

As an expression of its values, the United States also mediates its engagement with African states that deviate from those values. The Leahy Laws and Section 7008 restrictions are laws that restrict U.S. assistance from being provided to states that violate human rights or following a coup d'état. Department of Defense–appropriated funds may not be used for training, equipment, or other assistance for a foreign security force unit if the Secretary of Defense has credible information that such unit has committed a gross violation of human rights.[34] Section 7008 of annual foreign aid appropriations legislation restricts certain aid to the governments of countries in which the military has overthrown a "duly elected" leader.[35] These laws are meant to apply diplomatic or political pressure on states that experience unconstitutional transfers of power,[36] or whose military forces engage in a gross human rights violation.[37] Section 7008 is currently in effect for Burkina Faso (since a coup in 2022), Guinea (2021), Mali (2020), and Sudan (1989).[38] An unintended consequence of limiting U.S. support for these states is that both behaviors often arise in the broader context of desperate, even existential struggles with VEOs. Increasingly, states in this position have been left with no alternative to offers of support from Russian proxies. Consequently, U.S. influence weakens while Russian influence expands, with African states falling victim to predatory behaviors of the proxy without significantly diminishing the threat posed by VEOs. In some instances, this scenario seems to be an unavoidable trap for African states unable to work with the United States due to values-based conditions for aid and assistance.

There is no other region on earth in which the free and open international system is more needed or could improve the overall quality of peoples' lives more dramatically than in Africa. Undertaking an effort to help to improve the conditions expressed is not a question of selflessness. Africa is not a charity case.

U.S. Army Soldiers from U.S. Army Southern European Task Force, Africa, and Royal Moroccan Army soldiers watch as paratroopers from both countries perform joint operations jump from U.S. Air Force and Royal Moroccan Air Force C-130 Hercules aircraft during African Lion 2023, at Ben Guerir Air Base, Morocco, June 10, 2023 (U.S. Air Force/Nicholas Swift)

Chinese President Xi Jinping and his Senegalese counterpart Macky Sall attend handover ceremony of National Wrestling Arena built with Chinese aid in Dakar, Senegal, July 22, 2018 (Imago/Alamy)

Rather, it represents a profound and singular opportunity to advance universal values and global prosperity. As such, U.S. interests are compellingly attached to the future of the African continent. For example, Africa's population is growing, while most of the rest of the world's is shrinking.[39] The United Nations (UN) predicts the population of Sub-Saharan Africa will nearly double by 2050.[40] If African states can improve their economic efficiency, African consumers could significantly grow the global economy; conversely, if those states fail to develop economically, Africans will undoubtedly be forced to migrate globally in pursuit of opportunity. Despite the limited degree of democratic spread across Africa, two-thirds of Africans prefer democracy as a form of government.[41] A democratic Africa would serve as a powerful counterweight to authoritarian regimes such as the PRC and the Russian Federation. In contrast, an illiberal Africa will better serve the authoritarian motives of China and Russia, already evident in states such as the Central African Republic, which is exploited by malign actors and advances the geopolitical aims of America's adversaries.[42] Independent and capable African states will more effectively manage the social factors that give rise to violent extremism and can better protect themselves from exploitative predators.

President Biden's emphasis on the determinacy of this decisive decade is nowhere more compelling than in Africa. The choices the United States and its like-minded partners make over the coming years could be decisive in helping to enable the persistence of U.S. influence globally, while improving the lives of billions of Africans. The U.S. approach to its engagement with Africa, namely the "3Ds" of development, led by the U.S. Agency for International Development; diplomacy, led by the Department of State; and defense, led by the Department of Defense, is well-suited to assist African states to confront the challenges enumerated herein, but insufficiently resourced to achieve the President's goals. The scale of the problem is simply too large in relation to the level of U.S. investment in Africa. Moreover, the United States self-limits its engagement with African states, often in their times of greatest need. This choice is driven by an understandable emphasis on American values, although at times this comes at the expense of its interests.

Woman waits for medical treatment in Yendi, Ghana, June 3, 2023, during medical civic action program as part of exercise African Lion 2023 (U.S. Army/Nathan Baker)

In contrast, other global actors including the PRC and Russia are engaging in an aggressive and exploitative campaign to extract as much wealth as possible from Africa to fill their own coffers and fuel their wars while fostering the expansion of authoritarianism and repression. An expanded 3D strategy is needed, wherein U.S. engagement with African states reflects a more comprehensive use of America's instruments of national power alongside a clearer appreciation for the present opportunities and consequences of inaction.

The Current Approach: The 3Ds

USAFRICOM's efforts are informed by its 3D partnerships, internal and external to the command. Defense is intended to support and enable other U.S. efforts in the diplomacy and development space. In this vein, a primary focus area for USAFRICOM is to build partner capacity. This effort is a central contribution to partners' defense and an essential building block of the broader security cooperation programs USAFRICOM and its partners provide. Through various engagement channels, the command assists African security forces and defense ministries to establish and strengthen key processes for military logistics, financial and human resource management, cyber defense and communications, as well as multidomain rule of law. These capacity-building efforts help U.S. partners in Africa secure their borders, coastlines, and vulnerable populations. Ideally, U.S. efforts and persistent engagement will enable some partners to assume increased responsibility as regional security anchors, providing security assistance to other partners and contributing to peacekeeping operations on the continent.

USAFRICOM invests in a growing number of states that leverage U.S. military training to train African partners in an effort that multiplies the command's efforts. In addition to its institutional capacity-building programs, USAFRICOM engages its partners in multilateral exercises, which are also targeted to develop core defense and security capabilities. The command has also developed the Africa Distribution Network Forum, in which African and external partners pool airlift logistics capabilities to create efficiencies that enable entire regions to coordinate resupply missions for peacekeeping forces across the continent. Notably, USAFRICOM is not alone. International partners, including Brazil, the European Union, Japan, South Korea, and the UN, bolster African partners' maritime domain awareness and law enforcement capabilities.

The command also engages in several other developmental initiatives in the security space, including symposia

on military justice and ethics, an annual military intelligence conference, and efforts to advance a broader awareness of the disproportionate impact of conflict on women and children. Each of these initiatives aims to improve the professionalism, effectiveness, and legitimacy of African security and military forces. For instance, the Women, Peace, and Security (WPS) program is an integral component of USAFRICOM's efforts to enhance partner capability by enabling security cooperation efforts to better leverage the contributions of both women and men. The command implements WPS by supporting defense institutions' inclusion of women in African partner defense forces; ensuring security cooperation activities include requirements to protect civilians, specifically women and girls; and helping to develop training and accountability mechanisms within partner defense forces that establish professional standards of conduct and prevent sexual and gender-based violence. Each of these programs differentiate the United States from its competitors and are key contributors to promoting stability when implemented.

An Enhanced Approach: 3D+

Because of USAFRICOM's effectiveness, many states are enthusiastic to cooperate with the United States, particularly in the security sector, essentially giving the command more "work" than it can perform. If that demand could be met, it would expand U.S. influence. This dynamic exposes two principal problems with the American approach to Africa while also highlighting important opportunities for advancing U.S. interests. First, engagement with African states manifests too episodically, which suggests the United States lacks a well-developed understanding of its national interests in Africa. Second, U.S. engagement with African states manifests too narrowly, with an overemphasis on defense while underemphasizing diplomatic, informational, and economic tools. Unless and until these shortfalls are addressed, the United States is unlikely to increase its influence with African states or help meaningfully reinforce the rules-based international order on the African continent.

The lack of a more robust and widespread understanding of U.S. interests in Africa leads to its underinvestment on the continent, which is why the United States prioritizes defense over other instruments of national power. This likely arises because of the long-term nature of the challenges African states confront, while the United States deals with more urgent and near-term concerns. It may also be coupled to a limited understanding of the degree to which the United States benefits from the contemporary global order and a perception of how that order could be advanced in Africa.[43] Accordingly, Africa may be perceived more as a problem to be solved rather than an opportunity to be pursued. Moreover, while U.S. defense and security cooperation investments in Africa are helpful, they may also have limited outcomes since they have little to connect to in the economic and governance spheres. In other words, if the broader logic of U.S. security cooperation is to help build partner capacity in the security domain, then improved conditions of security should be connected to more robust economic activity and additional efforts to foster the maturation of democratic political institutions. For example, there is no doubt that real impediments to U.S. private sector investment in Africa exist. Yet if sufficient inducements are not offered to mitigate the challenges U.S. companies perceive, then U.S. companies will never do business in Africa.

The treatment of Africa as a problem rather than an opportunity is the case across the spectrum of the U.S. 3D approach. USAFRICOM is primarily focused on countering the most dangerous VEOs in Africa, while, for example, the U.S. Agency for International Development is primarily focused on addressing health crises, food security, and impacts of climate change. These are important efforts with real and positive effects where they are undertaken, yet they are also largely preventive rather than developmental. They address the most desperate conditions in Africa, and while they may even create fruitful conditions for economic development, they are not sufficiently built upon with additional, targeted efforts aimed at fostering enduring institutional development and economic expansion. Consequently, the problematic conditions described above tend to persist where they already exist. It is no surprise that more than 30 years after its initial intervention in Somalia, the United States remains primarily focused on counter-VEO operations there.

If the United States viewed Africa as an opportunity, then the pursuit of its interests would come into sharp focus. It may still wish to fight extremists in Somalia and AIDS in Sub-Saharan Africa, but it would also want to concentrate on fostering liberalism. Arguably, the best opportunity to advance democracy and the free market is to focus on those places in which it has already begun to take root. These are the states whose values are most likely to align with those of the United States, and where a consistent and constructive bilateral partnership could produce tangible outcomes. In turn, the positive results we have come to expect from such efforts should be an attractive incentive for neighboring states to reevaluate their own political and economic systems.

To advance such an approach, the United States needs to engage all its instruments of national power. It has many of the right tools in place, though not all and not enough. The tools that are engaged are simply underresourced. Because of a lack of resources, both the PRC and Russia are expanding influence and gaining access to the resources they need to advance their global aims, while VEOs continue to foster unacceptable levels of violence and political instability. Breaking this cycle requires a meaningful U.S. commitment to resource more fully its diplomatic, development, and defense capabilities while leveraging economic and information tools for multiplied effects. This is the 3D+ approach, with the "+" representing harnessing other governmental agencies, such as the Departments of Commerce and Treasury, and the Office of the United States Trade Representative.

U.S. industry must also be incentivized to invest in the continent. Tools such as the African Continental Free Trade Area could expand U.S. market access to and trade with Africa, diversify U.S. supply chains, and increase reciprocal opportunities for U.S.-African trade and investment expansion.[44] To address the robust information environment, the United States needs a dedicated information arm with more effective authorities to overcome malicious information dominance tactics currently enjoyed by the PRC and Russia. This combination of activities has the potential to improve political stability and democratic penetration, enhance economic performance, reduce violence, and increase U.S. influence. In short, it will help to advance the open, international order.

Still, the United States can do more to improve the consistency of its approach to its African partners, one that is more reflective of the intensity of its interests. Congress has already set conditions for this in one important domain, coup-related restrictions. As of fiscal year 2023, a waiver process has been added to Section 7008–related partnering restrictions.[45] The waiver process empowers the Secretary of State, "following consultation with the heads of relevant Federal agencies," to waive these restrictions "on a program-by-program basis if the Secretary certifies and reports to the Committees on Appropriations that such waiver is in the national security interest of the United States."[46] Furthermore, military training and equipment authorized to be provided by the Department of Defense under 10 U.S. Code § 333 can also potentially be waived from 7008 restrictions.[47] Appropriately, the waiver process has a high bar, but it permits senior decisionmakers to balance the tension between America's values and its interests. It allows for some flexibility to manage important partnerships and maintain crucial influence, while frustrating the exploitative and coercive efforts of U.S. competitors. Ideally, this constancy gives the United States a greater role in rapidly helping coup-impacted countries to return to a fair democratic system.

Throughout the world, but especially in Africa, U.S. foreign policy relies on the strategic integration of the 3Ds. This approach is designed to enable the United States to contribute meaningfully to addressing the range of challenges experienced by African states. These challenges include limited democracy, underperforming economies, high levels of corruption, and the expansion of violent extremist organizations. Collectively, these challenges can be exploited by competitors such as the PRC and Russia, one consequence of which is that the negative environmental conditions tend to persist or worsen. While the United States is an effective security partner for many African states, it has underresourced its approach to Africa, thus limiting its effectiveness. To break this cycle and truly advance the open international order, the United States needs to implement a 3D+ approach, leveraging the full range of tools to foster the improvement of economic and political conditions in Africa. In turn, this approach will help strengthen African states economically and politically, rendering them far less vulnerable to coercive and exploitative practices. **JFQ**

Notes

[1] *National Security Strategy* (Washington, DC: The White House, October 2022), https://www.whitehouse.gov/wp-content/uploads/2022/10/Biden-Harris-Administrations-National-Security-Strategy-10.2022.pdf.

[2] Ibid.

[3] Steven Pinker, *The Better Angels of Our Nature: Why Violence Has Declined* (New York: Viking Penguin, 2011); Michael Beckley, *Unrivaled: Why America Will Remain the World's Sole Superpower* (Ithaca: Cornell University Press, 2018).

[4] *National Security Strategy*.

[5] *Democracy Index 2022: Frontline Democracy and the Battle for Ukraine* (New York: Economist Intelligence, 2022); "Corruption Perceptions Index 2022," Transparency International, 2022, https://www.transparency.org/en/cpi/2022.

[6] "GDP (Current U.S.$)," The World Bank, 2023, https://data.worldbank.org/indicator/NY.GDP.MKTP.CD; "World Population Prospects 2022," United Nations, Department of Economic and Social Affairs, 2022.

[7] Ibid.

[8] "Mortality Rate, Infant," The World Bank, 2023, https://data.worldbank.org/indicator/SP.DYN.IMRT.IN?most_recent_value_desc=true.

[9] "Maternal Mortality Ratio," The World Bank, 2023, https://data.worldbank.org/indicator/SH.STA.MMRT?most_recent_value_desc=true.

[10] "Prevalence of HIV, Total," The World Bank, 2023, https://data.worldbank.org/indicator/SH.DYN.AIDS.ZS?most_recent_value_desc=true.

[11] Dave Lawler, "Coups Are Making a Comeback," *Axios*, January 30, 2022, https://www.axios.com/2022/01/30/coup-attemps-countries-around-world.

[12] *Global Terrorism Index 2023* (Sydney: Institute for Economics and Peace, March 2023), https://reliefweb.int/report/world/global-terrorism-index-2023.

[13] Lawler, "Coups Are Making a Comeback."

[14] *The New Frontier for Jihadist Groups? North of the Countries of the Gulf of Guinea* (Berlin: Konrad-Adenauer-Stiftung, 2021), https://www.kas.de/documents/261825/13432629/North+of+the+countries+of+the+Gulf+of+Guinea+-+The+new+frontier+for+jihadist+groups.pdf/97cbceda-85c1-33fc-45fd-50f8ddaaa0ab?version=1.2&t=1625138447487; "Jihadi Violence Takes Root in Benin, Its Spread Worries West Africa," *North Africa Post* (Rabat), December 30, 2022, https://northafricapost.com/63974-jihadi-violence-takes-root-in-benin-its-spread-worries-west-africa.html.

[15] *Sustaining Gains in Somalia's Offensive Against Al-Shabaab* (Brussels: International Crisis Group, March 21, 2023), https://www.crisisgroup.org/africa/horn-africa/somalia/b187-sustaining-gains-somalias-offensive-against-al-shabaab; Omar Faruk, "Al-Shabab Gunmen Attacks Airport in Somalia's Capital," Associated Press, March 23, 2022, https://apnews.com/article/africa-somalia-mogadishu-al-shabab-1f68208d223285db793386bfcbb96263.

[16] "Western Sahara Profile," BBC News, January 31, 2023, https://www.bbc.com/news/world-africa-14115273.

[17] "DR Congo's M23 Ceasefire: Angola to Deploy Troops After Failed Truce," BBC News, March 11, 2023, https://www.bbc.com/news/world-africa-64927180; Sonia Rolley, "Explainer: What Is Driving the Violence in Eastern Congo?" Reuters, February 1, 2023, https://www.reuters.com/world/africa/what-is-driving-violence-eastern-congo-2023-01-31/.

[18] *2022 Country Reports on Human Rights Practices: Ethiopia* (Washington, DC: Department of State, 2022), https://www.state.gov/reports/2022-country-reports-on-human-rights-practices/ethiopia.

[19] Ellen Ioanes, "In Sudan, a Power

Struggle Between Rival Armed Forces Turns Violent," *Vox*, April 30, 2023, https://www.vox.com/2023/4/15/23684493/us-citizens-evacuated-from-sudan.

[20] Data from U.S. Census Bureau and China Customs Statistics sourced via Trade Data Monitor. See "Welcome to Trade Data Monitor," Trade Data Monitor, 2023.

[21] Fikayo Akeredolu, "China's Role in Restructuring Debt in Africa," *Oxford University Politics*, February 16, 2023, https://blog.politics.ox.ac.uk/chinas-role-in-restructuring-debt-in-africa/.

[22] Arve Ofstad and Elling Tjønneland, "Zambia's Looming Debt Crisis—Is China to Blame?" *CMI Institute*, no. 1 (June 2019), https://www.cmi.no/publications/6866-zambias-looming-debt-crisis-is-china-to-blame.

[23] Ryan Dube and Gabriele Steinhauser, "China's Global Mega-Projects Are Falling Apart," *Wall Street Journal*, January 20, 2023.

[24] *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2021* (Washington, DC: Office of the Secretary of Defense, 2021), https://media.defense.gov/2021/Nov/03/2002885874/-1/-1/0/2021-CMPR-FINAL.PDF.

[25] Ariel Cohen, "China and Russia Make Critical Mineral Grabs in Africa While the U.S. Snoozes," *Forbes*, January 13, 2022.

[26] Bruce Vaughn et al., *China's Role in the Exploitation of Global Fisheries*, R47065 (Washington, DC: Congressional Research Service, April 12, 2022), https://crsreports.congress.gov/product/pdf/R/R47065/1; Kukka Ranta, "Illicit Migration to Europe," *Global Initiative*, May 8, 2015, https://globalinitiative.net/analysis/illicit-migration-to-europe-consequences-of-illegal-fishing-and-overfishing-in-west-africa/.

[27] Bulelani Jili, "The Rise of Chinese Surveillance Technology in Africa (Part 4 of 6)," *Electronic Privacy Information Center*, August 25, 2022, https://epic.org/the-rise-of-chinese-surveillance-technology-in-africa-part-4-of-6/.

[28] "Wagner Group's CAR Mining Operations Help Russia Evade Sanctions," *Africa Defense Forum*, May 2, 2023, https://adf-magazine.com/2023/05/wagner-groups-car-mining-operations-help-russia-evade-sanctions/.

[29] David Ehl, "Russia's Wagner Group in Africa: More Than Mercenaries," Deutsche Welle, June 24, 2023, https://www.dw.com/en/more-than-mercenaries-russias-wagner-group-in-africa/a-64822234; Sam Mednick, "After Burkina Faso Ousts French, Russia's Wagner May Arrive," Associated Press, April 7, 2023, https://apnews.com/article/burkina-faso-russia-wagner-jihadi-02d9235279f0991cdb6ad3ebb4d3e546.

[30] "Treasury Sanctions the Head of the Wagner Group in Mali," Department of the Treasury, May 25, 2023, https://home.treasury.gov/news/press-releases/jy1502.

[31] Colin P. Clarke, "How Russia's Wagner Group Is Fueling Terrorism in Africa," *Foreign Policy*, January 25, 2023.

[32] Debora Patta and Sarah Carter, "How Russia's Wagner Group Funds Its Role in Putin's Ukraine War by Plundering Africa's Resources," CBS News, May 16, 2023, https://www.cbsnews.com/news/russia-wagner-group-ukraine-war-putin-prigozhin-africa-plundering-resources/.

[33] Samy Magdy, "Sudan Military Finishes Review of Russian Red Sea Base Deal," Associated Press, February 11, 2023, https://apnews.com/article/politics-sudan-government-moscow-803738fba4d8f91455f0121067c118dd; Josh Pennington, Darya Tarasova, and Stephanie Busari, "Russia Tries to Blame West for Food Shortages as Lavrov Rallies Support on Africa Tour," CNN, July 25, 20221, https://edition.cnn.com/2022/07/25/africa/lavrov-africa-tour-food-shortage-ukraine-russia-intl/index.html.

[34] "About the Leahy Law," Department of State, January 20, 2021, https://www.state.gov/key-topics-bureau-of-democracy-human-rights-and-labor/human-rights/leahy-law-fact-sheet/.

[35] Alexis Arieff and Lauren Ploch Blanchard, "'An Epidemic of Coups' in Africa? Issues for Congress," *Congressional Research Service Insight*, February 11, 2022, https://crsreports.congress.gov/product/pdf/IN/IN11854.

[36] Alexis Arieff, Marian L. Lawson, and Susan G. Chesser, "Coup-Related Restrictions in U.S. Foreign Aid Appropriations," *Congressional Research Service In Focus*, April 21, 2021, https://apps.dtic.mil/sti/trecms/pdf/AD1171956.pdf.

[37] Michael A. Weber, "Global Human Rights: Security Forces Vetting ('Leahy Laws')," *Congressional Research Service In Focus*, August 5, 2022, https://crsreports.congress.gov/product/pdf/IF/IF10575#:~:text=Introduction,human%20rights%E2%80%9D%20(GVHR).

[38] Arieff, Lawson, and Chesser, "Coup-Related Restrictions in U.S. Foreign Aid Appropriations."

[39] "World Population Prospects 2022."

[40] Ibid.

[41] Robert Mattes, *Democracy in Africa: Demand, Supply, and the "Dissatisfied Democrat"* (Accra, Ghana: Afrobarometer, February 2019), https://www.afrobarometer.org/wp-content/uploads/migrated/files/publications/Policy%20papers/ab_r7_policypaperno54_africans_views_of_democracy1.pdf.

[42] Joseph Siegle, "How Russia Is Pursuing State Capture in Africa," *London School of Economics and Political Science*, March 21, 2022, https://blogs.lse.ac.uk/africaatlse/2022/03/21/how-russia-is-pursuing-state-capture-in-africa-ukraine-wagner-group/.

[43] Beckley, *Unrivaled*; Sean Starrs, "American Economic Power Hasn't Declined—It Globalized! Summoning the Data and Taking Globalization Seriously," *International Studies Quarterly* 57, no. 4 (2013), 817–830.

[44] Nicolas Cook and Liana Wong, *African Continental Free Trade Area (AfCFTA): Overview and Issues for Congress*, R47197 (Washington, DC: Congressional Research Service, May 3, 2023), https://crsreports.congress.gov/product/pdf/R/R47197.

[45] Arieff, Lawson, and Chesser, "Coup-Related Restrictions in U.S. Foreign Aid Appropriations."

[46] Ibid.

[47] Ibid.

Russia's icebreaker *50 Let Pobedy* moves into ice near Sabetta, Tyumen region, Russia, April 4, 2021 (Shutterstock)

Friction Points in the Sino-Russian Arctic Partnership

By Adam Lajeunesse, P. Whitney Lackenbauer, Sergey Sukhankin, and Troy J. Bouffard

In 2018, China outlined its role and ambitions in the Arctic with a comprehensive white paper titled *China's Arctic Policy*.[1] In it, Beijing identified four key areas of interest: shipping, resource development, regional governance, and science. Underlying these specific priorities is an ever-present and overarching theme of respect and participation: respect for China's interests in the Arctic and for the involvement of non-Arctic states in the region. In many ways, this policy announcement marked the high point of China's influence in the democratic Arctic. Since then, China's soft power in the north has suffered steady decline, as Arctic countries have digested the implications of China's human rights abuses in Hong Kong and Xinjiang as well as its aggressive posturing in the South China Sea and against Taiwan.[2] Chinese "wolf warrior" diplomacy tactics[3] against some Arctic states have heightened a sense of distrust, making it difficult to separate Arctic dynamics from the principal challenge posed by China to

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long-term U.S. security and prosperity and those of its allies more generally.[4]

While the trend in the seven like-minded states (Canada, Finland, Iceland, Norway, Russia, Sweden, and the United States) has generated a distaste toward engagement with China as an Arctic actor, Beijing has asserted a growing influence in Russia, where it has managed to consistently advance its Arctic interests in these four priority areas. Indeed, the Sino-Russia relationship in the north has tightened in the last couple of years, creating a mutually beneficial strategic partnership, an easy access point for China in the Arctic, and a willing financier and supporter for some of Russia's key northern development projects. Western sanctions imposed on the Russian economy in the wake of Russia's renewed invasion of Ukraine have only increased its need for Chinese investment, markets, and political support. And, in support of this partnership, China's diplomatic messaging toward the Russian Arctic is defined by the same "win-win" narrative that it applies globally, with specific attention to the value of Chinese investment, shipping, and resource development in the Russian north.

Today, there is a broad policy consensus in Russia about the desirability of keeping Sino-Russian relations on a positive trajectory in political and economic terms.[5] Chinese statements—and tacit acceptance of Russia's invasion of Ukraine—suggest that Beijing also sees strategic value in continuing to strengthen that relationship. This confluence of interest creates obvious dangers for the democratic Arctic states, which now openly recognize the economic, strategic, and military dangers posed by both authoritarian states in the Arctic and elsewhere.

Yet despite the seemingly close partnership, Sino-Russian relations in the north are not quite the friendly terrain of two like-minded states advancing a "friendship" with "no limits," as described by Vladimir Putin and Xi Jinping in February 2023. Arctic cooperation for the two authoritarian states remains a highly transactional partnership, underpinned by deep and abiding suspicion. China's presence and activities in the Arctic have long concerned Russian leadership, and while the outward face of that partnership remains positive, the smiles and handshakes rest on an unstable foundation, riven by friction.

