JFQ | Joint Force Quarterly

The Intellectual Edge and Future War

DOD Labs for the 21st Century

Megacities and the Joint Force

Cover 2 images (top to bottom): Aviation structural mechanic 2ⁿᵈ class, assigned to Navy Flight Demonstration Squadron "Blue Angels," communicates with other crew chiefs during morning turn operations, El Centro, California, January 6, 2020 (U.S. Navy/Timothy Schumaker); Young officer and his wife sit at dock in San Diego, California, staring quietly at waiting aircraft carrier before he leaves for Korea, ca. 1950 (Courtesy Black Star/U.S. Information Agency/National Archives and Records Administration); Administrative clerk with Installation Personnel Administration Center, Marine Forces Reserve, performs ammo can lifts during combat fitness test, Marine Corps Support Facility New Orleans, December 14, 2018 (U.S. Marine Corps/Tessa D. Watts)

In This Issue

About the Cover

U.S. Marine Corps Chemical, Biological, Radiological and Nuclear Defense specialist Private First Class James Fish, with Headquarters Company, Headquarters Regiment, 1st Marine Logistics Group, conducts training in Level A vapor protection suit during Dismount Recon Sets Kit and Outfits course on Camp Pendleton, California, June 13, 2017 (U.S. Marine Corps/Evan Ahlin)

Letter

To the Editor: The article "Joint Integrative Solutions for Combat Casualty Care in a Pacific War at Sea" by Dion Moten, Bryan Teff, Michael Pyle, Gerald Delk, and Randel Clark (*JFQ* 94, 3rd Quarter 2019) is an insightful piece that brings to light many issues that the Department of the Navy has been diligently pursuing over the past 2 years. In May 2018, the Chief of Naval Operations directed a comprehensive review of Navy Medicine's ability to support the concepts of Distributed Maritime Operations and Expeditionary Advanced Basing Operations with the underlying concept of Fleet Design. This review was not conducted solely under the auspices of medical operational requirements in a distributed maritime environment. Rather, it was developed by leveraging capabilities across surface platforms and the combat logistics force in order to enable a comprehensive approach for medical capabilities across warfighting domains.

The requirements evaluation identified a necessary paradigm shift for the delivery of medical care within an austere and distributed maritime environment. As the article mentions, the standard of the "golden hour" is no longer achievable in the future fight. The velocity-based capabilities that multidomain supremacy allows will not be granted in a Great Power competition. Instead, a capacity-driven network challenging the traditional continuum of care must be developed. The evaluation demonstrated many opportunities to develop capabilities to enable the warfighter. Some of the key findings that the Navy is currently developing are first responder care, patient movement, forward resuscitative care, and afloat theater hospitalization.

First Responder. The first responder is vital to survivability within a distributed environment. The Navy and Marine Corps recognize this and are currently instituting tactical combat casualty care for all Servicemembers and developing what prolonged maritime care will look like, both in equipment packages and training.

Patient Movement. A consistent gap in the Navy is the ability to treat and move patients via dedicated medical evacuation. Traditionally, the Navy and Marine Corps have leveraged Army and Air Force capabilities to treat and move patients around and out of the battlefield. A contested distributed maritime environment presents unique constraints for those traditional partnerships. As the article mentions, the Expeditionary Fast Transports (EPFs) have been identified as a viable solution for movement and treatment of patients, and design concepts are under way.

Forward Resuscitative Care. A great deal of analysis has been done that demonstrates the necessity of damage control surgery and forward resuscitative care as close to the point of injury as possible to increase survivability rates. Allowing greater distribution of Role II afloat both through the diffusion of Role II light maneuver in the fleet—as well as integration of surgical capabilities on the EPFs to increase surgical capacity, while also holding and moving the patient—is key.

Afloat Theater Hospitalization. The ability to maneuver and distribute over the significant distances of the Pacific while providing accessible capacity and capability challenge the current construct of USNS *Mercy* and *Comfort* hospital ships. The evaluation found a need to have smaller, more agile vessels that are able to be dynamically employed throughout the theater to support a wider range of warfighting missions. The Navy is currently reviewing alternatives to support the current and future demands.

As the demands and complexity of war continue to evolve, it is imperative that the Military Health System leverages its strengths and partnerships to truly enable the warfighter. An ongoing conversation and exchange of ideas is key to ensuring optimization of our resources across warfighting domains. **JFQ**

Rear Admiral Bruce Gillingham
U.S. Navy Surgeon General

and

Lieutenant Commander Kathleen Dagher
U.S. Pacific Fleet Medical Planner

CALL FOR ENTRIES

for the

2020 Secretary of Defense and 2020 Chairman of the Joint Chiefs of Staff

Essay Competitions

Are you a professional military education (PME) student? Imagine your winning essay published in a future issue of *Joint Force Quarterly*, catching the eye of the Secretary and Chairman as well as contributing to the debate on an important national security issue. These rewards, along with a monetary prize, await the winners.

Who's Eligible? Students, including international students, at U.S. PME colleges, schools, and other programs, and Service research fellows.

What's Required? Research and write an original, unclassified essay on some aspect of U.S. national, defense, or military strategy. The essay may be written in conjunction with a course writing requirement. Important: Please note that entries must be selected by and submitted through your college.

When? Anytime during the 2019—2020 academic year. Students are encouraged to begin early and avoid the spring rush. Final judging and selection of winners take place May 2020, at NDU Press, Fort McNair, Washington, DC.

For further information, see your college's essay coordinator or go to:
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