As the world has seen across the democratic Arctic, China's polar ambitions are subject to pushback when Beijing's ambitions conflict with local values and sensitivities. This article is an overview of Sino-Russian friction and points of vulnerability in their Arctic relationship. Downplayed by the Russian and Chinese governments and Arctic actors in those countries, each of these real or possible disputes has the potential to degrade the growing Sino-Russian strategic partnership in the region. In this article, we highlight three main areas of friction—navigation, resource exploitation, and infrastructure—that we see as exploitable gaps in the relationship. Western observers and commentators should not be neutral in observing this relationship; rather, we might benefit from shining a light on these issues that Beijing and Moscow have so assiduously sought to sidestep. In so doing, the like-minded Arctic states will be better positioned to address Russia and China as distinct regional challenges rather than an inherently unified front.[6]

China as a "Near-Arctic State" and the Role of Non-Arctic Actors

Chinese strategic messaging regarding the Arctic promotes an image of China as a peaceful and friendly world power seeking win-win economic cooperation.[7] This narrative, common to Chinese messaging around the world, is designed to blunt foreign criticism while facilitating investment, scientific collaboration, and the entrenchment of Chinese facilities and programs in foreign states. In the Arctic context, this means securing access to shipping routes, Chinese direct foreign investment in energy and mining projects, Belt and Road Initiative (BRI) infrastructure projects, and (potentially dual-purpose) scientific research.[8] Although the Arctic still holds the *promise* of resources and shipping routes that could one day be important as part of a global BRI as a "Polar Silk Road" (PSR),[9] many of these remain economically unviable. As such, China's short-term Arctic interests are more modest than many Western commentators suggest.[10]

As the region's largest coastal state and the most capable Arctic power, Russia has long insisted that Arctic governance should remain the sole responsibility of Arctic states, and Moscow remains intent on protecting its dominant position in the region. Beijing, in contrast, seeks to alter the status quo by advocating a greater role in Arctic governance. For years, China has maintained that its interests and capabilities in the Arctic make it a "near-Arctic state" while promoting the perception of the Arctic as a global commons, rather than a strictly regional space.[11] As Dmitri Trenin, former director of the Carnegie Moscow Center, has noted, "Russia is, in a word, a status quo power, while China is seeking to open up the region for the world and capitalize on that."[12] Disagreements over Arctic governance offer the most broad-based area for issues between the two states.[13]

In an illustrative article for the *Guangming Daily* in April 2021, Dong Yongzai, associate researcher at the Xi Jinping Strong Army Thought Research Center at the Academy of Military Sciences, echoes a common theme in Chinese political, academic, and media commentary: namely, that China "should play a constructive role in improving the rules of polar governance, promoting peace and stability in the polar regions, and safeguarding the common interests of all countries and the international community."[14] In so doing, it advances the *community of human destiny* in the polar regions.[15] This phrase is an increasingly dominant frame in Chinese messaging, which encompasses the idea that China must be more active in global affairs as it seeks "to realize the 'Chinese dream' of what Xi Jinping refers to as the 'great rejuvenation' (essentially, China's return to the center of world civilization)."[16]

Russia has naturally pushed back on this notion of Chinese rights, entitlement, and desire to internationalize the

Arctic. Indeed, its concern about China's emerging Arctic interests was a major impediment to Beijing's application for an Arctic Council observer position, obstructing the process for 7 years. Moscow reluctantly approved China's application to the council only after considerable pressure from Nordic nations and the drafting of the council's "Criteria for Admitting Observers," which required that new observers "recognize Arctic states' sovereignty, sovereign rights, and jurisdiction in the Arctic."[17]

In June 2020, in a revealing statement, the Russian Foreign Ministry's special envoy and senior official in the Arctic Council, Nikolai Korchunov, stated that Russia is not interested in delegating its share of responsibility for the Arctic Region to other countries. Korchunov stated, "The Americans are not prepared for this, either. In this respect it is impossible to disagree with U.S. Secretary of State Michael Pompeo's statement made in May 2019 that there are two groups of countries—Arctic and non-Arctic. He said so in relation to China, which positioned itself as a near-Arctic state. We disagree with this."[18] This statement—from one of Russia's highest-ranking Arctic officials, dismissing China's entire Arctic identity—is telling. It was surely planned to send a message and express a growing discomfort with China's growing self-defined Arctic identity.

The manifestations of China's near-Arctic state identity have also been unsettling to Russia. In the future, this may become more acute. While China's military has no Arctic presence, its growing icebreaker fleet and commercial activities give it more capability and leverage in the region. China's two icebreakers operate independently, and plans for a new nuclear-powered vessel comparable to the Russian *Arktika*-class, will give China the ability to match Russian access.[19] This growing access capability is concerning to the Russians, as it gives substance to China's broader claims to a near-Arctic identity.

There are also concerns within Russia that China's civilian presence will support a longer term military presence, although these thoughts are rarely expressed through official channels. In 2016, Liu Huirong, dean and professor at the Ocean University of China's College of Law and Political Science, highlighted such Russian concerns that he saw surrounding dual-use technology, specifically hydroacoustic research.[20] Mapping the Arctic seafloor and studying ocean salinity and thermal layers as well as regional ice dynamics are all activities of China's civilian research program and are prerequisites to a naval presence—particularly when considering potential submarine operations.

For Russia, this is a persistent fear that was dramatically brought to the fore in June 2020 when Russian authorities arrested Valery Mitko, a professor at the St. Petersburg Arctic Academy of Sciences. Mitko was charged with high treason for providing Chinese intelligence services with classified materials relating to hydroacoustics and submarine detection methods. While the details of his activities are not public, Chinese interest in co-opting an Arctic submarine expert must have provoked new concerns over its long-term objectives.

As China increases its Arctic presence and capabilities, it will likely become more strident about its rights in the Arctic and more unilateral in its approach. Russia has never supported such a presence and is explicitly opposed to any direct Chinese role in Arctic governance. This divergence in policy and philosophy can be papered over while China's role in polar governance is limited by its minimal access and tempered ambitions. However, China clearly envisions its role expanding in the future, in lockstep with access capabilities and economic clout. As that happens, Russia will have to come to grips with increased Chinese say in a region deemed to be of vital economic, military, and psychological importance to the Russian state.

Arctic Sovereignty: Chinese and Russian Disagreements

When China became an accredited observer to the Arctic Council in 2013, it did so on the condition that it "recognize Arctic States' sovereignty, sovereign rights, and jurisdiction in the Arctic."[21] This mollified many existing Russian concerns over China's Arctic objectives, and in the intervening years there have been no disputes over sovereignty or jurisdiction. This harmony has been facilitated by China's relative absence from the Arctic, where its ships make up only a small percentage of the voyages across northern Russia.[22] Beneath this harmony, however, remains deep disagreement on the question of sovereignty and jurisdiction, which strikes at the heart of Russia's position in the Arctic. As Chinese shipping and activity increase, this disagreement may be exacerbated.

Central to Russia's position in the Arctic is its assertion of sovereignty or control over the Northern Sea Route (NSR), or Northeast Passage. While the precise nature of that sovereignty remains somewhat ambiguous, Moscow claims to control key straits along the NSR as historic waters, while its published maps appear to extend its jurisdiction to the limits of the exclusive economic zone (EEZ), which Russia claims to manage in the same manner as its internal waters.[23]

As Russia's strategic thinking has increasingly emphasized sovereignty, its national regulations related to shipping along the NSR have been strengthened. In 2013, an authorization procedure for ships to pass through the NSR was introduced, and between 2017 and 2019, Russia proposed further limitations. In December 2017, the amendments to the merchant shipping code of Russia granted exclusive rights to vessels sailing under the Russian state flag to transport hydrocarbon resources produced in Russia and loaded onto vessels located in the NSR. In 2018, Russia banned the use of ships built outside the country to transport oil and gas extracted from the Russian Arctic. The following year, Russia added a new notification procedure for foreign warships passing through the territorial sea of the NSR. The new procedure means that a foreign state needs to submit a notification concerning the planned passage no later than 45 days prior to the start of the proposed passage. It also (under specific circumstances) requires mandatory icebreaker piloting by Russian-appointed

U.S. Army and Canadian soldiers practice and conduct tactical insertion on open ice skiway delivered by ski-equipped LC-130 Hercules of 109th Airlift Wing, New York Air National Guard, on frozen oceanic Arctic ice near Cornwallis Island, Nunavut, Canada, March 15, 2023, as part of exercise Guerrier Nordique 23 (U.S. Army/Mikel Arcovitch)

personnel in the NSR.[24] Under international law, such regulations and requirements should be illegal.

The Kremlin, therefore, views the NSR as being firmly within its (ill-defined) sovereignty. It is central to its core national security concerns and an important pillar of its economy and future development. Given these views, the Kremlin is committed to protecting its position in the region and would almost certainly react strongly to any efforts that it perceives to threaten that position.[25]

China has not forcefully asserted its position on Arctic maritime sovereignty regarding the NSR but is unlikely to align with Russia's views. China's 2018 Arctic white paper and statements backed by senior officials stress that Arctic shipping routes should be open to all and governed by existing international agreements.[26] That position is inflexible, given China's commercial reliance on transit rights around the world. In Chinese expert circles, the Polar Silk Road is also of growing interest. In Chinese academic and media commentary, these northern routes (and the NSR in particular) are—by a wide margin—the most discussed elements of China's Arctic interests. Of note, Chinese-language academic research and media commentary consistently assert China's rights of passage.[27]

Historically, Russia has shown an aversion to a Chinese presence on this route. In 2012, Russia blocked Chinese vessels from operating in the NSR, causing China to suspend its research activities during its fifth Arctic expedition.[28] As recently as the summer of 2021, Russia denied access to Chinese sailor Zhai Mo, a famous state-sponsored Chinese adventurer who was attempting to circumnavigate the Arctic Ocean (though access was later granted). While officially a private citizen, Zhai has a history of asserting Chinese state sovereignty in disputed areas, a fact that may have concerned the Russian authorities.[29] To date, many Russian experts claim that their government does not accept the PSR moniker, which uncomfortably subsumes the NSR into a China-sponsored initiative.[30] Despite misgivings, Russia has adopted a cooperative position, given its need for Chinese investment in the region.

While both China and Russia have sidestepped the question of sovereignty and jurisdiction, as Chinese activity increases these tensions will be harder to ignore. This difficulty will manifest for Russia if Chinese shipping comes to dominate the route—and particularly if China leverages its dominant economic and political position to deploy its own icebreakers in support. Increased shipping will also put China in the uncomfortable position of having to choose between continuing to implicitly (or even explicitly) respect Russian maritime sovereignty or adopting a clearer line on the freedom of the seas. The former flies in the face of Chinese Arctic and broader maritime policy, while the latter would seriously aggravate the relationship with Russia and highlight the considerable gap between the two on a political and legal issue of crucial importance to Russia.

USCGC *Healy* crewmember Petty Officer 2nd Class Patrick Edge stands bear watch from bridge wing during on-ice science equipment installation in Beaufort Sea, August 12, 2023 (U.S. Coast Guard/Briana Carter)

Marine Scientific Research and Chinese Encroachment

Over the past 20 years, China has undertaken extensive marine scientific research in the Arctic Ocean and adjacent seas. Chinese narratives surrounding this research program center on questions of environmental research, geophysics, and other purely scientific pursuits. Despite this, automatic identification system tracking of the Chinese icebreakers *Xue Long* and *Xue Long 2* demonstrates a serious interest in resource mapping and deep seabed mining. Historically, most of this work has been undertaken on the American continental shelf north of Alaska. In Washington, this was disconcerting enough to prompt a shift in U.S. marine scientific research policy surrounding core sampling.[31]

Because little Chinese survey work has been undertaken on the Russian continental shelf or extended continental shelf, this activity has not generated much friction. In 2020, however, that may have changed when China announced the research program for *Xue Long 2*'s maiden Arctic voyage, which centered on a survey of the Gakkel Ridge. This area of seafloor is suspected to contain sulfides, rich in copper, zinc, and other minerals. Just outside of Russia's claimed EEZ, the ridge was in a section of ocean dubbed "the Area" by the United Nations Convention on the Law of the Sea (UNCLOS), where access to resources is subject to governance by the International Seabed Authority and, through it, any state that applies for a mining license.[32]

Russian authorities reacted quickly in 2021 (before *Xue Long 2*'s voyage), altering their submission to the Commission on the Limits of the Continental Shelf to include the area being surveyed by China. This was a clear reaction to China's activities, representing concern over the Chinese presence there. Despite this new Russian assertion of jurisdiction, China followed through with its survey, collecting seafloor samples and geological studies that could facilitate later development.

Russia's position on seabed mining and jurisdiction over the Arctic Ocean more generally is diametrically opposed to China's. While both states accept UNCLOS as the governing structure for the region, Russia has long sought to maximize Arctic state jurisdiction while minimizing the extent of seafloor that might be considered "the common heritage of mankind" (Article 136 of UNCLOS)—open to exploitation by non-Arctic states. A central objective of China's Arctic policy has been to maximize influence and access for itself and other non-Arctic states in the region. Its position has been that it should play a leading role in the development of deep seabed development outside of coastal state jurisdiction (as outlined in Part XI of UNCLOS).

While the economics and technologies for developing these resources are not yet sufficiently mature to render exploitation a near-term possibility, continued geological research by Chinese vessels on the Russian shelf will invariably generate political friction. To date, all Chinese resource development activities in Russia have been as minority partners and with the full cooperation of Russian state enterprises. Chinese research activities on the continental shelf, however, are independent, suggesting that Russian partnerships may not be required. As such, this research poses a direct challenge to Russia's broader position that Arctic resources should be developed by Arctic states and, potentially, its direct control over what it declares to be its sovereignty and control over the continental shelf.

Chinese Investment: Both Limited and Exploitative

In the wake of the Russian invasion of Crimea and the imposition of Western sanctions in 2014, Moscow has turned to China for the investment and markets needed to advance Arctic resource projects. Moscow has had some success, most clearly the Yamal liquid natural gas (LNG) project, of which 29.9 percent is owned by the China National Petroleum Corporation (20 percent) and the Silk Road Fund (9.9 percent). Yet despite targeted Chinese investments, this relationship has seen more rhetoric than real investment. While many joint projects have been announced, few have moved forward.

In 2009, Hu Jintao and Dmitri Medvedev announced more than 200 joint projects. Five years later, less than 10 percent were actually progressing. In 2014 and 2015, Russia created 20 special economic zones to attract foreign investment to its Far East. Only six have secured Chinese investment, which totaled a mere $38 million between 2015 and 2018. Genuine cooperation has often been held back by red tape, poor infrastructure (both maritime and land-based), and corruption.[33] Some of the most promising Arctic infrastructure projects have also stalled. China's Poly Group's proposal to invest $5.5 billion in the port of Arkhangelsk is a clear example.[34] Instead, China frequently opts to invest in infrastructure projects supported by other Arctic actors, such as Finland, Iceland, and Denmark.[35] Moreover, given the high costs of natural resource extraction in harsh climates, Chinese investors have questioned the viability of investments with uncertain returns and frequently opt to conclude lucrative and long-term energy deals with other actors.[36]

Chinese capital is clearly not as anxious to rush into Russian projects as Russian state media makes it seem. Nor has Chinese investment in the Russian north been as beneficial for Russia as the state has advertised. The most significant business transaction was the construction of the Power of Siberia pipeline to export Russian gas to China. The pipeline began operations in December 2019, marking an important step in Russia's economic pivot to Asia. While the project was sold to Russians as evidence of the country's broader economic options and reduced reliance on the West, it does so on reportedly poor terms. When the project was negotiated, Russia was in a weak negotiating position, and China took advantage of this reality. In essentially all respects, China dictated the terms of engagement, including when to go ahead with the pipeline, after more than a decade of bilateral talks. The route of the pipeline closely followed Chinese preferences, and gas pricing has been extremely competitive, to the detriment of the pipeline's profitability.

USCGC *Polar Star* transits south in Bering Strait, January 19, 2021 (U.S. Coast Guard/Cynthia Oldham)

The Chinese were able to set the route of the pipeline and took advantage of Russian weakness on pricing as well. While exact pricing is not public, it was widely reported that an oil-linked price had been agreed on, with an effective slope of 10 percent. This suggested a price of $10 per million British thermal units at an oil price of around $100 per barrel.[37] The linking of the gas price to oil was a major Chinese win and a hit to profitability, according to Sberbank CIB experts.[38] Low returns on the piped gas must also be weighted against the project's extraordinary capital costs, estimated at $55 billion (including resource development). Russian attempts to secure $25 billion in Chinese prepayments failed, leaving Russia to bear the full expense.[39]

In May 2018, the Sberbank CIB investment advisory group released a report questioning the profitability of the project and suggesting that its rate of return is likely to be lower than the cost of capital to Gazprom and to be unprofitable to Russia even though the government exempted it from the mineral extraction and property tax.[40] Some analysts believe that when prices of oil fall below $60 to $70 per barrel, Russia may effectively be sending gas to China at a loss (when amortized capital costs are considered).[41]

Sitting at around 55° North, the Power of Siberia may only be a "near-Arctic" pipeline (to steal Chinese phrasing); however, it should be held up as a cautionary tale for future joint infrastructure projects. Moscow has already announced that the Power of Siberia 2 pipeline, drawing gas from Arctic fields, will replace Nord Stream 2 by delivering 50 billion cubic meters of gas per year to China.[42] At present, these projects are used in Russian propaganda to bolster the relationship and build support for the Russian government. Western analysts have an opportunity to flip that script, highlighting the Power of Siberia 1 line (and potentially the Power of Siberia 2) as examples of China using its economic and political leverage to exploit a weakened Russia. Likewise, Chinese investment more generally should be looked at in a different light: from plentiful and productive to anemic and exploitative.

Following Russia's February 2022 invasion of Ukraine, many of these trends have become even more apparent as Russia has been disconnected from the global financial system. Despite continued public support for Russia, China has moved to limit its own exposure to the country. The Chinese-led Asian Infrastructure Investment Bank froze all its activities relating to Russia and Belarus, citing "adherence to international law" and the need to "safeguard the financial integrity" of the bank.[43] Belt and Road Initiative projects have also been put on hold. According to the report published by the Green Finance and Development Center of Fudan University, no Chinese economic engagement regarding the Russia-related part of the BRI occurred in at least the first half of 2022.[44] This decision likely relates to Chinese fears of secondary sanctions as well as the growing volatility and instability of the Russian market.[45]

Chinese support for Russian energy projects has also been thrown into a state of limbo. On the surface, the

Members of China's research team set up ocean profiling float at short-term data acquisition location near icebreaker *Xuelong*, or "Snow Dragon," in Arctic Ocean, August 18, 2016 (Xinhua/Alamy Live News/Wu Yue)

future of this business relationship looks promising, with the Chinese Ministry of Commerce openly stating that China will not support oil-related sanctions or jeopardize Chinese businesses.[46] Behind such statements and implied support, however, this relationship faces growing challenges. Chinese multinational oil companies are loath to run afoul of Western sanctions, and China's embrace of Russia has not stopped Chinese energy firms from discreetly pulling back from new projects. Despite its official position in opposition to sanctions, the Chinese government seems to recognize the difficulties that they can cause multinational companies. In March 2022, the Chinese Ministry of Foreign Affairs reportedly summoned officials from the three major energy companies (Sinopec, China National Petroleum Corporation, and China National Offshore Oil Corporation) to review their business ties with Russia and "urged them not to make any rash moves buying Russian assets."[47]

As a result, the corporate response has been one of caution. In March 2022, Sinopec Group suspended its talks with Russia's Sibur for a USD 500 million petrochemical investment and a gas marketing venture. The reported reason for the cancellation was Chinese concerns over secondary sanctions that might impact Sinopec's global operations. According to the Russian side, this caution was primarily motivated by Chinese producers' fear of sanctions that could come from the side of the European Union.[48] Sinopec also suspended talks over a gas marketing venture with Novatek over concerns that Sberbank (one of Novatek's shareholders) is on the latest U.S. sanctions list.[49] Construction of the Arctic LNG 2 project has also been dealt a serious blow by a Chinese yard's decision to cease production on critical modules. As a result of this and other sanctions-related work stoppages, Novatek has halted construction on the two unfinished trains (of three) on the project. Production of LNG was originally due to start in 2023, but time schedules are now in flux.[50]

As the Chinese government and its state-owned entities digest the reality of Russia's war with Ukraine and adjust its approaches, investment may yet begin to flow. The most likely scenario, however, is exploitation. As one of the only major markets remaining for Russian resources and the only clear source of investment, China will hold extraordinary leverage. One-sided oil or gas contracts or infrastructure agreements can be used as a clear demonstration of Russian subordination. The failure of Chinese investment to materialize, meanwhile, would be a clear indication that the Russian pivot to the east has failed. Either of these

likely scenarios would belie the win-win Arctic narratives being advanced by both Russian and China.

Conclusion

Russia and China's cooperative approach to Arctic investment, shipping, and governance has been presented as a key component of those states' growing partnership. In China, it offers a new source of hydrocarbons and demonstrates the country's growing global influence, while in Russia, it channels funds to key projects and counters the impression that the country has been isolated by Western political and economic sanctions. More broadly, the Arctic has been presented as an area where the two Great Powers can demonstrate a degree of solidarity as part of their continuing economic and strategic conflict with the West.

In October 2022, the U.S. National Security Strategy noted the growing dangers of Great Power competition in the Arctic. Russian remilitarization and aggressive behavior represent military threats, while a rapidly growing Chinese regional presence presents longer term economic and hybrid security risks.[51] Individually, China and Russia each represents dangers to the democratic Arctic states; combined, those dangers are far greater.

Yet this partnership remains skin-deep, transactional, and deeply vulnerable. Important disagreements over Arctic governance, sovereignty, and development have been successfully papered over in support of overarching economic and geopolitical objectives; however, these sticking points remain just beneath the surface. Conflicts between the two authoritarian powers are also likely to become harder to disguise, as Chinese activity in the region increases and its global ambitions expand.

From a strategic messaging perspective, these disagreements (both real and potential) offer a gap that could be exploited by the West. Reframing the conversation away from the win-win narrative being sold by Moscow and Beijing both undermines their own messaging and forces a reckoning that these governments would prefer to avoid. Chinese shipping and marine scientific research are facilitated by a policy of purposeful ambiguity toward Russian sovereignty. Simply put, Russia does not ask China to explicitly recognize its sovereignty, which allows Beijing to avoid telling Moscow something that might create a rift. This arrangement works because the question is ignored. Western observers have an opportunity to press the issue, highlighting the difference in positions and making that ambiguity harder to maintain. Likewise, questions of economic exploitation, pipeline routing, and research should be elevated in Western conversations to a strategic level. These issues have traditionally been relegated to footnotes or obscure technical publications, yet these points have broader implications that directly impact the ability of Russia and China to maintain their "friendship with no limits" in the Arctic. If China is exploiting Russian weakness to secure cheap Arctic gas, that is a point that should be amplified. When Chinese research vessels work on Russia's extended continental shelf, Western observers should seek out clarification of China's position on Russian jurisdiction.

As Chinese Arctic activity grows and Russia becomes more desperate for Beijing's economic and political support, the opportunity to highlight these gaps will only grow. That relationship benefits from a lack of scrutiny, and the time is ripe for a more coordinated effort to reframe the conversation about Russia's partnerships in the Arctic from that win-win friendship to something more accurate: an exploitative relationship built on fragile foundations. **JFQ**

Notes

[1] *China's Arctic Policy* (Beijing: State Council Information Office of the People's Republic of China, January 2018), https://www.uaf.edu/caps/resources/policy-documents/china-arctic-policy-2018.pdf.

[2] This decline in soft power has been tracked across the Arctic by several surveys and studies in recent years. A sampling of these includes Laura Silver, Kat Devlin, and Christine Huang, "Unfavorable Views of China Reach Historic Highs in Many Countries," Pew Research Center, October 2020; Jesse Hastings et al., *Chinese Chess in the Wild West: How Icelanders View the Growing Iceland-China Relationship* (Reykjavik: Institute of International Affairs, 2015); Steven Chase, "Eight Out of 10 Canadians Say China Has Negative Influence on World Affairs: Poll," *Globe and Mail*, November 7, 2022; Pål Vegard Hagesæther, "Bought by China," *Aftenposten*, December 9, 2021; Ties Dams, Xiaoxue Martin, and Vera Kranenburg, eds., *China's Soft Power in Europe: Falling on Hard Times* (The Hague: European Think-Tank Network on China, April 2021).

[3] See Peter Martin, *China's Civilian Army: The Making of Wolf Warrior Diplomacy* (New York: Oxford University Press, 2021).

[4] *National Security Strategy of the United States of America* (Washington, DC: The White House, December 2017); *Summary of the 2018 National Defense Strategy of the United States of America: Sharpening the American Military's Competitive Edge* (Washington, DC: Department of Defense, 2018).

[5] Sergey Radchenko, "Driving a Wedge Between China and Russia Won't Work," *War on the Rocks*, August 24, 2021.

[6] Adam MacDonald, "China-Russian Cooperation in the Arctic: A Cause for Concern for the Western Arctic States?" *Canadian Foreign Policy Journal* 27, no. 2 (2021), 194–210.

[7] *Focus 2020* (Oslo: Norwegian Intelligence Service, 2020), 70.

[8] For overviews, see Linda Jakobson, *China Prepares for an Ice-Free Arctic* (Stockholm: Stockholm International Peace Research Institute [SIPRI], 2010); Anne-Marie Brady, *China as a Polar Great Power* (New York: Cambridge University Press, 2017); P. Whitney Lackenbauer et al., *China's Arctic Ambitions and What They Mean for Canada* (Calgary: University of Calgary Press, 2018); Nong Hong, *China's Role in the Arctic: Observing and Being Observed* (London: Routledge, 2020); Justin Barnes et al., eds., *China's Arctic Engagement: Following the Polar Silk Road to Greenland and Russia* (Peterborough, Ontario: North American and Arctic Defence and Security Network, 2021); Rush Doshi, Alexis Dale-Huang, and Gaoqi Zhang, *Northern Expedition: China's Arctic Activities and Ambitions* (Washington, DC: Brookings Institution, April 2021).

[9] Henry Tillman, Jian Yang, and Egill Thor Nielsson, "The Polar Silk Road: China's New Frontier of International Cooperation," *China Quarterly of International Strategic Studies* 4, no. 3 (2018), 345–362; Yang Jian and Zhao Long, "Opportunities and Challenges of Jointly Building the Polar Silk Road: China's Perspective," *Outlines of Global Transformations: Politics, Economics, Law* 12, no. 5 (2019), 130–144; Camilla T.N. Sørensen, "Belt, Road, and Circle: The Arctic and Northern Europe in China's Belt and Road Initiative," in *China's Belt and Road Initiative: Changing the Rules of Globalization*, ed. Wenxian Zhang, Ilan Alon, and Christoph Lattemann (Cham, Switzerland: Palgrave Macmillan, 2018), 95–114.

[10] For sobering analysis, see Yun Sun, *The Northern Sea Route: The Myth of Sino-Russian Cooperation* (Washington, DC: Stimson Institute, 2018), 1; Frédéric Lasserre, "Arctic Shipping: A Contrasted Expansion of a Largely Destinational Market," in *The Global Arctic Handbook*, ed. Matthias Finger and Lassi Heininen (Cham, Switzerland: Springer, 2019), 83–100; Adam Stepien et al., "China's Economic Presence in the Arctic: Realities, Expectations, and Concerns," in *Chinese Policy and Presence in the Arctic*, ed. Timo Koivurova and Sanna Kopra (Leiden: Brill-Nijhoff, 2020), 90–136; P. Whitney Lackenbauer, Adam Lajeunesse, and Ryan Dean, "Why China Is Not a Peer Competitor in the Arctic," *Journal of Indo-Pacific Affairs* 5, no. 5 (September–October 2022), 80–97.

[11] Camilla T.N. Sørensen and Ekaterina Klimenko, *Emerging Chinese-Russian Cooperation in the Arctic: Possibilities and Constraints*, Policy Paper 46 (Stockholm: SIPRI, June 2017).

[12] Dmitri Trenin, "Russia and China in the Arctic: Cooperation, Competition, and Consequences," Carnegie Endowment for International Peace, March 31, 2020.

[13] Jim Townsend and Andrea Kendall-Taylor, *Partners, Competitors, or a Little of Both? Russia and China in the Arctic* (Washington, DC: Center for a New American Security, 2021), 10.

[14] Dong Yongzai, "Polar Security: A New Frontier for National Security" [极地安全：国家安全的新疆域], *Guangming Daily* (Beijing), April 25, 2021.

[15] Sometimes translated to "community with a shared future for mankind" [人类命运共同体].

[16] Stella Chen, "Community of Common Destiny for Mankind," China Media Project, April 2021, https://chinamediaproject.org/the_ccp_dictionary/community-of-common-destiny-for-mankind/.

[17] Hong, *China's Role in the Arctic*.

[18] "Russia Has No Intention of Delegating Responsibility for Arctic to Other Countries—Envoy," TASS, June 16, 2020.

[19] Liu Zhen, "China to Develop New Heavy Icebreaker for 'Polar Silk Road,'" *South China Morning Post* (Hong Kong), November 13, 2021.

[20] Liu Huirong, "Analysis of the Value and Significance of Arctic Sea Routes in the Context of the 'One Belt One Road' Strategy," *Strategic Study of Chinese Academy of Engineering* 18, no. 2 (2016).

[21] "Arctic Council Observers," Arctic Council, n.d., https://arctic-council.org/about/observers/.

[22] S.K. Pestsov and A.B. Volynchuk, Strategiya razvitiya Dal'nego Vostoka: (ne) tipichnyy sluchay sovremennoy rossiyskoy regional'noy politiki [Far East Development Strategy: (Not) Typical Case of Modern Russian Regional Policy], *Istoricheskaya i sotsial'no-obrazovatel'naya mysl'* [Historical and Social-Educational Thought] 10, no. 3/1 (2018), 82–92. In the most recent shipping year, there were no Chinese ships making the transit across the Northern Sea Route.

[23] Lawson W. Brigham, "Arctic Shipping Routes: Russia's Challenges and Uncertainties," *Barents Observer*, August 12, 2022; Cornell Overfield, "Wrangling Warships: Russia's Proposed Law on Northern Sea Route Navigation," *Lawfare*, October 17, 2022; Vasilii Erokhin et al., "The Northern Sea Route Development: The Russian Perspective," in *Arctic Maritime Logistics: The Potentials and Challenges of the Northern Sea Route*, ed. Igor Ilin, Tessaleno Devezas, and Carlos Jahn (Cham, Switzerland: Springer, 2022), 283–303.

[24] Ian Anthony, Ekaterina Klimenko, and Fei Su, *A Strategic Triangle in the Arctic? Implications of China–Russia–United States Power Dynamics for Regional Security* (Stockholm: SIPRI, March 2021), 11.

[25] Townsend and Kendall-Taylor, *Partners, Competitors, or a Little of Both?* 7.

[26] *China's Arctic Policy*.

[27] See, for example, Guo Zhen, "China's Ocean Rights in the Arctic—Based on an Analysis of UNCLOS" [中国在北极的海洋权益及其维护—基于《联合国海洋法公约》的分析], *Theoretical Studies on PLA Political Work* [军队政工理论研究], no. 1 (2014); Wu Jun and Wu Leizhao, "An Analysis of China's Ocean Rights in the Arctic—Based on the Perspective of International Maritime Law" [中国北极海域权益分析—以国际海洋法为基点的考量], *Wuhan University Journal* (Philosophy & Social Sciences) [武汉大学学报(哲学社会科学版)] 67, no. 3 (2014).

[28] Ling Guo and Steven Lloyd Wilson, "China, Russia, and Arctic Geopolitics," *The Diplomat*, March 29, 2020.

[29] Zhang Zhilong, "Chinese Boating Extraordinaire Sets Sail to Mark Claim Over Disputed Islands," *Global Times* (Beijing), August 16, 2013.

[30] Elizabeth Wishnick, "Will Russia Put China's Arctic Ambitions on Ice?" *The Diplomat*, June 5, 2021.

[31] Executive Office of the President, Proclamation 10071, "Revision to United States Marine Scientific Research Policy," *Federal Register* 85, no. 182 (September 18, 2020), https://www.federalregister.gov/documents/2020/09/18/2020-20847/revision-to-united-states-marine-scientific-research-policy.

[32] Companies sponsored by United Nations Convention on the Law of the Sea member states can receive 15-year contracts from the International Seabed Association authorizing exploration for polymetallic nodules, polymetallic sulphides, and cobalt-rich ferromanganese crusts in the deep seabed. The association may receive a request for such a contract applying to the Gakkel Ridge at any time and from any sponsored company. Normally, the first to ask receives the contract.

[33] Mikhail Krutikhin, "Power of Siberia or Power of China?" *Al Jazeera*, December 19, 2019.

[34] Wishnick, "Will Russia Put China's Arctic Ambitions on Ice?"

[35] John Grady, "Panel: China Investing in Infrastructure Near the Arctic," *USNI News*, April 27, 2018.

[36] Sergey Sukhankin, "Sino-Qatari LNG Deal: A New Phase for Doha-Beijing Relations?" *Gulf International Forum*, June 16, 2021.

[37] James Henderson, "Russia's Gas Pivot to Asia: Another False Dawn or Ready for Lift Off?" Oxford Institute for Energy Studies, November 2018, 6.

[38] Ludmila Podobedova, "Profit for Contractors: How Much Gazprom Shareholders Lose on Construction Sites," in Russian, *RBC.ru*, May 21, 2018.

[39] Ibid.

[40] Ibid.; Krutikhin, "Power of Siberia or Power of China?"

[41] Hardy Graupner, ed., "Russian Gas Boost Fuels Moscow's China Pivot," *Deutsche Welle*, January 13, 2022.

[42] "Moscow Says Power of Siberia 2 Pipeline to China Will 'Replace' Nord Stream 2," *Euronews*, September 15, 2022.

[43] Paola Subacchi, "Is Asia's Development Machine Stuttering?" *IPS*, November 7, 2022.

[44] Christoph Nedopil, *China Belt and Road Initiative (BRI) Investment Report H1 2022* (Shanghai: Green Finance and Development Center, FISF, Fudan University, July 2022).

[45] Kirill Sokolov, "Investments in Russia Through China's Global Project Fell to Zero," in Russian, *RBC.ru*, July 25, 2022.

[46] "FT: Independent Refineries in China Increased Purchases of Russian Oil," *Kommersant* (Moscow), April 5, 2022.

[47] Chen Aizhu, Julie Zhu, and Muyu Xu, "China's Sinopec Pauses Russia Projects, Beijing Wary of Sanctions—Sources," Reuters, March 28, 2022.

[48] "Upstream: In China, a Number of Shipyards May Stop Work on the Construction of Modules for the Arctic LNG-2," *Rosbalt*, May 12, 2022.

[49] Aizhu, Zhu, and Xu, "China's Sinopec Pauses Russia Projects."

[50] Atle Staalesen, "Biggest Arctic Construction Sites Could Turn into Ghost Towns," *Barents Observer* (Norway), May 17, 2022.

[51] *National Security Strategy* (Washington, DC: The White House, October 2022), 44–45. On China's hybrid threats, see Rebecca Pincus and Walter A. Berbrick, "Gray Zones in a Blue Arctic: Grappling with China's Growing Influence," *War on the Rocks*, October 24, 2018.

Italian navy anti-submarine frigate ITS *Carlo Margottini* and command and control ship USS *Mount Whitney* transit alongside USS *Harry S. Truman* in support of Neptune Strike 22, February 2, 2022, in Adriatic Sea (U.S. Navy/Hunter Day)

Risky Business

Using the Joint Force's Framework for Managing Risk

By Bryan Groves, Jerad M. Rich, and Kaley Scholl

The 1962 Cuban Missile Crisis presented President John F. Kennedy and his advisors with one of the riskiest strategic dilemmas of the Cold War. How could America force the removal of Soviet nuclear weapons from Cuba without triggering a nuclear conflict? In response, President Kennedy implemented a multidimensional approach. He showed strength and resolve through a naval quarantine around Cuba while creating room for diplomacy by promising Premier Nikita Khrushchev (via discreet diplomatic back channels) that U.S. missiles would be pulled out of Turkey if the Soviets removed their weapons from Cuba.[1] Kennedy's decision to implement a naval quarantine balanced risk of action against risk of inaction or "overaction" (that is, too great an escalation). Kennedy effected the removal of Soviet nuclear missiles from Cuba while also providing an off-ramp to deescalate the situation.

Those 13 days in October 1962 were fraught with risk as President Kennedy aimed to reverse the Soviet's emplacement of nuclear weapons 90 miles off Florida's coast. While risky throughout, the decisionmaking and implementation were straightforward due to the bipolar international environment in which the United States and the Soviet Union were the two superpowers. The Kennedy administration assured military leaders that implementing the quarantine mitigated the severity and probability of risk appropriately through

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Lieutenant Isay Rapoport, left, directs F/A-18E Super Hornet, assigned to "Tophatters" of Strike Fighter Squadron 14, on flight deck of USS *Abraham Lincoln*, March 13, 2022, in Philippine Sea (U.S. Navy/Javier Reyes)

the specific policy directives issued and civilian oversight. The contemporary environment is not charged in the same way as during the Cuban Missile Crisis. The current multipolar world order that pits the United States, China, and Russia as Great Powers, however, complicates leaders' risk decisionmaking and mitigation measures beyond that experienced during the Cold War.

Today's multipolar dynamic means that risk and resourcing decisions must be made considering the signaling that actions against one Great Power are expected to have on another. Leaders' risk assessments and communications must reflect the prioritization provided in strategic guidance.[2] A prominent current example involves considering the effects on China of actions in Europe against Russia. How closely are Ukraine and Taiwan linked? What would be the best approach against China, America's long-term pacing challenge, in the Indo-Pacific region and globally? Should the United States unequivocally support the Ukrainian resistance to buoy its credibility and signal to China what its fate might be if it invades Taiwan? Or is Taiwan a separate and higher priority matter for which America and the joint force should save resources? These are policy decisions. Yet senior military leaders involved in related discussions support policymakers with military advice to inform that decisionmaking.

In this environment, managing risk across regions and over time in accordance with policy priorities is an especially important imperative for senior military leaders. A shared understanding of and approach to risk facilitates a coherent decisionmaking process for the U.S. military. While following civilian policy direction, the joint force uses the Joint Risk Analysis Methodology (JRAM) to prioritize globally and across time in a multipolar environment, for strategic competition, during crises, and throughout armed conflict. Coherent, prioritized decisionmaking that properly accounts for diverse types of risk is important because lives are in the balance. Decisions made in peace to prioritize one threat over another, one area of the world over another, one Service or capability over another, or urgent operations today over important and longer term modernization efforts could facilitate either tomorrow's success or its failure.[3] Managing critical decisions regarding force posture, planning, modernization, and investments in ways congruent with long-term strategy is truly "risky business."

This article provides the analytical basis for the JRAM, the framework for appraising and managing risk. It explains how risk informs national security decisionmaking. The JRAM is useful and flexible, within limits, to facilitate commanders' decisionmaking regardless of level. This article, however, focuses on the Joint Staff level and above. Beyond education, the purpose is to illustrate key risk considerations, including impacts of mitigation measures to other regions and across time in a multipolar environment.

Theoretical Underpinnings of Risk Methodology

To facilitate the Chairman of the Joint Chiefs of Staff's military advice to the Secretary of Defense and the President, the Joint Staff J5 formally penned, and coordinated with all combatant com-

mands and Services, the first JRAM, in 2016, to promote a common risk framework and lexicon to the joint force.[4] Since then, the updated JRAM, dated October 12, 2021, prepares the Chairman and military leaders at every level to consider and handle risk appropriately in an environment where the Nation and its allies are faced with two Great Powers engaged in a "no-limits" strategic partnership.[5] The 2021 JRAM represents an outcomes-oriented risk process that informs strategy and resourcing decisions, all the while nested in policy, doctrine, and practice.[6] The JRAM is not a tactical one-size-fits-all approach to risk; instead, the JRAM represents a common methodology for the joint force to normalize risk appraisal and risk management processes, facilitate consistency across the Department of Defense (DOD), and enhance risk communication for national security decisionmaking.[7]

The theoretical underpinnings of the current JRAM originated from the Joint Risk Assessment System (JRAS), which was the product of over 8 years of development and leveraged 2 decades' experience conducting the Chairman's Risk Assessment, Quadrennial Defense Review risk assessments, and other risk assessments. This system was developed in collaboration with the major risk stakeholders, including the Joint Staff, Services, combatant commands, and Office of the Secretary of Defense. Additionally, the Joint Staff J5 conducted research and engagements with the private sector, academia, and think tanks. The Chairman employed the JRAS's foundational risk governance framework from 2006 until updated in the JRAM in 2016.[8] While the JRAS provided the joint force with a concept of risk governance based around risk analysis and risk management for senior leaders, it only viewed risk through the lens of the commander providing the risk assessment instead of an assessment of global risk to surmise impacts across the joint force over time. The new JRAM addresses these shortcomings, providing a framework to understand globally integrated risk.

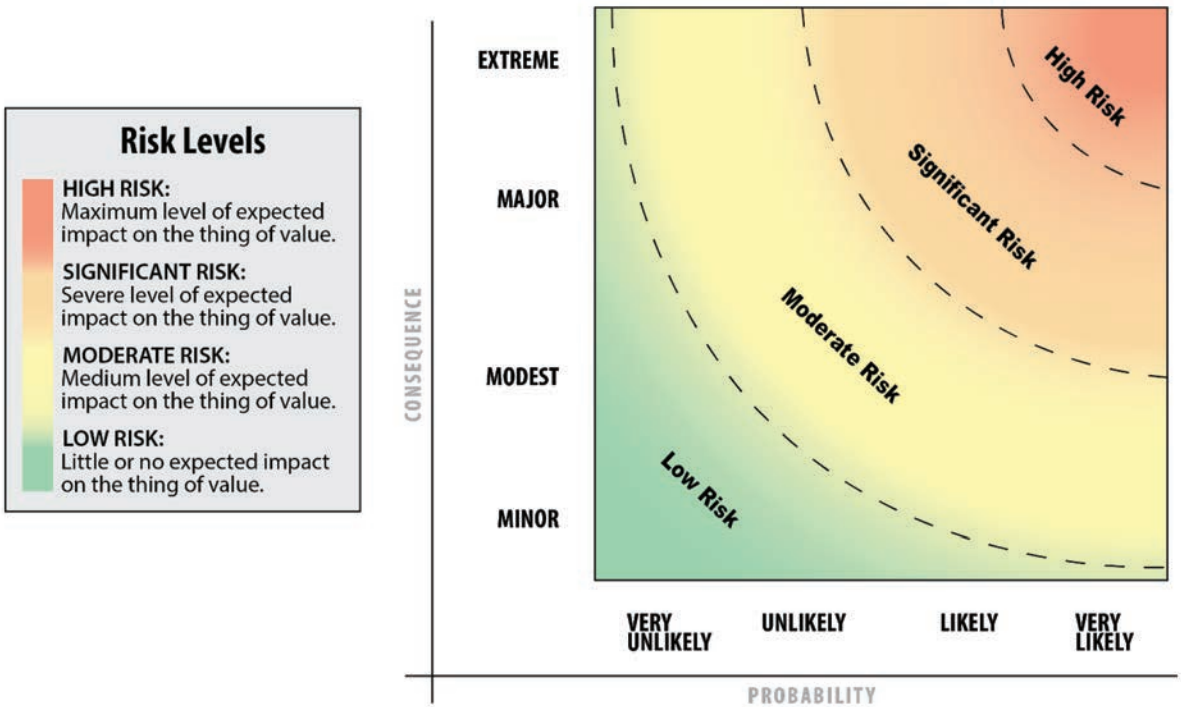
The JRAM's approach uses an index of severity (consequence levels) assessed for a harmful event (with various probability levels) that results in a risk level along a contour graph (that is, probability *x* consequence = *risk*), as shown in figure 1.

The combination of probability and consequence levels determines the initial risk assessment for a potential threat, which then allows for risk judgment, or the qualitative effort to determine a decisionmaker's final characterization of risk.[9] This approach allows the decisionmaker (that is, military leader) to determine an appropriate risk level based on an objective assessment of probability and consequence while incorporating the commander's judgment to account for various factors decisionmakers face.

Risk Assessments: Supporting Senior Leader Decisionmaking

Across Regions. Evaluating and communicating risk across regions is at the core of any successful risk appraisal and management effort. The JRAM strives to reduce misunderstandings between risk stakeholders despite the complexities and uncertainties in the dynamic global security environment by providing a common framework and lexicon. Leaders' use of

Figure 1. Probability and Consequence



Source: Chairman of the Joint Chiefs of Staff Manual, *Joint Risk Analysis Methodology* (Washington, DC: The Joint Staff, October 12, 2021), B-6.

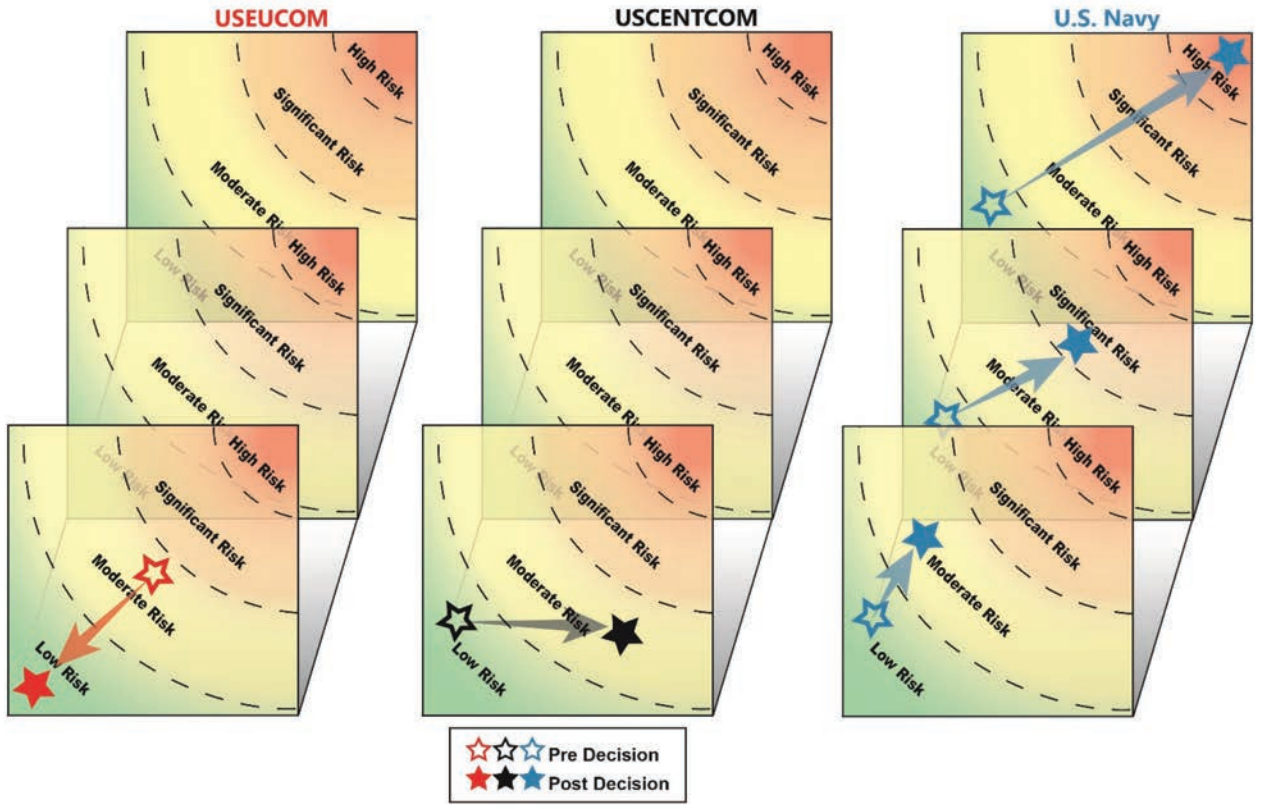
this framework and risk vocabulary is foundational in communications with partners and adversaries.[10] For example, on March 15, 2022, the U.S. Navy conducted an air demonstration from the USS *Abraham Lincoln* in the Yellow Sea, using F/A-18 E/F and F-35C aircraft. The official press release reaffirmed the U.S. security commitment to Japan and the Republic of Korea. Leaders also designed it to signal the Democratic People's Republic of Korea to reconsider its ongoing intercontinental ballistic missile launches.[11] These risk decisions, actions, and corresponding communications reaffirm security guarantees to Indo-Pacific partners while warning regional adversaries of the continued U.S. commitment to its Indo-Pacific allies and partners, despite its current focus on Russia's unprovoked invasion of Ukraine.

Across Time. A risk assessment should consider drivers of risk not only across combatant commands but also various time horizons.[12] Assessing risk over multiple time horizons is a recognition that managing risk today affects *future* risk. The JRAM employs three time horizons gleaned from other DOD strategy documents: force employment (0–3 years); force development (2–7 years); and force design (5–15 years). By analyzing risk across various time horizons, decisionmakers can be intentional about their willingness to *accept*, *avoid*, *mitigate*, or *transfer* risk to ensure their choices reflect global strategic priorities (see figure 2). In a 2021 article, General Charles Q. Brown, Jr., USAF, and General David H. Berger, USMC, discussed the need for a new strategic readiness paradigm, and that risk appraisal completed on behalf of the Chairman must look holistically across the joint force.[13] The 2021 JRAM supports the call to facilitate risk decisions that consider implications across multiple Services and combatant commands.

Figure 2 and the corresponding vignette demonstrate one way this could play out.

On January 21, 2022, leaders directed the USS Harry S. Truman carrier strike group to participate in Neptune Strike 22 exercises in the Mediterranean Sea amid pre-invasion tensions among the United States, the North Atlantic Treaty Organization (NATO), and Russia. The participation of the U.S. carrier strike group was a signal of transatlantic unity but did divert assets from the Persian Gulf. However, the carrier had just returned to sea after three consecutive deployments in 4 years, spanning 56,000 nautical miles through the U.S. Northern Command, U.S. European Command (USEUCOM), and U.S. Central Command (USCENTCOM) areas of responsibility (AORs).[14] *The carrier was supposed to enter a rigorous maintenance cycle. Instead, leaders slimmed down the maintenance to minimize maintenance backlogs*

Figure 2. Risk Across Regions, Services, and Time



Source: This figure is an example from the Joint Risk Analysis Methodology manual. The risk levels depicted are fictious and do not represent actual assessed risks. See Chairman of the Joint Chiefs of Staff Manual, *Joint Risk Analysis Methodology* (Washington, DC: The Joint Staff, October 12, 2021), B-10.

in the shipyard and met the demand for the Truman to return to the fleet.[15]

Analyzing the risk associated with this decision, we find that leaders accepted higher near-term risk in USCENTCOM AOR to drive down near-term risk in the USEUCOM AOR. Prioritizing select AORs to focus finite DOD resources on priority threats may necessarily raise risk elsewhere. For instance, if DOD prioritizes contemporary campaigning today in the USEUCOM and USCENTCOM AORs over modernization and maintenance, it may be accepting increased risk in a potential future fight in the Indo-Pacific region—if everything cannot be sufficiently resourced. Therefore, policymakers' resourcing decisions drive the joint force's ruthless prioritization of operations, activities, and investments consistent with policy guidance and long-term strategic aims—what some have referred to as "strategic discipline."[16] Again, because DOD resources are finite, policymakers must use the other levers of national power to compete with adversaries. President Joe Biden's Interim National Security Strategic Guidance highlights the use of diplomacy as the national security tool of choice, with the military being the tool of last resort.[17] By articulating risk holistically across regions and time, while also considering impacts across functions and domains, senior military leaders can better understand and articulate risk decisions' various implications.[18]

Commander's Discretion in Risk Analysis

The ongoing Russian invasion of Ukraine represents an important inflection point for defense policymakers. One approach could be to shore up NATO and European partners and allies by refocusing departmental and national resources toward NATO's eastern flank. A second approach could be to maintain discipline by allocating resources toward the pacing DOD challenge, China; in the Indo-Pacific region, globally; and toward related modernization efforts. As civilian policymakers decide on such policy and resourcing decisions, it will be incumbent on joint force commanders to mitigate risk with their campaigning, in crises, and potentially in armed conflict. Senior leaders must consider more than urgent force employment actions in these risk judgments. The JRAM presents a methodology to do just that. Yet it does so while realizing that actions taken today can also positively shape the future. Thus, it does not force leaders to forgo all operations or activities necessary to advance defense priorities today.

Conclusion

The United States no longer enjoys the strategic overmatch it encountered after the Cold War and now faces a multipolar security environment defined by two nuclear-armed Great Powers. To compete against these near-peer adversaries, joint force commanders must ruthlessly prioritize resources across regions and over time in accordance with global policies and imperatives. A foundational question addressed in each decision is how many resources to expend in each effort today versus apply toward another activity, hold in reserve, or invest for the future. The 2021 JRAM's risk framework supports Service chiefs, combatant commanders, and military leaders at all levels and aligns with recently released and forthcoming strategy documents.[19] There is still room for improvement.

Future iterations of the JRAM should consider applicability of the framework to assess strategy, analyze risk as opportunity, and apply the methodology to evaluate cumulative risk over time. In the meantime, its standardized yet flexible framework is a significant improvement in thinking and acting holistically about global risk to the joint force, across regions, elements, and time. Consistent use will facilitate senior leader decisionmaking in appraising, managing, and communicating risk throughout the tough decisions in our dynamic security environment. **JFQ**

Notes

[1] Graham Allison, "Putin's Doomsday Threat: How to Prevent a Repeat of the Cuban Missile Crisis in Ukraine," *Foreign Affairs*, April 5, 2022.

[2] *National Military Strategy 2022: Strategic Discipline* (Washington, DC: The Joint Staff, 2022); Ian Bremmer and Preston Keat, *The Fat Tail: The Power of Political Knowledge in an Uncertain World* (Oxford: Oxford University Press, 2010).

[3] Michael J. Mazarr, "Rethinking Risk in Defense," *War on the Rocks,* April 13, 2015.

[4] *U.S. Code* 10, § 153(a)(4)(B), "Chairman: Functions: Comprehensive Joint Readiness," https://www.law.cornell.edu/uscode/text/10/153.

[5] Brian Waidelich, "3 Possible Futures for China-Russia Military Cooperation," *The Diplomat*, March 11, 2022.

[6] Mazarr, "Rethinking Risk in Defense."

[7] See Chairman of the Joint Chiefs of Staff Manual (CJCSM) 3105.01A, *Joint Risk Analysis Methodology* (Washington, DC: The Joint Staff, October 12, 2021). This document contrasts sharply with the assessment found in Neils J. Abderhalden, "Risk Hindering Decision Making: How the DOD's Faulty Understanding of Risk Jeopardizes Its Strategy," *The Strategy Bridge*, March 11, 2022.

[8] Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3100.01C, *Joint Risk Assessment System* (Washington, DC: The Joint Staff, January 1, 2015), 2.

[9] CJCSM 3105.01A, B5–B6.

[10] CJCSM 3105.01A. This document contrasts with the assessment found in Abderhalden, "Risk Hindering Decision Making."

[11] Dzirhan Mahadzir, "U.S. Carrier Fighters Overfly Yellow Sea in Response to North Korean Missile Launch," *USNI News*, March 15, 2022.

[12] Abderhalden, "Risk Hindering Decision Making."

[13] Charles Q. Brown, Jr., and David H. Berger, "Redefine Readiness or Lose," *War on the Rocks*, March 15, 2021, https://warontherocks.com/2021/03/redefine-readiness-or-lose/.

[14] Diana Stancy Correll, "Aircraft Carrier Truman Is Back in Norfolk After Extended Deployment," *Navy Times*, June 17, 2020.

[15] Megan Eckstein "USS Harry S. Truman Out of Maintenance After 10 Months; Material Challenges Caused 3-Month Delay," *USNI News*, May 12, 2021.

[16] Caitlin Lee, "The U.S. Military's Force-Management Tug-of-War," *War on the Rocks*, March 23, 2022, https://warontherocks.com/2022/03/the-u-s-militarys-force-management-tug-of-war/.

[17] *Interim National Security Strategic Guidance* (Washington, DC: The White House, March 2021).

[18] CJCSM 3105.01A, B-11.

[19] CJCSM 3105.01A. This document contrasts with the assessment found in Abderhalden, "Risk Hindering Decision Making."

Soldiers with the 452nd Antiaircraft Artillery Battalion stand by and check their equipment during convoy in Belgium, November 4, 1944 (U.S. Army Signal Corps/Library of Congress)

Absent From the Front

What the Case of the Missing World War II Black Combat Soldier Can Teach Us About Diversity and Inclusion

By Bryon Greenwald

The prevailing view of the U.S. Army's White civilian and military leadership during World War II was that Black Soldiers were ineffective—that is, they "couldn't fight."

Although this assessment was obviously inaccurate, leadership wanted to maintain segregation and, despite a Presidential order to the contrary, took several administrative actions to prevent the organization and deployment of African-American combat units. While this article highlights the value of inclusion in changing perceptions and overcoming bias in the Army during World War II, its example points the way for today's larger defense establishment as it struggles to recruit enough young men and women into its ranks annually. These recruits will be more diverse in race,

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ethnicity, religion, and sexual orientation than their World War II predecessors. Many, however, will face similar prejudicial attitudes about their value to the force simply because they are seen to be in some way different. Appreciating the value of inclusion and how the mixing of racially different groups of Soldiers in World War II changed the attitudes of those White and Black troops encourages us to provide the same opportunity today.

Over 12 million Americans, including 900,000 African Americans, served in the World War II Army. While hundreds of thousands of Blacks deployed in over a thousand units to North Africa, Italy, Europe, and the Pacific, very few—only 3 percent of African-American units—were combat outfits, and even fewer engaged in combat. Why was there such a lack of proportional representation when even President Franklin Delano Roosevelt directed that 10 percent of all Army units would be Black?[1]

Immediately, the answer seems obvious. First, African Americans made up approximately 10 percent of the American population, but in 1940, 75 years after the Civil War and constitutional amendments abolishing slavery and establishing equality and the right to vote, the White American majority still did not consider Blacks as their equals in fighting spirit (or anything else).[2]

Second, while great strides had been made in the education of the Black population since the Civil War, and especially since World War I, the lingering effects of segregation, economic and social marginalization, and access to quality schools meant that Black intelligence, as measured by the Army General Classification Test, lagged behind that of Whites and reinforced U.S. military leaders' belief that Blacks were not smart enough to fight a modern war.[3]

Third, these beliefs dovetailed with conflicted attitudes and tensions of racial subordination and superordination within the disequilibrated system of race relations present in American society at the time. And because the World War II Army consisted of mostly White men with decades of socially sanctioned prejudice ingrained in their psyche, the World War II Army systematically discriminated against African Americans and established an apartheid-like segregation of Black Servicemembers despite Presidential directives to do otherwise. While publicly the national attitude toward Blacks and other minorities may have been "separate but equal" as decided in Plessy *v.* Ferguson (1896), the Army treated Black men and Black units as "unequal and keep separate."

In short, as far as the U.S. military was concerned, World War II was a White man's war; others need not apply.

Eye Opening

To understand this situation, however, requires some historical perspective. Despite African Americans having served with distinction in every war since the Revolution, when Congress passed the Selective Training and Service Act of 1940, there were 4,435 Black enlisted men, 5 commissioned officers, and 11 warrant officers in an Army of 269,023.[4] Shortly thereafter, more than 2.5 million African Americans registered for the draft in 1940, and about half were inducted, 75 percent of whom went into the Army.[5] During the war, the Army referred to the over 901,896 African Americans that served as "Negro personnel" and segregated them into "colored" outfits, which were delineated in some Army records by the parenthetical (Colored) or the abbreviation (Cld), as in 452nd Antiaircraft Artillery (Automatic Weapons) Battalion (Colored) or 452nd AAA (AW) Bn (Cld).[6] By modern standards, this policy seems extremely outdated, but it reflected the societal attitudes and norms of the time toward anyone but White people.

While not to the same degree, the Army treated women and other minorities similarly.[7] The prevailing attitude was that White men made the best Soldiers and should provide the preponderance of combat forces. To the extent that Blacks—or Hispanics, Filipinos, or women—entered the force, it was both the result of political pressure and to relieve White men of less meaningful tasks, so they could fight at the front. The Army had no issue with enlisting Blacks, Filipinos, or Puerto Ricans if they were in separate units. In fact, in 1940–1941, with the Japanese occupying northern Indochina (today Vietnam) and preparing for a likely war with the United States, the Army went so far as to refuse to allow Filipinos to enlist except in the Philippine Scouts or in units stationed in the Philippines that would accept them.[8] *Los Boringueños* were sent to units in Puerto Rico, such as the 123rd Antiaircraft Artillery (Gun) Battalion, which the Army formed out of a Puerto Rican National Guard Coast Artillery Regiment and moved between Puerto Rico and Trinidad during the war.[9] The largest and most politically active group, however, was African Americans.

At its peak in June 1945, the Army totaled 8,266,373 men, of which 694,818 (9.33 percent) were Black.[10] During the war years, African Americans represented about 10 percent of the U.S. population. At a Cabinet meeting on September 13, 1940, President Roosevelt stated his desire to have Black Soldiers proportionally represented in all Army unit types. The next day, Army Chief of Staff General George C. Marshall dutifully directed Brigadier General William E. Shedd III, the Army G1, to prepare a summary of the Service's ability to comply with the President's directive.[11]

Two weeks later, at a meeting with Black political leaders including A. Philip Randolph, head of the Brotherhood of Sleeping Car Porters, which Roosevelt unintentionally recorded, the President reiterated his position: "We are not, as you saw so much in the World War, confining the Negro into the non-combat services. We're putting 'em right in, proportionally, into the combat services." To the question of African Americans having "their own divisions and regiments, and the opportunity to prove their value," Roosevelt suggested that White and Black regiments "in the same division" and artillery batteries working near each other would coalesce organically. "After a while, in case of war, those people get shifted from one to the other. The thing gets sort of backed into. You have one battery out of a regiment of artillery . . . that would be

a Negro battery, with a White battery at the end, maybe a nearby battery . . . and, gradually working in the field together, you may back into it [integrated units]."[12]

Roosevelt's desire for proportional representation notwithstanding, lower education levels, the lack of Black leaders to serve as noncommissioned officers and officers, and prejudicial attitudes about the worthiness of Black units prevented the Army from reaching this goal until December 1945, 4 months after the Japanese surrender.[13] These factors—education, leadership, and prejudicial attitudes—also influenced the distribution of Black Servicemen among the Army's various branches, driving the allocation of African Americans out of combat units (armor, cavalry, coast/antiaircraft artillery, field artillery, and infantry) and into service branches. For the reasons mentioned, there were few Black combat units. Historians, however, tend to understate the extent to which the Army purposely assigned African Americans to noncombat and support units. Even the most authoritative sources, including the National World War II Museum and Matthew Delmont's Guggenheim and National Endowment for the Humanities–supported study, *Half American: The Epic Story of African Americans Fighting World War II at Home and Abroad*, note that "most" African Americans served in noncombat units.[14] As the following demonstrates, those estimates do not come close to recognizing how few African-American combat troops there really were.

History Revised

The discovery of the Army's July 1945 station list of all Colored units demolishes any claim by the Army of meeting Roosevelt's 10 percent distribution of Blacks across combat, combat support, and Service units.[15] A station list is a list of units by location. The Army kept monthly records, generally by theater. In June 1945, 73.4 percent of African Americans serving in the Army were overseas, compared with 63.4 percent of the Army's total strength.[16] An analysis of the 150-page station list confirms that not "the bulk" or "a majority" but virtually all African Americans ended the war in service units. First, theater commanders converted some units—infantry regiments of the 92nd and 93rd Infantry Divisions, antiaircraft battalions, and others—to noncombat duties. Second, 95 percent of all Black units deployed overseas were service units.[17]

Third, when one looks beyond infantry, armor, and artillery outfits to units often assumed to be combat units by their nomenclature—for example, engineers and aviators—and examines those units by their table of organization and equipment, only a few Black engineer units (15 of 325) were combat engineers or bridging units, and only 4 of 43 Black aviation units flew airplanes. Most Black Soldiers drove trucks that moved the unit's aviation support equipment. Indeed, page after page of this station list documents African-American truck companies, salvage battalions, laundry and bath detachments, stevedores, and supply units. And while their contribution in service and support tasks was critical to the war effort, digging ditches, unloading ships, or driving supply trucks (even the famed Red Ball Express) do not make for rousing historical narratives, nor did it change the view of most White Soldiers about the value of Black Soldiers.

Combat Brings Opportunities for Inclusion

Given the influence of segregation on their Army experience, Black Soldiers, unlike their White counterparts, focused more on equality than on winning the war. In March 1943, when asked, "Do you think this war is as much your affair as it is anybody else's?" 86 percent White and 66 percent Black Soldiers matched by education, region of origin, and branch of Service responded yes. When asked if they were "fighting to protect free speech for everyone," White Soldiers responded very positively (90 percent), Blacks less so (70 percent). When polled about what they might ask the President, 50 percent of African-American Soldiers stated they would ask about racial discrimination; less than 0.5 percent of White Soldiers responded similarly. Finally, and most important, to the question, "Do you think that most Negroes are being given a fair chance to do as much as they want to do to help win the war?" a majority of Blacks answered no (54 percent), 35 percent answered yes, and 11 percent were undecided. White Soldiers saw things differently, responding overwhelmingly yes (76 percent), with 12 percent answering no and 12 percent undecided.[18] This vast difference in perception seen in the last question clearly stemmed from preconceived ideas about the worthiness of Black Soldiers, their purposeful segregation, and the task or duty separation that limited the ability of Black and White Soldiers to interact in a meaningful manner. This perspective carried over to how African Americans thought about serving in the same outfit or unit as Whites. Of 3,000 Blacks surveyed in March 1943, 37 percent indicated that "they should be in separate outfits," while 36 percent opted to "be together in the same outfits." Of that latter group, 15 percent voiced statements about democracy and equality and 5 percent believed that closer association would bring improved understanding between the races. Similarly, of those Blacks opting for separate outfits, 13 percent indicated it was due to the existence of prejudice that drove their choice. In other words, if the prejudice did not exist, they might have chosen "same outfit" instead.[19]

When researchers asked that same question of 4,800 White enlisted men, 84 percent responded that they wanted to be in separate outfits; only 12 percent stated that Blacks and Whites should serve in mixed units together. Some (14 percent), however, qualified their "separate" vote by including statements suggesting that expediency during wartime drove their belief; 7 percent were concerned that intermingling would lead to friction and trouble.[20]

Researchers conducted these surveys of men who were out of combat and in some cases had not yet deployed overseas. After being in close combat, fighting for their very lives side by side with Black Soldiers, White opinions changed significantly. Using a framework developed

Soldiers of 92nd Infantry Division operate mortar near Massa, Italy, November 1944 (U.S. Army/National Archives and Records Administration)

by the author, three examples from the campaign against Germany show how White Soldiers went from *admiring* Black Soldiers in the performance of their duties to *desiring* their assistance to *requiring* their help to stay alive and win the war.[21]

Admiring. Take, for example, the experience of White infantrymen and others watching the Black men of the 320th Anti-Aircraft Barrage Balloon Battalion, VLA (Very Low Altitude), operating on Omaha and Utah beaches. The 320th Battalion was one of four Black barrage balloon battalions and the only battalion of its type (White or Black) to deploy to combat not once, but twice: first to Normandy on D-Day, June 6, 1944, within four hours of the assault, and then to the Pacific. The men of this battalion were the first Black Soldiers and the first Black combat unit to set foot in France. Their mission was to float several 35-foot-long balloons or "silver sausages" to an altitude of 2,000 feet and create an aerial hazard to either snare unsuspecting enemy aircraft or force them to higher altitudes where Army antiaircraft units or pursuit planes could engage them. Despite being under continuous artillery and machine gun fire, the battalion got its balloons aloft, sometimes grabbing the wire tether and maneuvering them by hand.

Along with the other Black balloon battalions, the 320th Battalion was a "source of tremendous pride for black America" and received frequent coverage in both the African-American and the White press. When it left France after 140 days, the 320th had destroyed one Junker JU-88 and possibly two other German aircraft and received a commendation from General Dwight Eisenhower for its service at Omaha Beach. Moreover, the 320th captured the attention of Servicemembers across Europe and changed some, if not all, minds about the ability of African-American Soldiers. As Bill Richardson, a military correspondent on Eisenhower's staff, noted, "It seems the whole front knows the story of the Negro barrage balloon battalion outfit which was one of the first ashore on D-day. [They] have gotten the reputation of hard workers and good Soldiers. Their simple earnestness and pride . . . [are] obvious to some of the most Jim Crow–conscious southerners."[22]

One Black Soldier, however, beat even the first Black balloon crew to Normandy. Corporal Waverly Woodson, Jr., a medic from Philadelphia, was temporarily detached from his battalion and assigned to an early arriving landing craft, tank (LCT), with the 29th Infantry Division to treat wounded Soldiers regardless of

Soldier with 12th Armored Division stands guard over group of Nazi prisoners, April 1945 (National Archives and Records Administration)

color. As Woodson's LCT approached Omaha Beach around 9:00 a.m., it struck a mine that disabled the motor and hit another mine that tore into the hull. An artillery round then landed in the jeep on deck, killing several men. Woodson suffered shrapnel wounds to the leg, his first of two, and soon found himself struggling to get out of the frigid water and ashore. Once on the fire-swept beach, he quickly set up an aid station and treated 200 wounded and dying Soldiers. Even after being relieved at 4:00 p.m. on June 7, after 30 hours of continuous action, Woodson gave artificial respiration to three White Soldiers who had gone underwater during their attempt to land their LCT before he collapsed from his wounds and sheer exhaustion.[23]

Woodson's battalion commander, a White officer, recommended him for the Distinguished Service Cross, the Nation's second highest award. Lieutenant General John C.H. Lee, the deputy commander of U.S. Forces in Europe, believed Woodson deserved the Congressional Medal of Honor and ordered the recommendation revised. Records indicate that the award even reached the White House, but it is lost to history whether the recommendation ever crossed President Roosevelt's desk. Woodson's personnel records burned in a 1973 fire at the National Personnel Records Center in St. Louis.

In recent years, some Black men have been belatedly honored, but during World War II Black men did not receive the Medal of Honor. Of the 433 Medals of Honor awarded during the war, none went to African-American Soldiers. In the end, Woodson received the Bronze Star, the Nation's fourth-highest award for valor. Years later, when talking about racial relations and his service on Omaha Beach, Woodson remarked that when men needed aid, "They didn't care what color my skin was."[24]

The same feeling may have existed among other White combat units. White infantrymen and tankers appreciated the labor of Black (and White) men culled from across the force to serve as truck drivers in the Red Ball Express, which provided desperately needed fuel, ammunition, and supplies to forward combat forces as they chased German units across the Seine River following the breakout from Normandy. This situation was another case where White combat troops in the forward areas could appreciate and admire the work done by Blacks and others but did not necessarily need to interact with them in a meaningful way.

Desiring. The strict segregation of African-American Soldiers and units

began to change as combat extended beyond Normandy and approached the German border in the latter part of 1944. Combat conditions in December 1944 in the Ardennes gave rise to the need for greater integration of units but not necessarily individual personnel. Indeed, the exigencies of close combat against the German attack that started on December 16 drove Black and White artillery units closer together than ever before.

In spring 1945, there were 238 separate field artillery battalions in the European theater of operations out of a total of 307 deployed worldwide; 9 of those battalions were Black, and all were in theater.[25] Outside the underutilized 92nd (Italy) and 93rd (Southwest Pacific Area) Infantry Divisions (Colored), those nine African-American artillery battalions, less than 3 percent of those in Europe and less than 4 percent of the total, represented the largest concentration of African-American combat power in a single theater of war. Their mere existence and inclusion in combat operations underscored the American preference for overwhelming firepower. For when it came to the desire to pummel the Germans with devastating artillery fire, the Army set aside its prewar concern about having Black battalions and batteries provide artillery fire support for White troops and prioritized its tactical ethos.

Army artillery provided support at several levels. The first and most direct support came from the artillery battalions assigned permanently to an Army division. The next most proximate support came from a battalion or often several battalions attached to an Army division. The third level of support occurred when one or more battalions, often under the command of an artillery group, reinforced the fires of a division's organic artillery battalions. Given the prewar Army's taboo against integrating Black and White units within the division, all nine African-American artillery battalions were assigned to corps artillery commands and organized as part of field artillery groups to reinforce the fires of assigned or attached artillery battalions.

In most cases, Black artillery battalions fought as part of White artillery groups commanded by and consisting of White men. However, several times in the war, White artillery battalions worked under the command of a Black artillery group led by Black officers.[26] And while this mixture of Black and White battalions occurred episodically in Europe, nowhere was this level of unit integration more necessary or the ability of Black and White units to cooperate more critical than during the Battle of the Bulge at the siege of Bastogne.

The European winter of 1944 was one of the coldest in nearly 40 years. Ice-cold rain turned dirt roads into rivers of mud that stopped vehicles in their tracks and then froze them in place when the temperature dropped. As the Allied armies approached Germany, the Ardennes forest, covered in a thick blanket of snow held in place by sub-zero temperatures, was one of the worst places to fight. In May 1940, the Germans attacked through what the French believed was the impenetrable Ardennes forest, overwhelmed a surprised French force, and reached the English Channel in weeks. In December 1944, Hitler intended to repeat the feat, slice through a weakly defended area of the Allied line, destroy the U.S. First and Ninth Armies and the British 21st Army Group, and recapture the port of Antwerp.

At 5:30 a.m. on December 16, the first of up to 27 German armor and infantry divisions—200,000 men in total—attacked across a 60-mile front, catching 83,000 men in six untested or refitting American divisions, most belonging to the VIII U.S. Corps, completely by surprise.[27] Over the next 3 days, American divisions managed to hold the northern and southern shoulders and delay the German main thrust in the center. While bitter combat occurred throughout the salient, the battle devolved into an all-out fight in the very compartmented terrain to hold bridges and major road junctions—in particular, the junction of several major roads at Bastogne.

In December 1944, VIII Corps divisions received reinforcing artillery fires from several organizations, including the 333rd Field Artillery (FA) Group (Colored). The 333rd FA Group consisted of two Black artillery battalions—the 333rd FA Battalion and the 969th FA Battalion, both equipped with 12 155mm howitzers—and the 771st FA Battalion, a White battalion armed with 4.5-inch guns. Over December 16–17, the German onslaught overran elements of the 106th Infantry Division and portions of the supporting 333rd FA Battalion and drove them to the west. In the process of retreating, the 333rd FA Battalion lost seven of its guns and most of its Soldiers, including 11 Soldiers massacred in Wereth, Belgium, by men from the German 1st SS Panzer Division.[28]

Meanwhile, Eisenhower sent one of his two theater reserve divisions, the 101st Airborne Division—3 months removed from the failed attempt to bounce the Rhine in Operation *Market Garden* and only 3 weeks removed from leaving the British line after an additional 65 days in combat—to Bastogne to hold the vital road junction and slow, if not stop, the German attack in the center of the Bulge. To reinforce the division's own artillery, VIII Corps placed the 333rd FA Group headquarters and the 969th FA and 771st FA battalions under the command of the 101st Division Artillery led by Brigadier General Anthony McAuliffe, who by happenstance was also the acting division commander as Major General Maxwell Taylor was out of the area.[29]

As the 101st Airborne Division moved by truck to Bastogne, the Germans attacked from the east, north, and south, forcing U.S. units to retreat toward the town. By December 20, the 333rd FA Battalion, having suffered a direct attack by German panzers, had lost 2 additional howitzers, for a 4-day total of 9 guns, 34 trucks, 12 weapons carriers, and 6 officers and 222 men, either as casualties or prisoners. The remnants of the battalion folded into the 969th FA Battalion, the other Black artillery battalion, now in the vicinity of Bastogne. Concurrently, direct German pressure on the White cannoneers of the 771st FA Battalion drove most of the Soldiers off, leaving just 6 officers and 14 Soldiers to man two of their 4.5-inch guns. The 969th FA Battalion took control of these guns, creating a composite

battalion, and the 20 remaining men of the 771st FA Battalion joined the 333rd Field Artillery Group headquarters. By the afternoon of December 21, with Bastogne now surrounded, the 969th FA Battalion was the only medium artillery to back up the division's light 105mm howitzers inside the half-mile-wide defensive perimeter.[30]

From December 21 to 26, the Germans surrounded Bastogne. Some of the artillerymen were within 500 yards of the frontlines. Artillery rounds, however, were in such short supply that the 969th FA Battalion only fired on targets called in by observers. The infantrymen defending the town did not stop to ask what color the cannoneers were when asking for artillery protection—they just asked for help.

Despite the shortages and the constant German artillery, armor, and infantry attacks, cooperation between men and units was superb. Soldiers from the 969th FA Battalion recovered abandoned vehicles, carried messages under fire, and evacuated wounded individuals to aid stations. Several Black men received the Bronze Star for their actions. Some men, identifying with the way Airborne Soldiers wore their uniforms, began tucking their pant legs into their boots. One enterprising 969th Battalion cook, Technician 4 Broman Williams, even set up an improvised mess and fed a thousand men, White and Black, daily. Like the men Waverly Woodson treated at Omaha Beach, the tired, cold, and hungry men of Bastogne did not care who prepared the food, if it was hot.[31]

Just before Christmas, C-47 aircraft began dropping precious supplies and ammunition. At 4:50 p.m. on December 26, the first tank from the 4th Armored Division, attacking from the south, pierced the German lines and entered Bastogne. Before dawn on December 27, American forces had sufficiently cleared both sides of the road leading to town that they now had a relatively secure path to resupply and succor the 101st Airborne Division in the tough fighting that followed.[32]

On January 3, 1945, Major General Taylor arrived with lead elements of the 4th Armored Division and resumed command of the 101st Airborne Division. Taylor wrote to Lieutenant Colonel Hubert D. Barnes, commander of the 969th FA Battalion, thanking them for their "gallant support" in defense of Bastogne, attributing the success to the "shoulder-to-shoulder cooperation of all units involved." He closed by noting that he was recommending the battalion for the Distinguished Unit Citation.[33] On January 11, Major General Troy Middleton, commander of VIII Corps, wrote, "Your contribution to the great success of our arms at Bastogne will take its place among the epic achievements of our Army."[34]

The 969th FA Battalion would leave Bastogne on January 16 to support French and American divisions in the Seventh U.S. Army in the reduction of the Colmar pocket in the Vosges Mountains. In February, along with units of the 101st Division, the battalion received the Distinguished Unit Citation. It was the second Black unit to receive the award.[35] In its 10 months in combat, the 969th FA Battalion fired 42,289 rounds in support of units in all four American Armies and the French army. On May 3, 1945, the battalion was reunited with the 101st Airborne Division, this time supporting the infantrymen by trucking German prisoners to the 101st Division's prisoner of war stockades.[36]

Requiring. Since the relatively light losses during the Normandy landings (2,499 killed in action), U.S. casualties had increased dramatically. Hedgerow fighting had decimated infantry divisions, in some cases resulting in almost 100 percent loss of infantry rifle company strength. By December 8, 1944, General George S. Patton's Third U.S. Army was short 11,000 infantrymen, the equivalent of 55 rifle companies or enough riflemen to fill 2 infantry divisions; Eisenhower's manpower specialists predicted the two major American forces, General Omar Bradley's 12th Army Group and General Jacob Devers's 6th Army Group, would need over 29,000 infantry replacements by the end of the month. The German attack in the Ardennes made a mockery of those estimates.[37]

Hitler's desperate gamble to knock the Allies out of the war in the west failed miserably but caused over 79,000 American casualties and drove the Army to rush replacements from the States and rear area White units. In a bit of inspired leadership, Lieutenant General John C.H. Lee, the commander of American Service troops in England who had earlier recommended Waverly Woodson for the Medal of Honor, approached Eisenhower with the idea to take volunteer Black support troops into the infantry. Already planning to release up to 20,000 White men to undertake infantry and armor training, Lee now wanted to tap his reserves of Black manpower. He had coordinated with Brigadier General Benjamin O. Davis, then special advisor and coordinator to the Theater Commander on Negro Troops, and Brigadier General Henry Marchett, commander of the Ground Force Reinforcement Command, who supported the idea. Lee had even drafted a message to be read to African Americans throughout his command asking them to volunteer and take reductions in rank to private and private first class to fight as individual infantry replacements on the frontlines.

His initial proposal for Black support troops to integrate into White units on an individual basis, however, ran afoul of Eisenhower's chief of staff, Lieutenant General Walter Bedell Smith. He argued that to follow Lee's suggestion would not only violate Army policy but also encourage Blacks and their patrons to push for an end to segregation in the Army. Eisenhower, as was his way, found a middle ground, rewrote Lee's message personally, and issued a request "to all soldiers without regard to color or race" to volunteer for combat assignments.[38]

While originally limited to 2,500 African Americans, 4,562 men came forward, eventually forming 37 overstrength Black rifle platoons, led by White officers and platoon sergeants. At the 16th Reinforcement Depot at Compiegne, France, these men received the same training White men had been undertaking since November 1944. The training staff noted that Black units had lower

absenteeism and fewer disciplinary problems than nonvolunteer White Soldiers. After the modest infantry training concluded, Eisenhower's headquarters sent 25 platoons to General Bradley's 12th Army Group, which detailed them to the First and Ninth Armies and further down through corps to Army divisions, where they fought side by side with White platoons in integrated infantry companies. The other 12 platoons went to 6th Army Group and down to the Seventh Army, where they formed into Black companies and fought in White battalions. A bit later, a second group of 16 platoons arrived, with 12 going to the 12th Army Group and 4 to the 6th Army Group. These units remained infantry outfits until the war ended, whereupon the Army either returned them to their Service unit headquarters or discharged them. The platoons and companies, particularly in the 12th Army Group, won praise from their commanders and from White men in their units.[39]

In the 12th Army Group, which had faced the brunt of the recent German attack, their gaining organizations did their best to welcome the arrival of the Black platoons. Division and assistant division commanders personally greeted them upon arrival, and in some instances, platoons received the division patch and a brief history of the division and regiment they were joining. As for their distribution, the platoons joined both veteran units (1st and 9th Infantry Divisions) and newer units like the 12th and 14th Armored Divisions and the 69th, 78th, 99th, and 104th Infantry Divisions. At least one division not immediately on the offensive put their platoons through additional training. As the assistant division commander of the 104th Division noted, "We wanted to make sure they knew all the tricks of infantry fighting. We assigned our best combat leaders as instructors. I watched those lads training and if ever men were in dead earnest, they were."[40]

The 104th Division was rewarded for the efforts. A divisional report noted, "Their combat record has been outstanding. They have, without exception, proven themselves to be good soldiers." The division G-1 told Brigadier General Davis during an inspection trip:

Combat Soldiers on patrol near bombed buildings, somewhere in Europe, 1944 (Everett Collection/Alamy)

Soldiers surround farmhouse as they prepare to eliminate German sniper, near Vierville-sur-Mer, France, June 10, 1944 (U.S. Army/National Archives and Records Administration)

Morale: Excellent. Manner of performance: Superb. Men are very eager to close with the enemy and to destroy him. Strict attention to duty, aggressiveness, common sense, and judgment under fire has won the admiration of all the men in the company. . . . The men of Company F all agree that the colored platoon has a caliber of men equal to any veteran platoon.[41]

Black platoons assigned to the 9th and 1st Infantry Divisions were just as effective. One Soldier, Private First Class Jack Thomas, received the Distinguished Service Cross for his actions with the 60th Infantry Regiment, 9th Infantry Division. In the 1st Infantry Division, the most bloodied and experienced division in the Army, the platoons joined the regiments that landed in North Africa and stormed the beach on D-Day. As they fought side by side, the platoons' proficiency climbed dramatically from 30 percent to 80 percent in 2 weeks. When casualties dropped one platoon's strength too low for it to continue as a separate unit, the remaining men joined a White platoon as an infantry squad. In another platoon, when the White platoon sergeant was wounded, a Black infantryman stepped forward, worked closely with the other White platoon sergeants and leaders, and performed "all duties . . . in a superior manner." More directly, a White platoon sergeant from South Carolina stated, "When I heard about it, I said I'd be damned if I'd wear the same shoulder patch they did. After that first day when we saw how they fought, I changed my mind. They are just like any of the other boys to us." In so integrating at all but the individual Soldier level, these men began to reverse centuries of discrimination, bigotry, and racism.[42]

In June 1945, a month after the war in Europe ended, the Army surveyed 255 White company officers, platoon sergeants, and other enlisted men to determine their reaction to fighting in integrated units. The officers, sergeants, and men noted that African-American Soldiers performed well, with 84 percent of the White officers and 81 percent of the sergeants and enlisted men responding "very well" and 16 percent and 17 percent responding "fairly well," respectively. Stated another way, 100 percent of the officers and 98 percent of the enlisted men responded positively that Blacks, fighting side by side with Whites, had performed well. When asked if "with the same Army training and experience, how do you think colored troops would compare with White troops as Infantry Soldiers?" 86 percent of White officers and 92 percent of White platoon sergeants and men stated "just the same" or "better than White troops." Still, almost all officers and men felt that if the Army continued to use Black Soldiers as infantrymen, it should do so in separate platoons, companies, or even battalions.[43]

In a way, while touting the fighting ability of Black Soldiers, these responses confirmed the "equal and separate" policies espoused by the Army and American society at the time. While an emergency action during war, the integration of Black platoons into White infantry units nonetheless represented a small, if belated, step forward for actual equality. From *admiring* to *desiring* to *requiring* the support of Black Soldiers to win the war, White infantrymen and others in these vignettes gradually came to accept integration when their lives depended on it. And as Roosevelt predicted in 1940, they "backed into it."

With Executive Order 9981 in 1948, President Harry Truman ordered the military to integrate, but it would take the Korean War to force the Army to eliminate separate African-American units and the Vietnam War before it became a cultural reality.[44] Even then, changing attitudes and perceptions was exceedingly difficult. It would take a few more decades before the Army truly integrated Blacks into all levels of the force, from individual squad members to three- and four-star commanders, and longer still before the Defense Department promoted them to positions such as the Chairman of the Joint Chiefs of Staff and Secretary of Defense.

Conclusion

So what does "the Case of the Missing World War II Black Combat Soldier" teach us about diversity, equity, and inclusion?

Warfare has always been and will remain a human affair. Despite ever-present improvements in technology and their influence on the conduct of war, the last two decades of conflict in Afghanistan, Iraq, Syria, and now Ukraine only reaffirm this conclusion.

The problem at the onset of World War II and the problem now is that the United States faces a shortage of qualified personnel to populate its Armed Forces. Recent reports highlight the dearth of American youth (18 to 24 years old) capable of meeting the Defense Department's intellectual, physical, and moral standards for service. In

Lieutenant General George S. Patton, U.S. Third Army commander, pins Silver Star on Private Ernest A. Jenkins, of New York City, for his conspicuous gallantry in liberation of Châteaudun, France, October 13, 1944 (U.S. Army Signal Corps/National Archives and Records Administration)

2019, out of 31.8 million military aged youth, 9.1 million met the *minimum* physical, mental, educational, aptitudinal, legal, and drug use qualifications, but only 435,000 were of high academic quality and were interested in military service.[45] Moreover, civilian corporations worldwide are competing for the same shrinking pool of high school and college graduates. Given this situation, the U.S. military, both as a corporate business and as a combat organization, can ill afford to treat potential employees with disdain, discriminate against them, or exclude them because they are seen as different—for example, in race, ethnicity, gender, religion, or sexual orientation.

In World War II, the U.S. military systematically discriminated against African Americans, shunted those it allowed to serve into noncombat roles, and believed that winning the war was a job for White men only. In the end, particularly in Europe, where the Wehrmacht chewed up battalion after battalion of American GIs in epic defensive battles from Normandy to the Rhine, the Army ran out of fighting White men and had to rush in a hasty infusion of companies and platoons of Black volunteers from Army service forces units to plug the frontlines and continue the fight. This emergency inclusion of African-American troops fighting alongside White infantrymen changed a few attitudes about the fighting abilities and value of Black Servicemen and set the stage for the 1948 Presidential directive to integrate the Armed Forces and start the slow process of structural and cultural integration. Today's force must not repeat the same mistakes; it must capitalize on our national diversity and include individuals from all communities into the defense establishment if we are to maximize our intellectual and physical abilities to defend the Nation and ensure our continued prosperity.

This article highlights the systematic discrimination against Blacks in World War II and through three vignettes showed how the perception of Black Servicemen changed as White men began to associate with them and gradually include them in their combat space, ultimately integrating African-American service troops among White battalions and companies in the later stages of the European campaign. The lesson this article offers for diversity, equity, and inclusion suggests that the assumptions a majority makes about a minority are often wrong, and when they are placed together and required to interact, attitudes can and will change. Actions speak louder than words. Advocates for the creation of African-American combat forces helped initiate steps that led to Black troops being available in Europe and elsewhere, but the act of fighting together, of placing Black platoons and companies within White units, created the opportunity for change to take root. Going forward, we must actively engage in making our organizations better by welcoming all highly qualified and competent Americans into the Armed Forces. We must not settle for President Roosevelt's passive approach. Our humanity, our professional ethics, and our dire personnel (recruiting) situation require us to do more than back into it. **JFQ**

Notes

[1] The first Presidential directive on proportional representation occurred in September 1940. "Reports on presidential intention regarding publicizing Black participation in the services," cited in Morris J. MacGregor and Bernard C. Nalty, eds., *Blacks in the United States Armed Forces: Basic Documents*, vol. 5, *Black Soldiers in World War II* (Wilmington, DE: Scholarly Resources, Inc., 1977), 25. On June 25, 1941, President Roosevelt also issued Executive Order (EO) 8802, *Reaffirming Policy of Full Participation in the Defense Program by All Persons, Regardless of Race, Creed, Color, or National Origin, and Directing Certain Action in Furtherance of Said Policy* (Washington, DC: The White House, June 25, 1941), which prohibited ethnic or racial discrimination in defense industries. It was amended four times by Roosevelt and Truman: EO 8823 (July 18, 1941), EO 9111 (March 25, 1942), EO 9346 (May 27, 1943), and EO 9964 (December 15, 1945).

[2] Specifically, the 13th, 14th, and 15th Amendments.

[3] Shirley Star, Robin Williams, and Samuel Stouffer, "Negro Soldiers," in *The American Soldier: Adjustment During Army Life*, vol. 1, ed. S.A. Stouffer et al. (Princeton: Princeton University Press, 1949), 489–492; Ulysses Lee, *The Employment of Negro Troops* (Washington, DC: U.S. Army Center of Military History, 1966), 244.

[4] "The Negro Soldier," Extension of Remarks by Honorable Helen Gahagan Douglas (D-CA), February 1, 1946, in *Congressional Record* 92, pt. 9, appendix (Washington, DC: Government Printing Office [GPO], 1946), A428–A443.

[5] Michael Lee Lanning, *The African-American Soldier: From Crispus Attucks to Colin Powell* (Secaucus, NJ: Carol Publishing Group, 1997), 173.

[6] For African-American number of 901,896, see "Research Starters: U.S. Military by the Numbers," National World War II Museum, https://www.nationalww2museum.org/students-teachers/student-resources/research-starters/research-starters-us-military-numbers.

[7] Although one will find occasional discussion of African Americans and women where appropriate throughout the Army's multivolume history of World War II, both groups have separate volumes devoted to in-depth coverage of their contributions and the policies surrounding them. See Lee, *The Employment of Negro Troops*; Mattie E. Treadwell, *The Women's Army Corps* (Washington, DC: U.S. Army Center of Military History, 1991). The terms *subordination*, *superordination*, and *disequilibrated* are drawn from Star, Williams, and Stouffer, "Negro Soldiers," 486–487.

[8] Robert K. Griffith, Jr., *Men Wanted for the U.S. Army: America's Experience with an All-Volunteer Army Between the World Wars* (Westport, CT: Greenwood Press, 1982), 212.

[9] The name *Borinqueños* came from the Puerto Rican island's original name of Boriken, meaning Land of the Brave People, created by the Taino-Arawak people, a highly advanced race dating to 4,000 BCE.

[10] Lee, *The Employment of Negro Troops*, 415.

[11] Memorandum, Chief of Staff for General Shedd (G1), September 14, 1940, CCS 20609-79, "Reports on Presidential Intention Regarding Publicizing Black Participation in the Services," National Archives and Records Administration (NARA) II; MacGregor and Nalty, *Blacks in the United States Armed Forces*, 25.

[12] "FDR Meets With Black Leaders, Side 1, 1637–1972, September 27, 1940," Transcripts of White House Office Conversations, 8/22/1940–10/10/1940, Franklin D. Roosevelt Presidential Library and Museum, http://docs.fdrlibrary.marist.edu/transcr4.html. See also R.J.C. Butow, "The Story Behind the FDR Tapes," *American Heritage* 33, no. 2 (February–March 1982), https://www.americanheritage.com/story-behind-fdr-tapes#1.

[13] In December 1945, the Army had 367,630 enlisted African Americans on the rolls out of a total of 3,572,577 enlisted men (10.29 percent). When officers are added, the percentage drops to 8.81 percent. See Lee, *The Employment of Negro Troops*, 415.

[14] Matthew F. Delmont, *Half American: The Epic Story of African Americans Fighting World War II at Home and Abroad* (New York: Viking, 2022), viii. For additional examples, the National World War II Museum in New Orleans notes that "most African Americans serving at the beginning of World War II were assigned to non-combat units and relegated to service duties." One of the best military history texts available also notes that for the reasons mentioned in this article, "most blacks could serve usefully in labor units." See Allan R. Millett, Peter Maslowski, and William B. Feis, *For the Common Defense: A Military History of the United States from 1607 to 2012* (New York: Free Press, 2012), 383. Williamson Murray and Allan R. Millett's masterful *A War to Be Won: Fighting the Second World War* (Cambridge: Harvard University Press, 2001), a strategic, operational, and industrial history of the war, has an excellent chapter on "Peoples at War" that includes five pages on women in war but mentions Black Servicemen only once in passing despite their numbers eclipsing those of American women in the U.S. Army. Even scholars focused on African-American Soldiers generalize about the numbers of Blacks in service or combat support units. Bryan D. Booker, *African Americans in the United States Army in World War II* (Jefferson, NC: McFarland and Company, 2008), 3, uses the phrase *overwhelming majority.* Jeremy P. Maxwell, *Brotherhood in Combat: How African Americans Found Equality in Korea and Vietnam* (Norman: University of Oklahoma Press, 2018), states 15 percent as the number that "secured combat assignments," a figure he cites from Lanning, *The African-American Soldier*, 173.

[15] "T/O Colored Units Continental and Foreign as of 7 July 1945, STN-122," War Department General and Special Staff, G-1, RG 165, Decimal File 1942–June 1946, 291.2, Box 443, National Archives and Records Administration (NARA).

[16] Star, Williams, and Stouffer, "Negro Soldiers," 497.

[17] The author acknowledges that not all units are the same size. Also, the author did not attempt to inventory the exact size of every Black unit as of July 1945. Such a task would require access to countless unit records, many of which do not exist or only contain fragmentary information.

[18] Star, Williams, and Stouffer, "Negro Soldiers," 504, 508, 511.

[19] Ibid., 573–576.

[20] Ibid., 577.

[21] The following examples are illustrative and not meant to be inclusive of all White and Black relationships in World War II. The author developed this framework.

[22] Cited in Linda Hervieux, *Forgotten: The Untold Story of D-Day's Black Heroes, at Home and at War* (New York: Harper, 2015), 238.

[23] Ibid.; Elliot V. Converse et al., *The Exclusion of Black Soldiers from the Medal of Honor in World War II: The Study Commissioned by the U.S. Army to Investigate Racial Bias in the Awarding of the Nation's Highest Military Decoration* (Jefferson, NC: McFarland and Company, 2008), 79–80.

[24] Hervieux, *Forgotten*; Converse et al., *The Exclusion of Black Soldiers*, 80.

[25] Booker, *African Americans in the United States Army in World War II*, 113.

[26] Lee, *The Employment of Negro Troops*, 644.

[27] Charles B. MacDonald, *The Mighty Endeavor: The American War in Europe* (New York: William Morrow, 1969), 388–394, 397.

[28] Raymond E. Bell, Jr., "Black Gunners at Bastogne," *Army* 54, no. 11 (November 2004), 49–53; Denise George and Robert Child, *The Lost Eleven: The Forgotten Story of Black American Soldiers Brutally Massacred in World War II* (New York: Caliber, 2017), 272–300. The book's cover mistakenly shows Black Soldiers manning a 40mm Bofors antiaircraft gun. Besides the 320th Barrage Balloon Battalion, the only Black 40mm antiaircraft battalion in the European theater of operations was the 452nd AAA Automatic Weapons (Mobile) battalion, which was part of Patton's Third Army and protected XII Corps artillery units during this period. Although one of the most effective AAA units in Europe, it was not at Bastogne. "452nd AAA Battalion History, 1 January to 31 December 1944," CABN-452-0, 452 AAA AW Bn, NARA.

[29] Bell, "Black Gunners at Bastogne," 51.

[30] Ibid.; Converse et al., *The Exclusion of Black Soldiers*, 77–78.

[31] Bell, "Black Gunners at Bastogne," 52–53.

[32] S.L.A. Marshall, *Bastogne: The Story of the First Eight Days in Which the 101st Airborne Division Was Closed Within the Ring of German Forces* (Washington, DC: U.S. Army Center of Army History, 1988), 172.

[33] Cited in both Booker, *African Americans in the United States Army in World War II*, 120, and Bell, "Black Gunners at Bastogne," 50.

[34] Booker, *African Americans in the United States Army in World War II*, 121.

[35] Converse et al., *The Exclusion of Black Soldiers*, 75–77. The first unit was Third Platoon, Company C, 614th Tank Destroyer Battalion, for action on December 14, 1944, near Climbach, France.

[36] Booker, *African Americans in the United States Army in World War II*, 125.

[37] "The World's Most Complete Account of D-Day Fallen," National D-Day Memorial Necrology Project, https://www.dday.org/learn/necrology-project/; Gordon Harrison, *Cross-Channel Attack* (Washington, DC: Government Printing Office, 1954), 330n, estimates a total of approximately 10,000 casualties (killed, wounded, and missing) for the Allies on D-Day. For infantry casualties in the 2 months following the Normandy invasion, see Booker, *African Americans in the United States Army in World War II*, 274–275.

[38] Lanning, *The African-American Soldier*, 181–182; Lee, *The Employment of Negro Troops*, 695–705.

[39] Lanning, *The African-American Soldier*, 181–182; Lee, *The Employment of Negro Troops*, 695–705; Booker, *African Americans in the United States Army in World War II*, 277.

[40] Booker, *African Americans in the United States Army in World War II*, 279.

[41] Ibid.

[42] Ibid., 279–280; Stouffer et al., "Negro Soldiers," 592.

[43] Star, Williams, and Stouffer, "Negro Soldiers," 589–591.

[44] For an excellent discussion of the period following World War II, see Jeremy Maxwell, *Brotherhood in Combat: How African Americans Found Equality in Korea and Vietnam* (Norman: University of Oklahoma Press, 2018).

[45] Data from the Army Marketing Research Group, cited in *Inspired to Serve: The Final Report of the National Commission on Miliary, National, and Public Service*, Report to Congress (Washington, DC: National Commission on Miliary, National, and Public Service, March 2020), 32–33, https://www.volckeralliance.org/sites/default/files/attachments/Final%20Report%20-%20National%20Commission.pdf.

Navy Lieutenant Mayra Perez, Tours With Industry fellow, speaks to George Washington High School students during Navy Promotional Day in Philadelphia, Pennsylvania, May 11, 2022 (U.S. Navy/Diana Quinlan)

Training With Industry

Integrating the Commercial Defense Industrial Base

By Michael K. Lima

I'm a proud United States Air Force veteran, and when I look across Raytheon Missiles and Defense, I'm not alone. The defense industry is full of veterans because we connect deeply with the mission of defending our nation and our allies' interests around the world. It's what motivates me to come to work every day.

—Wes Kremer
President, Raytheon Missiles and Defense

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This article examines Training With Industry (TWI)'s impact on the joint force, and it assesses and reviews the perspective of the World War II–era historical TWI program and contrasts it with today's version. The article uses three research methodologies: assessment of the author's experience with the first-ever TWI program at Raytheon Missiles and Defense (RMD), review of other Department of Defense (DOD) TWI programs, and examination of research on the correlation between TWI and promotion. The program can connect DOD to the commercial defense industrial base (DIB) through Servicemembers participating in it. The aspects evaluated here include the origins of the program's history, the skills TWI participants gain for the future force, and disadvantages to senior-level promotion. Recommendations are made to incorporate TWI training objectives into the Joint Learning Continuum, ensure individual TWI lessons are captured in the Joint Lessons Learned Program, and modernize the TWI program as a fellowship to address strategic level gaps.

In February 2020, Raytheon Missiles and Defense signed a gratis agreement with the U.S. Army Human Resources Command TWI coordinator. The signed memorandum formed a mutually beneficial agreement for a new TWI position at RMD headquarters in Tucson, Arizona. RMD, a Raytheon Technologies business, agreed to provide annual on-the-job management training for mid-level Army Soldiers to gain experience and training that a military or civilian school cannot replicate to meet the objectives of the Army and DOD.

Today, each military department participates in the TWI program except for the Marine Corps. The Air Force's program is called Education With Industry (EWI), and the Navy's program is called Secretary of the Navy Tours With Industry (SNTWI). The DOD program has well-intentioned objectives, but it has had problems.

In 2012, the Senate directed the Government Accountability Office (GAO) to review DOD's use of fellowships and TWI programs to determine the statutory provisions and oversight for these programs and the extent to which the Services benefit from these programs.[1] The GAO concluded that the benefits of participation in these programs could not be ascertained because:

- not all the Services conduct periodic or sufficiently comprehensive program reviews
- there is no clear guidance on what qualifies as a post-program assignment that uses the skills and knowledge developed during the program
- the Services do not know their overall program costs to determine cost-effectiveness
- some Services do not have memoranda of understanding with the non-DOD host organizations.[2]

In response to the stated GAO findings, the Office of the Under Secretary of Defense for Personnel and Readiness led an effort to revise DOD Instruction 1322.06, *Fellowships, Legislative Fellowships, Internships, Scholarships, Training-With-Industry (TWI), and Grants Provided to DOD or DOD Personnel for Education and Training*, published on October 12, 2016.[3] Before these revisions to the modern-day TWI program, the program looked quite different than it does today.

Historical TWI Program

The program dates to the early U.S. War Manpower Commission, the War Production Board, and the Department of War from 1940 to 1945. The purpose was to meet the high demand for wartime materiel from a small workforce whose experienced personnel were being drafted during World War II.[4] The shortage of trained and skilled personnel challenged the defense industry. The U.S. Government acted and created the TWI program (then called Training Within Industry), a decentralized program carried out throughout the country in defense industrial areas. To meet the supply shortfalls, TWI aimed to improve job training methods by emphasizing job progression (or upgrading), trade apprenticeship, and supervisory development.[5]

The former TWI program established a nationwide network of industry professionals. These professionals comprised volunteers and full- or part-time employees from private industry on loan from their companies.[6] The network taught valuable techniques to the manufacturers of war materiel. The TWI's training program, which focused on learning by doing, trained primarily in:

- the five needs of a supervisor: knowledge of the work, requisite responsibility, and skill in instructing, improving methods, and leading
- the "J" programs: job instruction, job methods, and job relations.[7]

Although the original TWI program has long been gone, its lessons can be seen in modern management practices, such as the Japanese *Kaizen* (continuous improvement) method, one of the most recognized methods in the Toyota Production System.[8] Currently, the civilian TWI Institute provides organizations with a TWI certification process with an expansion of each module and applies job instruction, job relations, job methods improvement, job safety, and problem solving to organizational culture and excellence.[9]

Current TWI Program

Despite its tremendous usefulness at the time and lessons learned that have endured for more than half a century, the TWI program of World War II was far different than that of the current DOD TWI program. DOD Instruction 1322.06 states that the purpose of the TWI program is to provide selected DOD personnel the opportunity to gain career-broadening experience while working in a commercial industry environment.[10] The program provides the participant's organization with the needed skills or expertise to accomplish its Service mission more effectively. In the Army, the TWI program is nondegree-producing and provides training and skills in best business procedures and practices that cannot be obtained through military or advanced civilian schooling programs.[11] For the Air Force, the EWI program's ultimate

goal is to develop leaders with greater business acumen and empathy and with the expertise to implement innovative practices after the assignment.[12] Finally, the Navy program (SNTWI) offers Servicemembers a chance to learn from (and with) leading industry partners to improve their leadership, management, and communications skills.[13]

Each Service participates with commercial industry leaders. However, these assignments offer more than training and skills in the best commercial business procedures and practices; they also provide a vital link for each Service to have key personnel with the training and skills necessary to integrate the commercial industrial base. The Army's TWI program was initiated in the 1970s in response to a critical need for skills in industry practices and procedures that could not be obtained through routine military education. These skills were mainly related to materiel acquisition and logistics management.[14] The Air Force's EWI program dates back to 1947 and returns to the Air Force (and, as of 2021, the Space Force) an individual trained in industry best practices.[15] Today, DOD's TWI program has evolved from enlisted-only participants to include noncommissioned and commissioned officers from most branches and training that is conducted throughout the country with major companies, including Amazon, Apple, Boeing, FedEx, GE Digital, LinkedIn, Northrup Grumman, Oak Ridge National Laboratory, SpaceX, Tesla, and USAA.[16] To that end, the TWI participants' skills in industry practices and procedures enhance the ability for unified action. The comprehensive approach focuses on the cooperation between the U.S. military and other interorganizational participants toward common objectives.[17]

The term *interorganizational* refers to U.S. Government departments and interagency partners; state, territorial, local, and tribal agencies; multinational partners; nongovernmental organizations; and the private sector.[18] The most notable private sector is the commercial defense sector, which comprises the defense industrial base but is separate from DOD's organic industrial base. The DIB includes DOD, government, and private sector worldwide industrial complexes with capabilities to perform research, development, and design and to produce and maintain military weapons systems, subsystems, components, or parts to meet military requirements.[19] The TWI host companies are composed of many program sponsors that provide essential services and products for DOD. For example, in the weapons programs, significant consolidations in the 1990s reduced competition, with the total number of U.S.-based prime contractors declining from 51 in 1993 to 5 in 2000.[20] The consolidation makes the TWI program even more critical for DOD as the right companies must be selected and the participants must be placed in the correct business units within the company.

Defense Contractor and Military Support

One such business unit is RMD, which provides the industry's most advanced end-to-end solutions, delivering innovation to detect, track, and defeat threats. The business cuts across each military Service's mission area, mainly focusing on airpower, land warfare and air defense, strategic missile defense, naval power, and advanced technology. These mission areas accounted for $15.3 billion in 2020 sales, with slightly more than half of these in domestic business sales.[21] RMD has 15,000 engineers and 30,000 employees across 30 states and 28 countries.[22] With its headquarters in Tucson, Arizona, this diverse business unit presents an excellent opportunity for TWI participants to interact with various employees and understand their business processes.

Raytheon Missiles and Defense headquarters is located near Davis-Monthan Air Force Base, a critical air combat command installation. The 355th Wing serves as the host unit and provides combat search and rescue capabilities. Most notably, the Davis-Monthan installation is known for the mission and facility of the 309th Aerospace Maintenance and Regeneration Group, called "The Boneyard," an aircraft storage and maintenance facility.[23] The Davis-Monthan Welcome Center is a one-stop shop for new arrivals, with access to the Military Personnel Flight (same as the Army's Military Personnel Division), Comptroller Squadron (Finance), Traffic Management Office (Transportation), and the Medical Group (Medical Center). The Davis-Monthan Welcome Center can also provide information and contacts for the School Liaison Officer, Exceptional Family Member Program, and Military Housing Office. While not technically assigned to Davis-Monthan, Army Servicemembers attending TWI will receive all necessary support from the Davis-Monthan installation, which adds to the joint environment of the position while assigned to TWI with RMD.

Training Assignment

The TWI program enhances DOD personnel's professional, technical, and executive management areas in the commercial DIB. At the same time, experiences may be different for each military Service and various occupational skills. The Land Warfare and Air Defense division of RMD is the assigned mission area that provides day-to-day responsibility for the TWI position. The 1-year assignment additionally requires the completion of a 2-year mandatory follow-on utilization tour for the Army, concurrent with a 3-year Active-duty service obligation upon program completion.

As a nonimitative assignment in the highly selective and competitive career development program, officers who want to participate in the TWI program must submit applications to their respective branch managers.

Army TWI participants are administratively assigned to the U.S. Army Student Detachment at Fort Jackson, South Carolina, a small contingent of military and civilian personnel that provide support at various levels to more than 2,400 students.[24]

Training Objectives

The rotational-style training implemented by Raytheon provides the TWI participant with a uniquely tailored experience that goes in depth into the techniques and industrial procedures of

Army Captain Pablo Mendez Adorno, Training With Industry banking officer student, helps customer at Armed Forces Bank, Fort Leavenworth, Kansas, March 23, 2022 (U.S. Army/Mark R.W. Orders-Woempner)

the various RMD directorates. Within the first month, the host TWI company and the TWI participant submit a training plan to the proponent office. The training plan provides a detailed outline for desired training and general learning objectives in partner management practices, acquisitions, technology, and mechanical engineering.

TWI participants are exposed to modern technologies and business practices in the commercial industry. These skills are needed to support new Army technologies such as the Integrated Personnel and Pay System–Army and gain exposure to industry software such as Oracle's PeopleSoft, software engineering and testing, business analytics, and how data science is applied.[25] Participants' ability to see the industry leverage artificial intelligence and machine-learning capabilities enhances DOD efforts to modernize Joint All-Domain Command and Control. The 2022 National Defense Strategy calls for an integrated deterrence using every tool at the Defense Department's disposal to develop, combine, and coordinate our strengths to the maximum effect.[26] Training and engagement offered in the TWI program is an untapped resource to build the future force. The RMD TWI billet and the DOD TWI program deliver the needed expertise to successfully integrate the commercial sector into U.S. defense strategy.

Benefits and Disadvantages

The recently conducted RMD TWI program fulfilled the initial general learning objectives focused on partner management practices, acquisitions, technology, and mechanical engineering. This training included participation in the Diné facility in Farmington, New Mexico, which proudly boasts a workforce of which 90 percent are members of the Navajo Nation. The Raytheon Diné Facility stores and generates parts for 12 missile programs, such as the Tomahawk cruise missile, the Javelin weapons system, and the Advanced Medium-Range Air-to-Air Missile,[27] that provide critical experience in the munitions commercial industrial base. Participants gained insight into the intricate work required to build a weapons system at mass and understand all required inputs—as well as the inter-

Technical Sergeant Jules Ponton, former 316th Force Support Squadron manpower analyst and now Education With Industry fellow at Deloitte Consulting, poses for photo at SparkX Cell Innovation and Idea Center on Joint Base Andrews, Maryland, March 4, 2022 (U.S. Air Force/Bridgitte Taylor)

nal actions for lot acceptance—before sending it to government representatives for approval.

In another example, an Air Force captain who participated in a recent EWI at SpaceX was assigned as lead manufacturing engineer for the first time from the West Coast.[28] The participant completed tasks aligned to host TWI procedures to understand the flexibility to solve uncommon problems that DOD may ask of him. Additionally, the officer was selected for transfer to the Space Force, which will allow the officer to bring some of the most advanced knowledge of the space domain back to the newest and most relevant department in DOD.

Other significant experiences include that of a Navy lieutenant commander, a maintenance officer, who participated in the SNTWI at Amazon headquarters in Seattle. This position placed the officer as a senior program manager in the customer excellence department, working on a small team project to improve Amazon's customer service.[29] The officer saw how the commercial industry handled supply problems and applied innovative solutions at a national level that could not be accomplished within government bureaucracies.

One major drawback for participants of the TWI program is that it does not provide a direct correlation for promotion. In a Naval Postgraduate School research project, the authors concluded that there are no major positive or negative effects on an officer's promotion or career after completing a TWI program.[30] The assessment was based on data from 12 TWI participants' promotion histories where the TWI participants were promoted within their "in-zone" period.[31] While the sample size was small and the outcome was not favorable, the assessment shows no correlation in not getting promoted, which led this author to conduct additional research on the correlation to promotion.

The author completed an in-depth review of 200 general and flag officers' official biographies of the three Services that have a TWI program: Navy, Army,

and Air Force (table). The assessment discovered that not one of these officers mentioned the TWI program as part of his or her military service. The vast majority listed a fellowship program (40.5 percent), followed by not listing a broadening assignment (38 percent), and the next highest listing was an assignment as an instructor (9 percent).[32] A few conclusions can be drawn from the assessment. Many of the officers had experience serving in program executive/management offices in their field, and those with highly technical backgrounds (doctors, aviators, engineers, and others) opted to receive additional certification or professional training. From the research, a conclusion can be drawn that the performance of operational assignments must be strong enough for promotion to support a broadening assignment that will have a Servicemember perform work outside of his or her functional area.

TWI produces Servicemembers with insights into the commercial sector that can provide necessary linkage to the DIB to inform joint doctrine and to integrate and synchronize the actions of the joint force to conduct globally integrated operations with interorganizational cooperation against priority challenges and achieve national strategic objectives.

Recommendations

The first recommendation moving forward with the TWI program is to incorporate the training objectives of each Service into the Joint Learning Continuum, a fundamental systematic approach to ensure professional development throughout an individual's career,[33] and aligning the individual training with organizational training within the Joint Training System Methodology, a four-phased methodology that aligns joint training strategy with assigned missions to produce trained and ready joint organizations.[34]

Individual joint training is considered one of four pillars for joint officer development across the Joint Learning Continuum. Specifically, the joint force must evaluate current TWI training objectives through the Joint Training System Phase I, requirements initiated by assessing current capability and identifying gaps to determine if they can be closed through training.[35] Each Service in the joint force must receive the desired training to leverage cross-organizational capabilities for unified action during war. Chairman of the Joint Chiefs of Staff Instruction 3500.01J, *Joint Training Policy for the Armed Forces of the United States*, already states that individual joint training "can be delivered through various methods, depending on the requirements of the learning organization," including commercial training programs.[36]

The second recommendation is to mandate all organizations with a TWI position to submit their reports to the Joint Lessons Learned Program for validation.[37] The validation is a submission of observation into the lessons learned process for the best practices and issues to proceed to the resolution phase.[38] The resolution would solve any collective issues across the Services with utilization tours that may need to be aligned with organizations with Tier 1 national- and combatant command–level training, which is training designed to prepare national-level organizations to integrate interorganizational partners in highly complex environments.[39] Additionally, even the authors of the Naval Postgraduate School research project called for further research into the benefit of assigning specific utilization tours.[40] The resolution processes would allow for further analysis by a potential office of primary responsibility and subject matter experts, along with developing solutions to address any root causes.[41]

The third recommendation is to incentivize the program to our most talented personnel by realigning the TWI program as a fellowship. Currently, military personnel are selected by their branch and left to the host organization as a participant to train for the gaps identified by their organizations. Instead, create a fiscal year cohort across the Services and with the same career field into a fellowship sponsored by DOD organizations that deal directly with the commercial industry in that field, such as the Defense Security Cooperation Agency, Defense Logistics Agency, and Joint Program Executive Office Armaments and Ammunition, and their respective project offices. The fellowship would allow for collaboration among Servicemembers across the joint force to solve challenges faced at the strategic level. TWI fellows could explore problems and focus their training experience to provide solutions—linking individual and organizational training objectives to gaps and ensuring that the individual lessons are captured for evaluation and provide direct value.

Table. Review of General and Flag Officers' Official Biographies

Broadening Assignment (Name)	Navy	Army	Air Force	Grand Total
Fellowship	50	14	17	81
Not Listed	26	27	23	76
Instructor	5	6	7	18
Faculty	2	6	2	10
Legislative	5		1	6
Aide	4		1	5
Career Manager	2	2		4
Grand Total	**94**	**55**	**51**	**200**

The Russo-Ukrainian war has proved that U.S. defense supply chains are susceptible to war demands that unexpectedly shift from crisis to armed conflict. To prepare for large-scale combat operations, the joint force will have to support ground, maritime, and air forces on a scale not seen since World War II, further complicated by the introduction of the new space and cyberspace domains. The Defense Department must urgently integrate a whole-of-government approach and modernize the TWI program to ensure unified action and foster interorganizational cooperation. Servicemembers who have trained with commercial industry partners and share what they have learned with their respective Services and the joint force are critical to closing gaps and strengthening our deterrence against hostile nations. **JFQ**

Notes

[1] *Military Education: Improved Oversight and Management Needed for DOD's Fellowship and Training-With-Industry Programs* (Washington, DC: Government Accountability Office, April 2012), 1, https://www.gao.gov/assets/gao-12-367.pdf.

[2] Ibid.

[3] Department of Defense (DOD) Instruction 1322.06, *Fellowships, Legislative Fellowships, Internships, Scholarships, Training-With-Industry (TWI), and Grants Provided to DOD or DOD Personnel for Education and Training* (Washington, DC: DOD, October 12, 2016), https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/132206p.pdf.

[4] Jim Huntzinger, "The Roots of Lean. Training Within Industry: The Origin of Japanese Management and Kaizen," Lean Enterprise Institute, 2001, 4, https://ww.lean.org/search/documents/105.pdf.

[5] *The Training Within Industry Report, 1940–1945* (Washington, DC: War Manpower Commission, September 1945), 5, https://www.allaboutlean.com/wp-content/uploads/2018/02/Training-Within-Industry-Report.pdf.

[6] Huntzinger, "The Roots of Lean," 5.

[7] Ibid., 11.

[8] Ibid., 17.

[9] "TWI Certification," TWI Institute, https://www.twi-institute.com/twi-certification/.

[10] DOD Instruction 1322.06.

[11] "TWI Eligibility and Application Requirements," U.S. Army Human Resources Command, July 13, 2023, https://www.hrc.army.mil/content/TWI%20Eligibility%20and%20Application%20Requirements.

[12] "Education With Industry Program," Air Force Institute of Technology, https://www.afit.edu/CIP/page.cfm?page=1567.

[13] "FY20–21 Secretary of the Navy Tours With Industry Announcement," U.S. Navy, https://www.navy.mil/Resources/NAVADMINs/Message/Article/2338854/fy20-21-secretary-of-the-navy-tours-with-industry-announcement/.

[14] "TWI Eligibility and Application Requirements."

[15] Josh Tarrant, "EWI Fellows Creating Tangible Results in a Virtual World," Air Force Institute of Technology, February 19, 2021, https://www.airuniversity.af.edu/News/Display/Article/2509316/ewi-fellows-creating-tangible-results-in-a-virtual-world/.

[16] "Training With Industry," U.S. Army Acquisition Support Center, 2023, https://test.asc.army.mil/web/career-development/programs/aac-training-with-industry/.

[17] Joint Publication (JP) 3-0, *Joint Operations* (Washington, DC: The Joint Staff, October 22, 2018), x.

[18] Ibid., xi.

[19] JP 3-27, *Homeland Defense* (Washington, DC: The Joint Staff, April 10, 2018), GL-8, https://www.jcs.mil/Portals/36/Documents/Doctrine/pubs/jp3_27.pdf.

[20] Office of the Under Secretary of Defense for Acquisition and Sustainment, *State of Competition Within the Defense Industrial Base* (Washington, DC: DOD, February 2022), https://media.defense.gov/2022/feb/15/2002939087/-1/-1/1/state-of-competition-within-the-defense-industrial-base.pdf.

[21] Wes Kremer, "Raytheon Technologies Investor Day 2021," Raytheon Technologies, 2021, 48, https://investors.rtx.com/static-files/78ed3bc0-545d-4c87-ba92-ff6bc3b29d22.

[22] Ibid.

[23] "About Davis-Monthan Air Force Base," Davis-Monthan Air Force Base, https://www.dm.af.mil/About-DM/Units/Tenant-Units/.

[24] "U.S. Army Student Detachment," U.S. Army Training and Doctrine Command, https://usacimt.tradoc.army.mil/ltb/usasd/index.html.

[25] Gregory S. Johnson, "Train With Industry to Retain and Develop Army Talent," U.S. Army Human Resources Command, February 7, 2022, https://www.linkedin.com/pulse/train-industry-retain-develop-army-/.

[26] *2022 National Defense Strategy of the United States of America* (Washington, DC: DOD, October 27, 2022), iv, https://media.defense.gov/2022/oct/27/2003103845/-1/-1/1/2022-national-defense-strategy-npr-mdr.pdf.

[27] "Raytheon Completes New $5 Million Warehouse at Diné Facility Near Farmington," Raytheon Technologies, April 24, 2017, https://raytheon.mediaroom.com/2017-04-24-Raytheon-completes-new-5-million-warehouse-at-Dine-facility-near-Farmington.

[28] Tarrant, "EWI Fellows Creating Tangible Results in a Virtual World."

[29] Meghann Myers, "Navy Officers Start 1st Industry Tours at Amazon, FedEx," *Navy Times*, October 14, 2015, https://www.navytimes.com/news/your-navy/2015/10/14/navy-officers-start-1st-industry-tours-at-amazon-fedex/.

[30] Melissa S. Flynn and Amphay Souksavatdy, "Return on Investment for the United States Navy's Training With Industry Program" (master's thesis, Naval Postgraduate School, June 2017), 69, https://apps.dtic.mil/sti/pdfs/AD1046366.pdf.

[31] Ibid.

[32] Author researched professional information about DOD general officers and flag officers from official military Web sites.

[33] Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3500.01J, *Joint Training Policy for the Armed Forces of the United States* (Washington, DC: The Joint Staff, January 13, 2020), A-2, https://www.jcs.mil/Portals/36/Documents/Doctrine/training/cjcsi3500_01j.pdf?ver=2020-01-21-111919-340.

[34] Ibid., B-1.

[35] Ibid., B-2.

[36] Ibid., B-6.

[37] Author researched Joint Lessons Learned Information System and found only one TWI Lessons Learned Observation.

[38] Chairman of the Joint Chiefs of Staff Manual (CJCSM) 3150.25B, *Joint Lessons Learned Program* (Washington, DC: The Joint Staff, October 12, 2018), B-1, https://www.jcs.mil/Portals/36/Documents/Library/Manuals/CJCSM%203150.25B.pdf?ver=2018-10-26-172524-850.

[39] Ibid., B-5.

[40] Flynn and Souksavatdy, "Return on Investment," 70.

[41] CJCSM 3150.25B, A-4.

Allied tanker *Dixie Arrow*, torpedoed in Atlantic Ocean by German U-71, in 1942 (U.S. Navy/National Archives and Records Administration)

Beating *Drumbeat*

Lessons Learned in Unified Action from the German U-Boat Offensive Against the United States, January–July 1942

By Casey L. Miller, Carl Jappert, and Matthew Jackson

In the first 7 months after the United States entered World War II, a handful of German U-boats almost brought the Allied war effort to a standstill in a shockingly effective campaign against merchant shipping. From January to July 1942, the Germans would sink 585 vessels in U.S. waters—over three million gross tons of shipping—and lose only six U-boats.[1] These shipping losses accounted for more than 20 percent of the *total* Allied vessels sunk over the entire war. Army Chief of Staff General George C. Marshall wrote to Admiral Ernest J. King, Chief of Naval Operations: "Another month or two of this will so cripple

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Lookouts stand watch on Navy destroyer's deck house during convoy duty in Atlantic Ocean, June 1943 (U.S. Navy/National Archives and Records Administration)

our means of transport that we will be unable to bring sufficient men and planes to bear against the enemy . . . to exercise a determining influence on the war."[2] The effectiveness of the German attack, known as Operation *Drumbeat* (*Paukenschlag*), and the U.S. ineptitude in countering it, has transfixed historians for decades.

Examining this case study from a joint perspective provides timeless lessons for contemporary planners. Today, the American homeland faces a strategic environment that is arguably just as complex and lethal as it was in December 1941. Current strategic guidance notes that in future conflicts, the United States will again see attacks on the homeland aimed at undermining America's economic power, will to fight, and ability to project military force.[3] The Department of Defense and civilian governmental agencies charged with defending the Nation face an array of "all-domain" transregional threats limited only by our adversaries' means, motives, and imagination.[4] With this in mind, it seems worthwhile to reexamine the causes of the delayed American response to an existential threat so that we can mitigate any future reoccurrence.

Accordingly, and in contrast to the bulk of previous *Drumbeat* analysis focusing on single-Service perspectives, assigning blame, or tracking U-boat exploits, this analysis seeks to understand *why* as comprehensively as possible. Why was the American response to the German assault so ineffective? Why did American authorities take so long to address a problem that the British had been countering since 1940? Why were the Allies able to successfully force the U-boats into the mid-Atlantic by the summer of 1942? A holistic approach can begin to answer these questions. First, it is necessary to understand the adversary logic behind *Drumbeat* from the perspective of Admiral Karl Dönitz, commander of the German U-boat command. Next, analyzing the reactions and interactions of civilian strategic leadership, the Allies, and the Armed Forces illuminates various causes.

Ultimately, examining Operation *Drumbeat* from a joint perspective reinforces essential lessons in an era of

resurgent strategic competition, namely that

- clearly defined command relationships and responsibilities are essential
- military means negotiated prewar are often inadequate for the wartime task at hand
- allied contributions are critical, if not outright decisive
- anticipation, preparation, and adaptation are crucial to survival.

Allied and U.S. leadership had to learn these lessons during the first 7 months of 1942. In the meantime, the U-boats carried out a "merry massacre" off the U.S. coast.[5] Civilian leaders struggled to adapt and trust their Allies. Military leaders blamed operational and organizational deficiencies on material shortfalls. Services struggled to overcome ingrained cultures and understand their roles and responsibilities. As a result, there was a broad failure to achieve unified action.[6] Ultimately, it was mainly American willingness to adopt proven convoy methods and mobilization of the Nation's incredible industrial capacity that saved it from its incompetence. However, contemporary planners need to anticipate that our future adversaries will not allow the United States the same time or opportunities to learn, adapt, and overcome.

The Road to *Drumbeat*, 1939–1941

Throughout World War II, Admiral Karl Dönitz remained steadfast in his belief that the only way to secure victory for Germany was with the U-boat. Dönitz was determined to maximize damage to Great Britain's sea lines of communication. In his view, only an attritional war against Allied shipping could force Great Britain to sue for peace. "Our aim," he noted, "should obviously be to sink as much enemy shipping as quickly as we could."[7] Yet Adolf Hitler and the Naval High Command (*Oberkommando der Marine*) remained fixated on employing Germany's surface fleet to defeat the Royal Navy and destroy British merchant shipping in the Atlantic.[8] Dönitz nevertheless made the most of his consistently meager resources.

After the fall of France in June 1940, the Battle of the Atlantic began in earnest. The Germans were able to establish U-boat bases on the French coast with direct access and increased operational reach into the Atlantic. In July 1940, Dönitz had 29 active U-boats, but the Germans still managed to inflict disproportionate casualties on their foes. In October 1940 alone, 8 U-boats were able to destroy 63 merchantmen (352,407 tons). As the year progressed, the U-boats put increasing pressure on Great Britain in preparation for Germany's Operation *Sea Lion* (*Seelöwe*), the cross-Channel invasion of the British home islands. When the operation did not occur, Dönitz reoriented on "the only thing that counted"—sinking British shipping.[9] By the end of 1940, however, the British had relearned valuable lessons from World War I—namely, no matter how lightly escorted, ships in convoys were safer than ships sailing alone. The British were also beginning to overcome escort shortages. Significantly, the United States agreed to trade 50 destroyers for the leasing rights of British naval bases in the Atlantic, Canada, and the Caribbean. This trade was "crucial to Britain's ability to conduct the war in Europe."[10]

In 1941, the British refined convoy systems and antisubmarine methods while the Germans pushed into the Atlantic and improved their tactics. From March to June 1941, with 21 operational vessels, the U-boats sank 203 ships (1,128,030 tons), honing the integration of *Luftwaffe* air support and wolfpack tactics (*Rudeltaktik*). However, things shifted against the U-boats in the second half of 1941, when the British captured German Enigma codes and machines and began decrypting all U-boat transmissions. Additionally, the British used high-frequency direction-finding (HF/DF) radio stations along the coast to track U-boats and divert convoys. The Americans also joined in and took responsibility for escorting convoys to Iceland and protecting "any ships of other nationalities as wished to attach themselves to such convoys."[11] This "Undeclared War" frustrated German U-boat commanders' attempts to adhere to Hitler's strict orders not to target American vessels.[12] Hitler further complicated efforts to concentrate forces against British shipping by ordering Dönitz to divert all operational U-boats to the new "main theater of operations," the Mediterranean, to screen the *Wehrmacht*'s operations in North Africa.[13] As a result, Dönitz retained only 10 U-boats to employ in the Atlantic. By the end of 1941, the widely dispersed U-boats began to suffer unaffordable losses of veteran crews.

December 7, 1941, brought new opportunities for U-boat command with the Japanese attack on Pearl Harbor. However, the Japanese attack caught the Germans by surprise. It took 5 weeks for Dönitz to get the five U-boats of his initial assault force 3,000 miles to U.S. waters for the first Operation *Drumbeat*.[14] On January 13, 1942, they attacked, achieving "complete success."[15] The U-boats found "that conditions . . . were almost exactly those of normal peace-time."[16] By the end of January, the British recorded 62 vessels (327,357 tons) lost, with the bulk in U.S. waters. More U-boats arrived in February, as the Germans incorporated medium-range Type VIIC vessels to reinforce the longer range Type IX boats. The spring introduction of Type XIV U-tankers, or milk cows (*Milchkühe*), enabled U-boats to refuel and rearm at sea, extending their operational reach into the Caribbean and Gulf of Mexico. The U-boats found undefended targets from Key West to Trinidad. To make things worse, the Germans added a fourth wheel to their Enigma devices in April, and the Allies lost the ability to decrypt U-boat communications for over 10 months. Hitler's spasmodic diversions, however, forced Dönitz to send most of his boats off Norway when it became the new "decisive theater of war."[17] Dönitz could only keep six to eight U-boats in U.S. waters from January to June 1942.

It took 3 months before the Americans started introducing a convoy system off the East Coast. Eventually, this system extended into the Caribbean and the Gulf of Mexico, but not until after the U-boats had inflicted horrendous casualties. The month of May saw the highest

monthly losses in any war area, with 41 ships (219,867 tons) sunk in the Gulf, over half of them valuable tankers. After this, Dönitz noted, "the convoy system was gradually introduced, and it became obvious that . . . the main effort in the U-boat war would have to be switched back to the wolfpack attacks on convoys" in the Atlantic.[18] In the end, the U-boats sank 585 ships (3,080,934 tons), losing only 6 U-boats in the process. Dönitz concluded "that the results obtained had by far exceeded the high expectations held by U-boat Command in January. . . . The successes achieved by a small number of U-boats were extraordinary."[19]

Civilian Leaders and Strategic Direction

Civilian strategic direction was essential in guiding the Allied responses to Operation *Drumbeat*. In December 1941, American strategic leadership quickly aligned war efforts with the "Plan Dog" recommendations of the former Chief of Naval Operations, Admiral Harold Stark. U.S. strategy aimed to defeat the Axis powers by holding off the Japanese in the Pacific while focusing on Germany's decisive defeat. American strategic leaders knew the only way to defeat Germany was on the ground in Europe. Therefore, all preparations and shaping operations beginning in December focused on setting conditions for an eventual cross-Channel invasion of Europe with Great Britain as the staging area. However, U.S. and British leadership did not have a shared vision for implementing this strategy or the threat the U-boats posed to it. This disconnect directly affected the American response to *Drumbeat*.

Prime Minister Winston Churchill fully appreciated the U-boat threat to victory and the survival of Great Britain. He wrote that defeating the U-boats "was the dominating factor all through the war. Never for one moment could we forget that everything happening elsewhere on land, at sea, or in the air, depended ultimately on its outcome."[20] Churchill took control of Britain's war against the U-boats by forming and chairing the Battle of the Atlantic Committee and leveraging "all the resources at the disposal of the British Government . . . to defeat the U-boat menace."[21] He worked directly with the Admiralty, "with whom [he] lived in the closest amity and contact."[22] He actively maneuvered the United States to increase its participation, convoy security, and escort production before entering the war. He secured the Anglo-American agreement, trading bases for 50 much-needed destroyer escorts.

Churchill was likely perplexed by his American counterpart's passive role when *Drumbeat* commenced in January 1942. President Franklin Delano Roosevelt appears at first to have taken little active part in stopping the massacre of shipping off the U.S. coast. American civilian leadership dragged their feet in establishing a convoy system. They did not attempt to enforce a coastal blackout out of concerns it might impact tourism. It was as late as May in some locations before the Navy and War departments eventually rose to that challenge. National leadership focused on preparing for the cross-Channel invasion, and military shipping production priorities focused on building landing craft rather than escorts well into the first half of 1942.[23]

However, President Roosevelt was just as effective at diplomacy and manipulation as Churchill.[24] Churchill expressed his "deep concerns" to Roosevelt regarding the unprecedented rate of sinkings in U.S. waters.[25] Great Britain could only watch as the Americans allowed tons of British shipping to get torpedoed in waters where the Royal Navy could do nothing. Roosevelt responded to Churchill's concerns by suggesting that Britain might consider reducing its net imports.[26] Ultimately, Roosevelt maneuvered the British into providing additional escort resources in the American area while buying the United States time to mobilize its industry. By the end of March, the British had sent 10 corvettes and 24 armed trawlers to the fight. More significantly, the Allies agreed to adjust mid-Atlantic convoy routes and timetables to free up two destroyer escort groups to support America's Eastern Seaboard.

Meanwhile, Roosevelt directed the U.S. Maritime Commission to build 24 million tons of shipping.[27] By the summer of 1942, America could produce Liberty ships in 90 days. Despite the apparent weak executive response to the U-boat threat, Roosevelt mobilized America's production capacity, ensuring that the United States could outproduce anything the U-boats could sink. While one contemporary historian considers this approach "mindless," by July 1942, America was producing 170 percent more tons of shipping monthly than the Germans were destroying.[28]

The Allies: British and Canadian Military Assistance

The British and Canadian militaries made valiant efforts to help the United States form an effective response to the U-boat threat in U.S. waters. The Royal Canadian Navy notably assumed control of Atlantic convoy routing and contributed 40 percent of Atlantic convoy escorts to free American resources for coastal escort duty.[29] In addition to the vessels and seasoned crews they provided, the Allies brought critical experience and information to the table. As early as December 1941, the First Sea Lord, Admiral Dudley Pound, was in Washington looking for ways to enhance Anglo-American cooperation and coordination.[30] The British worked directly with the U.S. Navy Mission in London to maximize information-sharing and to pass on lessons learned. According to the Royal Navy's historian, "The policy of the Admiralty had been to give to the American Navy virtually the whole of our knowledge and experience."[31] The Royal Navy openly shared its antisubmarine doctrine, tactics, techniques, and procedures with the U.S. Navy and Merchant Marine. Additionally, the British sent vital personnel to advise the U.S. Navy. In April, they sent Captain George E. Creasy, the Royal Navy's director of antisubmarine warfare, to Washington along with Air Vice Marshal Geoffrey R. Bromet "to advise [the U.S. Armed Forces] on the formation, training, and organization of air and surface antisubmarine forces."[32]

Allied convoy in Atlantic Ocean moves toward its destination while Navy K-class lighter-than-air aircraft hovers overhead, watching for enemy U-Boats, June 1943 (National Museum of the U.S. Navy)

For intelligence, the Royal Navy sent advisors to convince the U.S. Navy of the need to form an operational intelligence center (OIC) to track U-boat movements, synthesize reporting, and provide guidance and warnings to merchant shipping. Commander Rodger Winn, a Royal Navy Volunteer Reserve officer and head of the Royal Navy's Submarine Tracking Room, was selected for this task.[33] Despite anticipated resistance, the Chief of Naval Operations, Admiral Ernest J. King, was highly receptive to the idea, and the U.S. Navy rapidly established an equivalent to the British OIC. One historian describes what became the "Atlantic Section, Operational Intelligence" as "the closest exercise of transatlantic cooperation of the war."[34]

Despite British and Canadian contributions, the Americans still seemed to stubbornly resist implementing a coastal convoy system. To the British and Canadians, the Americans seemed "slow" in failing to adopt convoys.[35] Indeed, the Americans "first tried every conceivable measure—*except* convoy and escort."[36] In the end, the military Services had to make their own choices and learn their own lessons. No amount of Allied proselytizing seemed effective in changing American behavior on the topic of convoys.[37]

The Army and Army Air Force: Rivalries and Responsibilities

The War Department's only means of contributing to the fight against the U-boats was the newly branded Army Air Forces (AAF). Some even believed that the AAF was far better equipped, due to its monopoly on land-based bombers, to handle the problem than the Navy.[38] Unfortunately, prewar Army-Navy rivalries and ambiguous responsibilities hampered that response. To better understand these problems, it is crucial to review the Services' competing perspectives on airpower and the heated Army-Navy feud over funding and responsibilities that occurred during the interwar years. After World War I, the Navy Department focused on developing airpower to support the fleet. Meanwhile, airpower advocates in the Army wished to create a separate Army Air Force focusing on long-range

Coastguardsmen watch for possible depth charge explosion results during convoy patrol in Atlantic Ocean during World War II (National Museum of the U.S. Navy)

strategic bombing targeting vital centers deep inside enemy territory.[39] The problem for both departments was that the American public had shifted toward isolationism and had little interest in spending money on armaments, let alone airpower.[40]

Due to the scarcity of congressional funding, the Army was reluctant to invest a significant portion of its meager budget into aviation. Conversely, the Navy saw larger, albeit still reduced, budgets for strengthening the fleet. This disparity led airpower advocates in the Army and Navy to continuously seek opportunities to compete and demonstrate their respective Service's superior operational concepts.[41] The most referenced example of this was General William "Billy" Mitchell's widely publicized bombing of the SMS *Ostfriesland* during a joint Army-Navy bombing experiment in 1921.[42] Paranoia abounded. The Army Airmen believed the Navy might attempt to develop its own strategic airpower, while the Navy believed (correctly) that the Army Airmen were actively lobbying for the diversion of Navy funding to support Army bomber development.[43] These behaviors and perceptions continued into World War II, as the branches competed for funding and public attention.

This inter-Service rivalry over the future of airpower led to disputes over Service responsibilities in national defense. Until the development of aviation, the Navy and War departments enjoyed clear responsibilities when defending the Nation. The Navy would intercept any invading fleet, and the Army would protect the coastline with artillery and infantry if enemy forces survived to reach the shores. The coastline and artillery range allowed for a clear delineation of responsibility.

However, the advent of the airplane blurred this line as the Army's new aircraft could reach targets far out at sea. The Army used these capabilities, and public spectacles like the bombing trials, to convince the American people that the Army needed to develop airpower as a defensive weapon. The War Department's persistence paid off; they eventually convinced Congress that naval aviation should be attached to the fleet while the Army should control

all land-based aviation.[44] Congress pressed Army Chief of Staff General Douglas MacArthur and Chief of Naval Operations Admiral William Pratt for an agreement on aviation development. In 1931, the chiefs released the MacArthur-Pratt Agreement, but it did little to stop the jurisdictional debate.[45]

The Services held an additional Joint Army-Navy Board in 1935 to clarify their responsibilities and authorities for aerial operations over water in the Nation's defense. Yet despite the joint board's efforts, the refined guidance created further ambiguity as it now based Service responsibilities on "apparent" enemy intent and whether enemy objectives were likely ashore or at sea.[46] The board's guidance also failed to delineate boundaries, instead making vague references to "coastal area[s]" and subjective Service assessments of whether the enemy was "close enough to threaten . . . [American] territory."[47] Official guidance changed little before the attack on Pearl Harbor, and the ongoing disputes ultimately degraded the American response when *Drumbeat* commenced.

The Service rivalries, and the AAF's proclivity for long-range strategic bombing, prevented the development of equipment and training for antisubmarine warfare. The interwar agreements limited Army training operations to within 100 miles of the coast, and the Navy had to approve flights beyond this range. This policy discouraged the Army from training over the water, so it focused its efforts on bombardment. At the end of 1941, the AAF units "best equipped for antisubmarine operations trained almost exclusively in . . . [strategic] bombardment."[48] Unsurprisingly, when the German U-boat offensive began, the AAF was not ready to meet it.

Nevertheless, the Army still possessed the most capable aircraft, and the Navy's request for Army aviation came as early as December 1941. The War Department selected the 1st Bomber Command for this support. Despite its best-trained unit being on the West Coast, the command eventually provided 50 bombers, including 9 B-17s and a mixture of B-25s and B-26s. These aircraft began patrolling 600 miles out to sea during daylight hours but only conducted two flights daily from three airfields. Unfortunately, antisubmarine reconnaissance was vastly different from anything the Army forces had practiced, and the aircraft initially lacked the detection equipment necessary for hunting U-boats, such as radar or Leigh Lights. The number of aviation assets and their training and equipment proved inadequate against the U-boat threat.

The AAF eventually improved its equipment and methods, although not in time to make a difference. The Service resolved its aircraft and equipment shortfalls through asset reallocation and production. As for training, official Air Force historians note, "Techniques had to be learned through actual experience; and, owing to the urgent need for antisubmarine patrols, the air units were forced to accomplish their training in the course of operational missions."[49] As the 1st Bomber Command began working jointly with the Navy along the coastal frontiers, it became apparent that the rivalries over responsibilities would need to end in favor of unified action.

The Navy Department: Multiple Roads to Unified Action

The Navy Department and Admiral King are the most common scapegoats for historians studying America's *Drumbeat* failures. However, the Navy's inadequacy in countering the U-boat threat early in 1942 did not come from a single source or individual. In the end, a national effort, with many aspects tied to the Navy, was necessary to counter and overcome *Drumbeat*. Adaptation and learning had to overcome material deficiencies, span operational seams, and fill the void between strategic priorities and unit-level tactics. While the Navy's incremental and comprehensive improvements contributed decisively to the defeat of the U-boats, it could not have succeeded alone.

In early 1942, policy divided Service responsibilities, and the U-boats fully exploited the seam in coastal defense. The Navy Department focused on fleet actions and seagoing aircraft. Throughout the interwar years, the Navy prepared for decisive Mahanian-style naval engagements, focusing minuscule aviation budgets on aircraft that directly supported the fleet. Too few aircraft for coastal defense and long-range reconnaissance, like the PBY Catalina, were produced at scale in time to counter the U-boat threat in early 1942. Even then, while seaplanes that existed had valuable endurance, they were too slow to detect and engage a watchful U-boat before being spotted.

The Navy needed the right aircraft to be effective in antisubmarine warfare. The British proved that bomber-type airframes could be lethal against U-boats due to their endurance, operational reach, and ability to deliver a payload over a U-boat before it could crash dive. From the Navy's perspective, Army-Navy integration was essential if they wanted to provide the correct type of aircraft for the antisubmarine mission. At the Navy's request, in March 1942, the Army directed "all Army Air Force units allocated by defense commanders for operations over the sea to protect shipping and conduct antisubmarine warfare."[50] While this was a move toward providing the right aircraft, their numbers were still insufficient, and they were ill prepared to engage small moving targets. As the Navy eventually realized, they needed aircraft and pilots trained in the nuances of antisubmarine warfare, working in concert with a deliberate convoy system to provide adequate protection to shipping.

The Navy's surface fleet was in a similarly poor state of readiness regarding antisubmarine and escort capabilities in January 1942. Most of the Navy regarded antisubmarine warfare as an uninteresting secondary mission. Before the war, most officers believed that a destroyer could easily engage and defeat submarines using a combination of sonar, acoustics, and visual observation. This view led most Navy officers to adopt a hunter-killer mindset regarding enemy submarines. The reality in combat proved that killing U-boats was not so simple. Furthermore, chasing after reports or false contacts drew scarce escort assets away, leaving merchant shipping unprotected.

As the casualties from *Drumbeat* mounted, the Navy actively invested time and research in finding solutions to defeat the U-boat threat. Despite a lack of consensus on the best way to proceed, Admiral King commissioned the Atlantic Fleet Anti-Submarine Warfare Unit in March 1942 to unify analysis, training, tactics, and development efforts through a partnership with the scientific community.[51] King eventually pulled this unit to Washington, DC, where it evolved into the Antisubmarine Warfare Operational Research Group (ASWORG). This group of civilian scientists and military personnel partnered with President Roosevelt's National Defense Research Committee to develop new techniques in antisubmarine warfare and to analyze and assess operations.[52] Studies validated British reports that convoy-centric operations were more successful and began to overcome the hunter-killer mindset. Additional research from ASWORG led to the integration of technology with new search methods using radar and HF/DF systems to maximize the efficiency and lethality of surface and aerial escorts.[53] The outputs of this collaboration with the scientific community began to shape the Navy Department's response to the U-boat threat and to inform effective resource employment.

Nevertheless, the Navy's handling of its destroyer escort resources is another recurring point of historical condemnation. While an apparent misstep in allocation, competing factors make the situation less clear. The Navy's destroyer allocation prioritized fleet and transoceanic troop-carrying convoy protection while fighting what were essentially two wars in separate oceans.[54] These priorities left few destroyers to protect the western Atlantic coastal regions, even when Admiral King knew that Dönitz was deploying U-boats to the area.[55] It is unlikely that more destroyers would have had any measurable impact on shipping survivability in early 1942 without an accompanying coastal convoy system and integrated air cover. Random destroyers using ineffective hunter-killer methods would have been a gross waste of resources. However, trained destroyers operating with transatlantic convoys could provide significant protection to the U.S. troops beginning to surge overseas in 1942. Ultimately, when faced with a limited number of available escorts, Admiral King opted to prioritize protection of "military lives [over] military cargo."[56]

Like the aviation issues, the Navy's escort shortages began in the interwar years. The focus on fleet defense meant deep-water oceangoing destroyers were of utmost importance. The Navy leadership ignored President Roosevelt's prewar prompts to adopt a small craft program for coastal protection.[57] The Navy believed larger oceangoing destroyer escorts were more useful and that the industrial base could quickly build small coastal defense craft if needed.[58] Although not entirely untrue, this mindset proved counterproductive. In wartime, strategic demands focused production capacity on building landing craft while the merchant shipping that needed protection was under a relentless U-boat assault. Ultimately the Navy accepted the President's calls for mass production of small coastal protection vessels and shifted construction priorities accordingly.[59] Still, it was far from an immediate or ideal solution.

That ideal solution, and the culmination of efforts to counter *Drumbeat*, was the deliberate interlocking convoy system. The U.S. civilian maritime posture before 1942 was that of unencumbered coastal shipping spanning from Canada to South America. Unlike the island-bound British, the Americans remained relatively confident in the security of their sea lines of communication; the Navy was strong, and the oceans were vast. For the British, however, it was a matter of national survival. As a result, they were quicker to relearn the importance of a convoy system early in World War II, while the United States did not.

For nearly 3 months after the U-boat offensive commenced, the United States did not entertain the idea of a coastal convoy system. When King asked for recommendations from subordinate sea frontier commanders, they recommended against implementing such a system.[60] Contrary to evidence from the British experience, these commanders believed that an inadequately protected convoy would be at greater risk than dispersed unescorted shipping. That notion cost many lives and many ships.

It was not until April 1, 1942, that Rear Admiral Adolphus Andrews, commander, Eastern Sea Frontier, explored an interim solution. The "bucket brigade" was an ad hoc convoy system using anchorages protected behind nets or mines, established approximately 1 day's sail time apart.[61] Merchants traveled by day when U-boats were less active and sought refuge in these protected anchorages at night. This approach helped slow but did not end losses. Without air cover to force U-boats to dive, the attacks continued. Further steps to improve the convoy system included establishing the Convoy and Routing section under the Chief of Naval Operations, on May 15, 1942, and assigning naval aviation and escort assets directly to Sea Frontiers rather than operational naval commands such as the Atlantic Fleet. Admiral King further simplified command and control by assigning convoy coordination responsibilities to the originating Eastern, Gulf, or Caribbean Sea Frontier commanders.

The final interlocking convoy system turned the tide on shipping losses. Following mediocre success with the bucket brigade system, Admiral King called for an informal board to recommend a more enduring and effective solution. This system, established in late August 1942 and 8 months after the assault began, integrated air, escorts, and shipping movement times, resulting in continuous convoy protection. U-boat success rates dropped off precipitously following implementation.

Although the interlocking convoy system proved effective, it took a national effort and emerged after many failures. Success came from aligning priorities, enhancing organizational relationships, and leveraging effective partnerships with the scientific community. Additional factors, such as improved training, tactics, weapons systems, production, and allocation of the right ships and aircraft, paid dividends. All these efforts intertwined the merchant and military and formed the interlocking convoy system.

Boarding party from Navy destroyer escort USS *Pillsbury* works to secure tow line to bow of captured German submarine U-505, June 4, 1944 (U.S. Navy/Naval History and Heritage Command)

Conclusions and Implications: Unified Action in a Contested Homeland

Many factors contributed to the ineffective U.S. response to Dönitz's U-boat assault from January to July 1942. Petty rivalries, confusion over responsibilities, lack of training and equipment, refusal to listen to Allies, and divergent leadership visions contributed to failures. While primarily tied to establishing coastal convoys, the solutions were just as multifaceted. As the official Navy historian writes, it took cooperation "[between the Allies,] civilian scientists, between foreign policy and military operations, and between the armed forces and the public."[62] Beating *Drumbeat* was unequivocally an example of unified action in defense of the homeland.

Today's strategic environment includes an array of multidomain threats as well as new layers of bureaucracy and seams among alliances, departments, commands, and subordinate headquarters that could easily lead to the same mistakes America saw in 1942. Whether serving at a combatant command or the Department of Homeland Security, examining the Allied response to Operation *Drumbeat* is instructive for contemporary national security professionals attempting to achieve unified action. Planners should seek to internalize and apply *Drumbeat*'s lessons as they prepare for future assaults against the United States that could come in any form, from a radicalized lone wolf to waves of hypersonic missiles. While we will not face Dönitz's U-boats, the timeless lessons learned defeating them should not have to be relearned in the next crisis.

Clearly defined command relationships and responsibilities are essential to maximize integration and minimize gaps that adversaries can exploit. When a major war breaks out, the tools will inevitably be insufficient, and the side that adapts more quickly will win. Close ties among civil society, the private sector, the scientific community, and the military will shorten this adaptation cycle. Allied contributions are critical, especially if the ally or partner has already been fighting the foe for years. Anticipation and preparation are crucial. This last lesson is probably the most important in an era of strategic near-peer competition. In 1942, Germany made enough mistakes that it allowed the United States and its Allies the time and space to react. To prepare for future conflicts, members of the joint force and national security community

should prepare to act in a unified and decisive manner from the beginning. The next time a foe brings the fight to the homeland, there might not be any second chances. **JFQ**

Notes

[1] Karl Doenitz, *Memoirs: Ten Years and Twenty Days*, trans. R.H. Stevens (London: Weidenfeld and Nicolson, 1959), 223.

[2] Dan Van der Vat, *The Atlantic Campaign: World War II's Great Struggle at Sea* (New York: HarperCollins, 1988), 267.

[3] *2022 National Defense Strategy of the United States of America* (Washington, DC: Department of Defense, 2022), 4–5, https://media.defense.gov/2022/Oct/27/2003103845/-1/-1/1/2022-national-defense-strategy-npr-mdr.pdf.

[4] Ibid., 4.

[5] Samuel E. Morison, *History of United States Naval Operations in World War II*, vol. 1, *The Battle of the Atlantic: September 1939–May 1943* (Boston: Little, Brown and Company, 1951), 128.

[6] "Unified Action is a comprehensive approach that focuses on coordination and cooperation of the U.S. military and other interorganizational participants toward common objectives, even if the participants are not necessarily part of the same command or organization." Joint Publication 3-0, *Joint Operations* (Washington, DC: The Joint Staff, January 17, 2017, Incorporating Change 1, October 22, 2018), x.

[7] Doenitz, *Memoirs*, 116, 150.

[8] George W. Baer, *One Hundred Years of Sea Power: The U.S. Navy, 1890–1990* (Stanford: Stanford University Press, 1994), 190.

[9] Doenitz, *Memoirs*, 150.

[10] Williamson Murray and Allan R. Millett, *A War to Be Won: Fighting the Second World War* (Cambridge: Belknap Press, 2000), 240.

[11] Doenitz, *Memoirs*, 188.

[12] Ibid., 184–188.

[13] Ibid., 153–154.

[14] Ibid., 198–202.

[15] Ibid., 202.

[16] Ibid.

[17] Clay Blair, *Hitler's U-Boat War: The Hunters, 1939–1942* (New York: Random House, 1996), 442–444; Doenitz, *Memoirs*, 206.

[18] Doenitz, *Memoirs*, 221–222.

[19] Ibid., 223.

[20] Winston S. Churchill, *The Second World War*, vol. 5, *Closing the Ring* (Boston: Houghton Mifflin Company, 1951), 6.

[21] Doenitz, *Memoirs*, 116.

[22] Winston S. Churchill, *The Second World War*, vol. 2, *Their Finest Hour* (Boston: Houghton Mifflin Company, 1949), 529.

[23] S.W. Roskill, *The War at Sea 1939–1945*, vol. 2, *The Period of Balance* (London: Her Majesty's Stationery Office, 1956), 93; Baer, *One Hundred Years of Sea Power*, 196; Blair, *Hitler's U-Boat War*, 451–452.

[24] George McJimsey, *The Presidency of Franklin Delano Roosevelt* (Lawrence: University Press of Kansas, 2000), 124–125.

[25] Roskill, *The Period of Balance*, 97.

[26] Ibid.

[27] Blair, *Hitler's U-Boat* War, 451; Van der Vat, *The Atlantic Campaign*, 270.

[28] Blair, *Hitler's U-Boat* War, 451; Van der Vat, *The Atlantic Campaign*, 271.

[29] Blair, *Hitler's U-Boat War*, 456.

[30] Roskill, *The Period of Balance*, 96.

[31] Ibid., 98–99.

[32] Ibid., 98.

[33] Van der Vat, *The Atlantic Campaign*, 264.

[34] Ibid., 265.

[35] Roskill, *The Period of Balance*, 97.

[36] Ibid., 98. Emphasis added.

[37] Van der Vat, *The Atlantic Campaign*, 265.

[38] Blair, *Hitler's U-Boat War*, 464.

[39] William Mitchell, *Winged Defense: The Development and Possibilities of Modern Air Power—Economic and Military* (New York: G.P. Putnam's Sons, 1925), xi–xix, 126–127; Thomas H. Greer, *The Development of Air Doctrine in the Army Air Arm, 1917–1941* (Washington, DC: Office of Air Force History, 1955), 44–48.

[40] Harold Sprout and Margaret Sprout, *Toward a New Order of Sea Power: American Naval Power and the World Scene, 1918–1922*, 2nd ed. (Princeton: Princeton University Press, 1946), 104–121.

[41] George H. Monahan, "The Army-Navy Contest for Control of Land-Based Antisubmarine Aviation and the Military Unification Debate, 1942–1948," in *The Sea and the Second World War: Maritime Aspects of a Global Conflict*, ed. Marcus Faulkner and Alessio Patalano (Lexington: University Press of Kentucky, 2019), 273–277.

[42] Monahan, "Antisubmarine Aviation and the Military Unification Debate," 273; Thomas Wildenberg, *Billy Mitchell's War With the Navy: The Interwar Rivalry Over Air Power* (Annapolis, MD: Naval Institute Press, 2013), 70–94.

[43] Monahan, "The Army-Navy Contest for Control of Land-Based Antisubmarine Aviation and the Military Unification Debate, 1942–1948," 273.

[44] Archibald D. Turnbull and Clifford L. Lord, *History of United States Naval Aviation* (New Haven: Yale University Press, 1949).

[45] David E. Johnson, *Fast Tanks and Heavy Bombers: Innovation in the U.S. Army, 1917–1945* (Ithaca, NY: Cornell University Press, 1998), 154.

[46] The Joint Board, *Joint Action of the Army and the Navy* (Washington, DC: Government Printing Office, 1936), 8.

[47] Ibid.

[48] Wesley F. Craven and James L. Cate, eds., *The Army Air Forces in World War II*, vol. 1, *Plans and Early Operations, January 1939 to August 1942* (Washington, DC: Office of Air Force History, 1983), 521.

[49] Ibid., 526.

[50] Morison, *The Battle of the Atlantic*, 241.

[51] Ibid.

[52] Blair, *Hitler's U-Boat War*, 476–479; Montgomery C. Meigs, *Slide Rules and Submarines: American Scientists and Subsurface Warfare in World War II* (Washington, DC: NDU Press, 1990), 54–63.

[53] Morison, *The Battle of the Atlantic*, 219–228.

[54] Charles M. Sternhell and Alan M. Thorndike, *Antisubmarine Warfare in World War II*, OEG Report No. 51 (Washington, DC: U.S. Navy Department, Operations Evaluation Group, 1946); Blair, *Hitler's U-Boat War*, 460.

[55] Ernest J. King, *U.S. Navy at War 1941–1945: Official Reports to the Secretary of the Navy* (Washington, DC: U.S. Navy Department, 1946).

[56] Blair, *Hitler's U-Boat War*, 460.

[57] Morison, *The Battle of the Atlantic.*

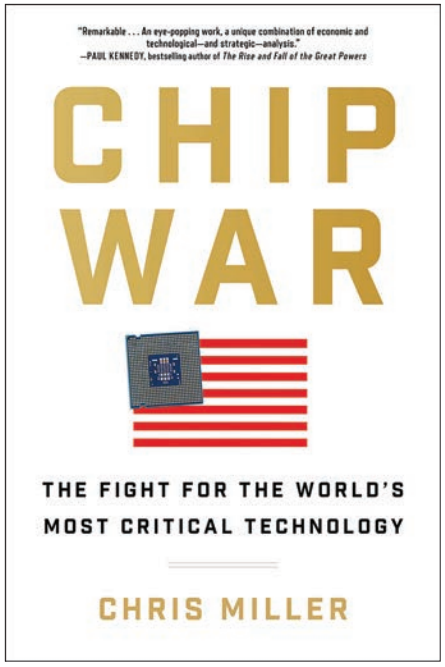
[58] Blair, *Hitler's U-Boat War*, 447–452.

[59] Ibid., 451.

[60] Ken Brown, *U-Boat Assault on America: Why the U.S. Was Unprepared for War in the Atlantic* (Annapolis, MD: Naval Institute Press, 2017).

[61] Blair, *Hitler's U-Boat War*, 525–526.

[62] Morison, *The Battle of the Atlantic*, 203.



Chip War: The Fight for the World's Most Critical Technology

By Chris Miller
New York: Scribner, 2022
464 pp. $24.99
ISBN: 9781982172008

Reviewed by Brennan Gallagher

The Joe Biden administration and the Department of Defense maintain a current policy of "strategic ambiguity" toward the defense of Taiwan. However, President Biden openly stated last year that he would use military force to support Taiwan's defense. Why should the American people and the U.S. Government consider the protection of Taiwan a national security interest? With the withdrawal from Afghanistan only 2 years ago, does the defense of Taiwan satisfy the Weinberger Doctrine, which stipulates that forces not be committed to combat unless in the vital national interests of the United States?

In *Chip War*, Chris Miller, an associate professor of international history at the Fletcher School of Law and Diplomacy at Tufts University, offers a novel justification. Miller delivers an insightful discussion of several conflicts associated with the rise of semiconductors and provides a detailed history of the industry, the tycoons who shaped it, and the strategic importance of Taiwan's role in the current geopolitical environment. He omits the typical arguments that revolve around the defense of democracy and liberalist ideology, instead offering a coherent realist rationale for the defense of Taiwan. Miller's compelling thesis is that the semiconductor industry shapes international politics, the world economy, and the global balance of power. Even though it is unstated, Miller uses the framework of strategic competition between the United States and China to address the criticality of high-end semiconductors.

The highlight of *Chip War* is the exhaustive context about Taiwan's role as a linchpin in the global production of semiconductors, which are used in everything from smartphones to advanced weapons systems. Miller details the history, science, and business leaders underpinning the modern semiconductor industry and how the industry shapes today's global balance of power. For readers with no prior understanding of semiconductors and microchips, Miller illuminates each technological advancement, from William Shockley's theorization of the solid-state valve in 1945 to the divergence of chip types and extreme ultraviolet lithography processes used in modern chip fabrication. Examining the science and complex history of semiconductors reveals why these technologies and manufacturing processes cannot be easily replicated. This substantiates the central claim of *Chip War*: that U.S. interests are tied to Taiwan for high-end semiconductors because the United States cannot quickly redevelop domestic capacity to produce comparable technology. Furthermore, the U.S. strategy of economic offshoring gave the Taiwanese a significant manufacturing lead—a lead that Intel, Micron, or any other U.S.-owned semiconductor manufacturer cannot reclaim anytime soon.

Chip War also strikes a unique balance between history and suspense. Miller walks the reader through several historical conflicts associated with the technological rise of semiconductors, from the U.S.-Soviet struggle to best integrate microchip-enabled technologies into weapon systems after the Vietnam War to the current economic tug-of-war between the United States and China over Taiwan's manufacturing capabilities. Miller deftly weaves in the exploits of several Elon Musk–like revolutionaries in the semiconductor industry with historical context and a surprisingly gripping tale of corporate and national espionage, third-party purchasers, and proprietary data transfers that account for the globalization of semiconductor processes. The semiconductor industry was also a critical facet during the Cold War, with Joseph Stalin and his KGB even going so far as to establish the enigmatic Directorate T, in which the *T* stood for *teknologia*. With capital investment from the Kremlin, Directorate T built a technology-focused city called Zelenograd to replicate the success of Silicon Valley with semiconductors. Miller argues that the Kremlin's strategy of stealing U.S. proprietary technologies never yielded the Soviet Union an advantage. Soviet spies were able to acquire the most advanced microchips from the United States, but they could not replicate the precise manufacturing processes to produce their own microchips. This futile effort cost the Soviets millions of dollars and left their tech sector years behind that of the United States.

Among the unique insights from *Chip War*'s exploration of Cold War–era semiconductor development and espionage is that the many strengths associated with U.S. post–Cold War strategy, including establishing multilateral supply chains in Asia, are causal factors for current shortcomings in the American semiconductor industry. The United States focused on innovation and creativity and pushed manufacturing offshore to support economic interdependence. Silicon Valley focused solely on advancing technologies, not on manufacturing them. Miller argues that U.S.-owned technology companies swapped out their Ph.D.-holding innovative leaders for Ivy League MBA managers to maximize efficiency and increase profit margins.

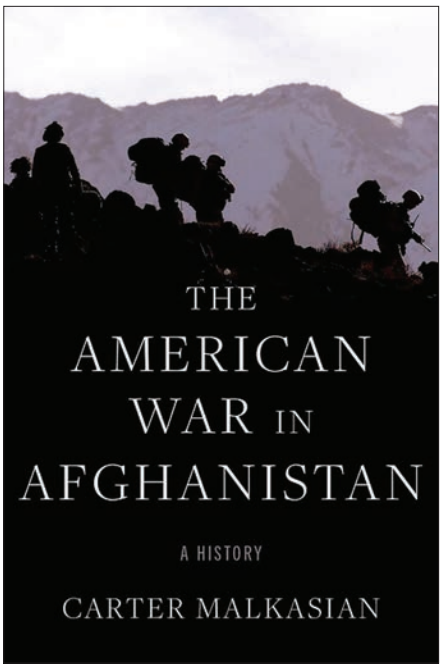
Thus, this short-term beneficial strategy killed America's position as the leader in microchip fabrication. In contrast, today's policies tend toward reshoring and "friend-shoring."

The eccentric tycoons who formed the leadership of the early semiconductor industry highlight the importance of personalities and relationships. Most notably, Miller emphasizes Morris Chang, founder of the Taiwan Semiconductor Manufacturing Company (TSMC), and his role in shaping Taiwan's global position. After the leadership at Texas Instruments did not choose him for CEO, Chang elected to leave the United States to establish TSMC, and it is the presence of TSMC in Taiwan that gives the United States a critical interest in defending the island. In Taiwan, Chang singlehandedly grew the most crucial semiconductor facilities in the world. Unlike a McDonald's franchisee, other countries cannot simply duplicate TSMC's facilities, skilled workers, and exquisite technological processes. This fact is the foundation for Miller's thesis: Taiwan's current semiconductor industry anchors international politics and could decide the balance of military power.

Although Miller writes primarily from an American perspective, he acknowledges the views of Taiwan and other semiconductor-producing countries on the strategic competition between the United States and China. Miller states that Taiwanese leadership "recognizes [the chip industry] as its greatest source of leverage on the international stage." Taiwanese political and business leaders, particularly Chang, built Taiwan's semiconductor industry to be a source of strategic capital. By no accident, Taiwan, a small democratic island about the size of Maryland, produces 90 percent of the world's most advanced semiconductors. This strategic anchoring provides additional value to Miller's claim. However, when addressing the modern conflict, Miller picks a side and assumes the reader will accept the predominance of Western literature on the topic. To this point, Miller could have further explored Chinese identity and Taiwan or acknowledged alternative reasons why President Xi Jinping seeks reunification. He misses an opportunity to provide a deeper perspective on Chinese global and regional hegemonic objectives.

Chip War is a practical and valuable reference for why Americans should care about Taiwanese independence and the surprising ways in which the semiconductor industry ties our security together. It is a must-read for anyone uncertain about why the U.S. Government has a national interest in protecting Taiwan—or more so, the advanced semiconductor facilities—from Chinese reunification. For joint force decisionmakers, *Chip War* offers a compelling argument for fulfilling the Weinberger Doctrine and a valuable window into the future competition over technology and national security. Chris Miller does an outstanding job of capturing the Taiwan dilemma through a novel lens. And he does more than explain why the United States should care about Taiwan; he provides the necessary history and context to justify its defense. **JFQ**

Major Brennan Gallagher, USAF, is a Special Action Officer assigned to the Commander's Action Group at Headquarters U.S. Air Forces in Europe and Air Forces Africa at Ramstein Air Base, Germany.



The American War in Afghanistan: A History

By Carter Malkasian
New York: Oxford University Press, 2021
496 pp. $34.95
ISBN: 9780197550779

Reviewed by Kevin D. Stringer

Carter Malkasian provides a magisterial and balanced account of the American intervention in Afghanistan from 2001 until the early months of 2021. His writing, analysis, and credibility are buttressed by his multiple deployments to the country at both the provincial and district levels as well as by his fluency in Pashto. His roles as senior advisor to the military commander in Afghanistan and later to the Chairman of the Joint Chiefs of Staff further enhance his insights. Since the topic can be approached from a myriad of perspectives, Malkasian's book is likely the first in a long series of historical examinations over the next several decades. His book can serve as the flagship for those who follow, given its comprehensiveness and lucidity. While lessons for future conflicts are abundant, *The American War in*

Afghanistan illuminates three critical areas for understanding U.S. operations and errors in Afghanistan: improper cultural understanding of Afghanistan and the region, avoidable national security policy mistakes, and blunders in decisionmaking by senior leaders.

Malkasian adroitly demonstrates how successive U.S. administrations and their military and civilian leaders failed to understand that the Taliban most represented the Afghan culture's tribal core values, which centered on Islam and resistance to any foreign occupier. This cultural dimension made any Western-supported government suspect. The American tendency to conflate the Taliban with al Qaeda, especially in the period of 2001–2005, compounded this lack of comprehension and resulted in the exclusion of the Taliban in a post-invasion agreement. This exclusion closed what was probably the best chance for an orderly withdrawal after the great 2001 success in what would become an extended conflict. At the regional level, an inability to understand and address Pakistan's historical, cultural, and geopolitical position in a nuanced fashion resulted in creating a permanent sanctuary for the Taliban outside of Afghanistan and a state provider of security force assistance for the Taliban's resistance fighters within Afghanistan.

Similarly, the author reflects on and examines a continuous sequence of avoidable national security policy mistakes—avoidable in the sense that the correct policy decisions would have required the courage to confront skeptical domestic and bureaucratic constituencies. Two major examples illustrate these miscalculations. First, the unwillingness to engage in a firm but direct diplomacy with the Taliban closed opportunities to reach a negotiated settlement under the Bush and Obama administrations. Second, President Barack Obama's restrictive policy on airstrikes from 2014–2015 led to a series of Afghan government defeats, resulting in a downward spiral in morale for the Afghan military that echoed into 2021. Malkasian illustrates this misplaced policy when he notes how Obama White House staff "often asked why the Afghan army needed air support when the Taliban so clearly did not." This approach cost the Afghan military dearly in both blood and spirit.

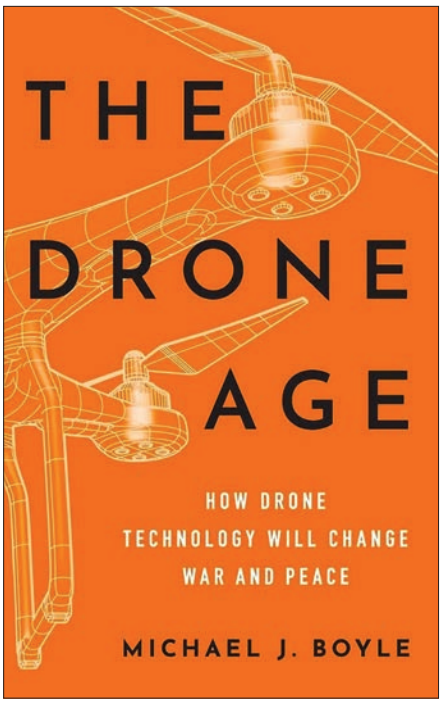
Finally, the author stresses the importance of human agency. On the civilian side, although the decisionmaking of all four involved Presidents contributed to the 20-year imbroglio, the author demonstrates that President Obama oversaw the period with the greatest prospects for an acceptable solution. His missteps were unfortunately manifold. As noted, he failed to negotiate with the Taliban, he did not leverage the troop surge to its fullest, and his communication of a withdrawal deadline instead of relying on a conditions-based troop reduction allowed the Taliban to wait him out.

Interestingly, the author postulates that President Donald Trump had the political courage and will to open negotiations with the Taliban, which provided the only opportunity for a peace with honor. Sadly, President Trump's impatient and erratic policymaking made for a less-than-satisfactory peace agreement. Insightfully, Malkasian notes that whereas the Bush and Obama administrations neglected to engage with the Taliban, the Trump White House negotiated a settlement without the Afghan government, thereby undercutting the legitimacy of the agreement. This method repeated that of the 1973 Paris Peace Accords, which ended the Vietnam War for the United States. The South Vietnamese government was also excluded and overrun by North Vietnam 2 years later.

On the military side, Malkasian critiques fewer of the military commanders but singles out a handful of notables for a closer examination. General Joseph Dunford, former Chairman of the Joint Chiefs of Staff, comes away as the most astute and prescient general of the war. Although Malkasian worked directly for Dunford, he provides a fair assessment of the general's pragmatic approach to the Afghan conflict. Unerringly, General Dunford focused consistently on the main U.S. interest: "protecting the United States from terrorist attacks—with the minimum force." In addition, Dunford studiously avoided the media, which resulted in his not running afoul of the White House. General Scott Miller, the former Joint Special Operations Command leader, who served multiple Afghan tours, receives merited accolades as the "most skilled general of the war." His strategy adjustments to support negotiations, his "black cloud" operational approach (which combined a lethal package of special operations, drones, and intelligence assets to maximize pressure on the Taliban), and his preparation for withdrawal are worthy of future study for a campaign well-executed under trying circumstances.

This book is essential reading for all military officers, national security professionals, U.S. politicians, and relevant academics. While not the final assessment of the conflict, since it does not cover the Joe Biden administration's disastrous withdrawal and evacuation of Afghanistan in August 2021, *The American War in Afghanistan* offers an academic-practitioner's incisive account of the political and military aspects of America's longest war. It provides numerous valuable lessons, not the least of which is a reminder of the human costs of such a foreign intervention. **JFQ**

Colonel Kevin D. Stringer, USA (Ret.), Ph.D., is the Chair of Education for the U.S. Irregular Warfare Center and an affiliated faculty member at the General Jonas Žemaitis Military Academy of Lithuania.



The Drone Age: How Drone Technology Will Change War and Peace

By Michael J. Boyle
New York: Oxford University Press, 2020
387 pp. $19.56
ISBN: 9780190635862

Reviewed by John W. Sutherlin

Timely, relevant, and provocative, Michael J. Boyle's *The Drone Age* makes the point better than any other on the subject: the sky is full of drones, and policymakers, especially those in defense agencies, need to come to terms with this technology.

Boyle is an associate professor of political science at La Salle University (Philadelphia) and a senior fellow with the Foreign Policy Research Institute. *The Drone Age* shows remarkable growth, maturity, and analytical abilities over his earlier effort *Violence After War: Explaining Instability in Post-Conflict States* (John Hopkins University Press, 2014). Both works demonstrate Boyle's capacity to conduct interesting and thorough research while posing critical questions. *The Drone Age* is buttressed by almost a decade of published articles by Boyle in numerous journals addressing drone technology and the effectiveness of drones in war, terrorism, and humanitarian causes.

Woven throughout all of Boyle's research on drones (the book includes almost 70 pages of notes) is the troublesome issue of ethics. It is not the author's intent to resolve all moral issues, but rather to level the playing field of knowledge about drones so that policymakers and citizens alike can begin to bridge the chasm that seems to exist between technology and ethics. Boyle notes that fear of the unknown is often what paralyzes sound judgment. And with drones, fear abounds.

Hidden behind euphemisms like "redistributing risks," "find, fix, and finish," and "precision warfare" is the real-world deployment of killing machines operated remotely. The metaphor of "wargames" where joysticks have replaced triggers is never more precise. The term *drone* (technically an unmanned aerial vehicle, or UAV) evolved from a Northrup company invention based on the Royal Navy (UK) aircraft *Queen Bee*. Boyle provides an exemplary synopsis of the early days of the Wright Brothers to World War I and the interwar period when airplane potential was realized in bombing raids in all theaters of conflict.

He also provides the reader with context along the way, describing many drone technology firsts—for example, the first U.S. President to observe a drone, and the first time a U.S. citizen was targeted and killed by a drone outside of a war zone. Boyle also displays his vast knowledge of drone characteristics, models (such as the Phantom, Predator, Dark Star, and Divine Eagle), and capabilities. For anyone approaching this subject for the first time, this book is a great place to advance your comprehension of an extremely complex subject.

However, Boyle's real contribution is his documentation of the progression from fascination to interest to acceptance to deployment of drones by the Air Force. This movement from novelty to lethality paved the way for military advisors to press Presidents to use drone technology. With limited congressional oversight, Presidents have been able to adjust the criteria for drone deployment in war or security matters from certainty to reasonable certainty. And drones further push the limits of privacy protection and data security when used in a policing context.

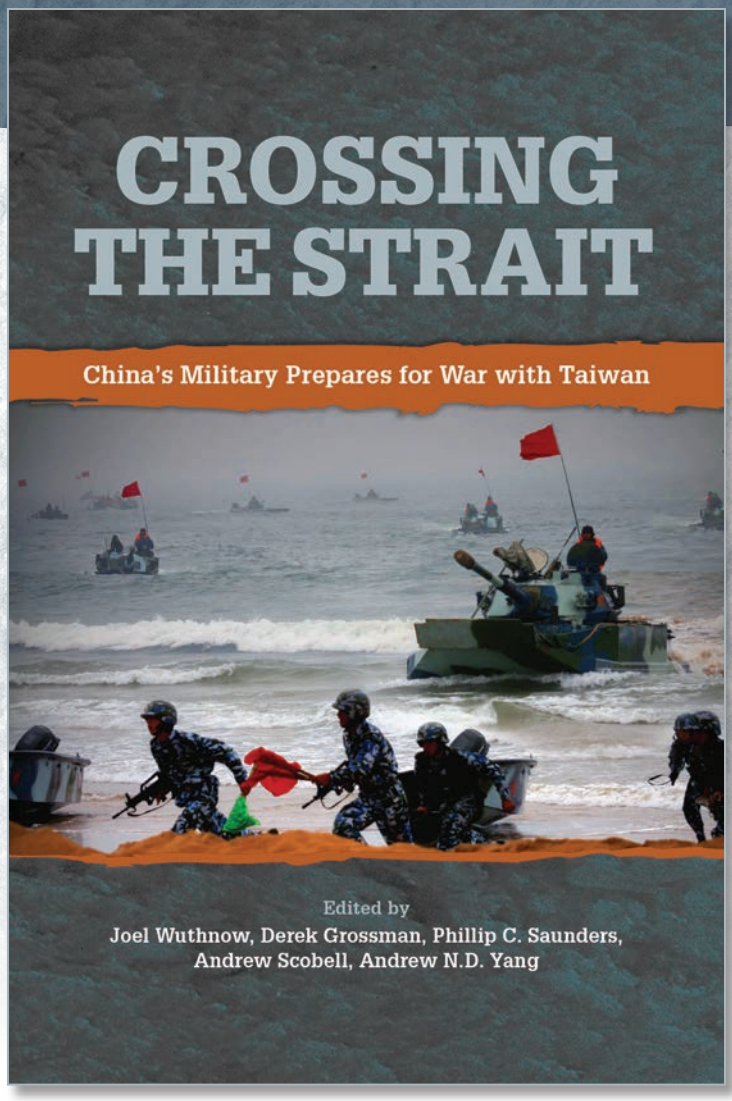
Perhaps one of the most important conclusions Boyle reaches is that drone technology cannot be blamed for increased violence or political instability. Rather, any new technology, including the use of artificial intelligence, can lead conflict to expand beyond initial justification for the use of drones. "Goal displacement" or "mission creep" seem to address the subtitle of the book, *How Drone Technology Will Change War and Peace*. Simply stated, drone technology is already changing war and peace. Casualties and collateral damage by those using drones may be limited, but that does not translate into a more peaceful world with a cessation of all hostilities. In fact, there may not be the same level of deterrence or moral handwringing as found during the Cold War regarding the development or use of nuclear weapons. According to Boyle, the need for some "clear legal and moral understanding" regarding drone technology, development, sale, and use is serious, and a lack of such understanding could "exaggerate the hubris of governments." Coupled with the erosion of democracies worldwide, drone technology could have a cumulative negative impact on peace.

For those in any branch of the joint force, *The Drone Age* is a useful look at this multifaceted issue. The question remains: Will humans abdicate their moral responsibilities to unmanned flying machines? I guess we will see sooner than our moral decisionmaking can adjust. Technology seems to be always one step ahead of our ethics. **JFQ**

John W. Sutherlin, Ph.D., is the Chief Innovation and Research Officer at the University of Louisiana Monroe, which developed one of the first drone programs more than a decade ago.

New from NDU Press

for the Center for the Study of Chinese Military Affairs



Both the U.S. and Chinese militaries are increasingly focused on a possible confrontation over Taiwan. China regards the island as an integral part of its territory and is building military capabilities to deter Taiwan independence and compel Taiwan to accept unification. Based on original research by leading international experts, *Crossing the Strait: China's Military Prepares for War with Taiwan* explores the political and military context of cross-strait relations, with a focus on understanding the Chinese decision calculus about using force, the capabilities the People's Liberation Army would bring to the fight, and what Taiwan can do to defend itself.

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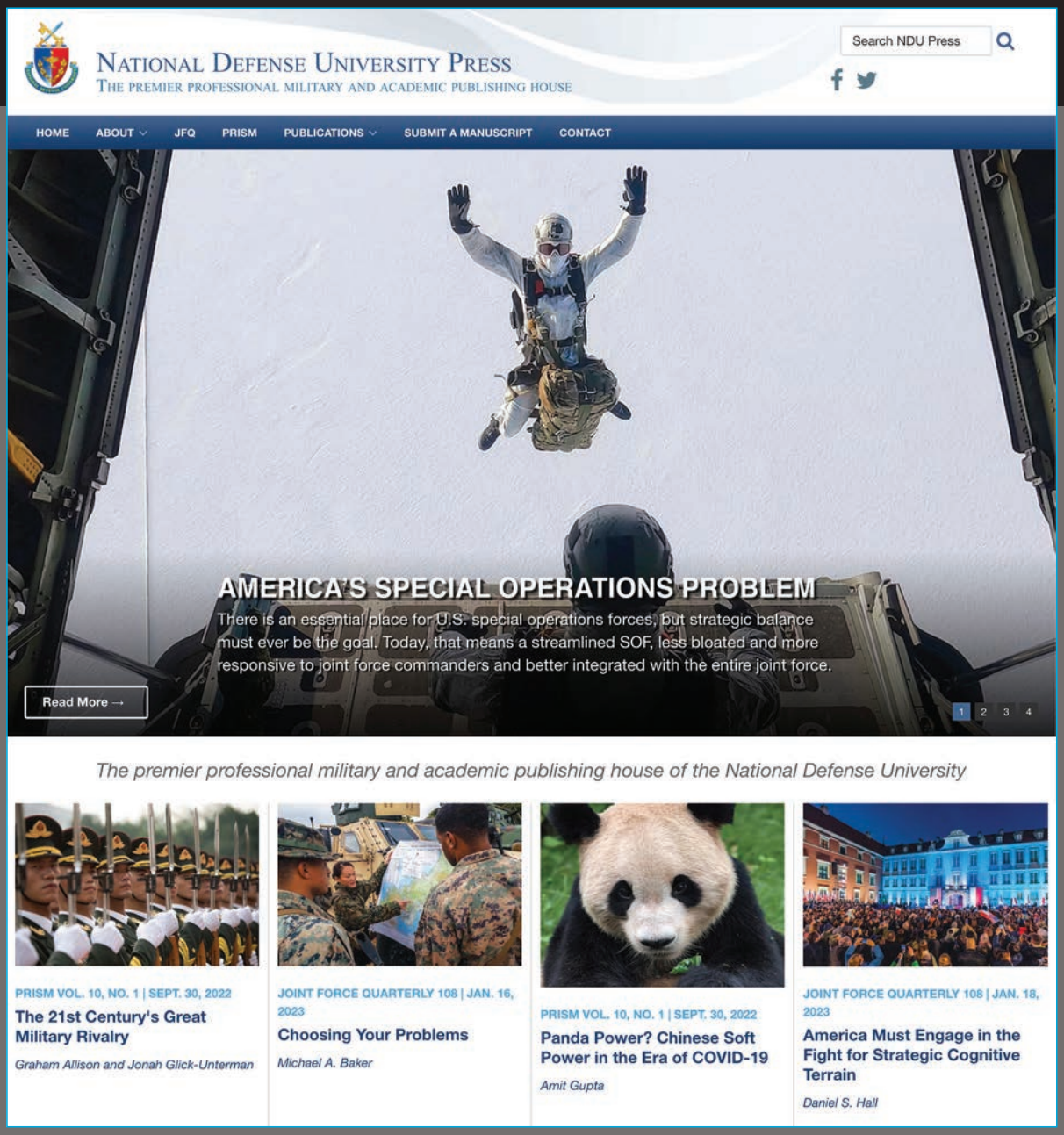

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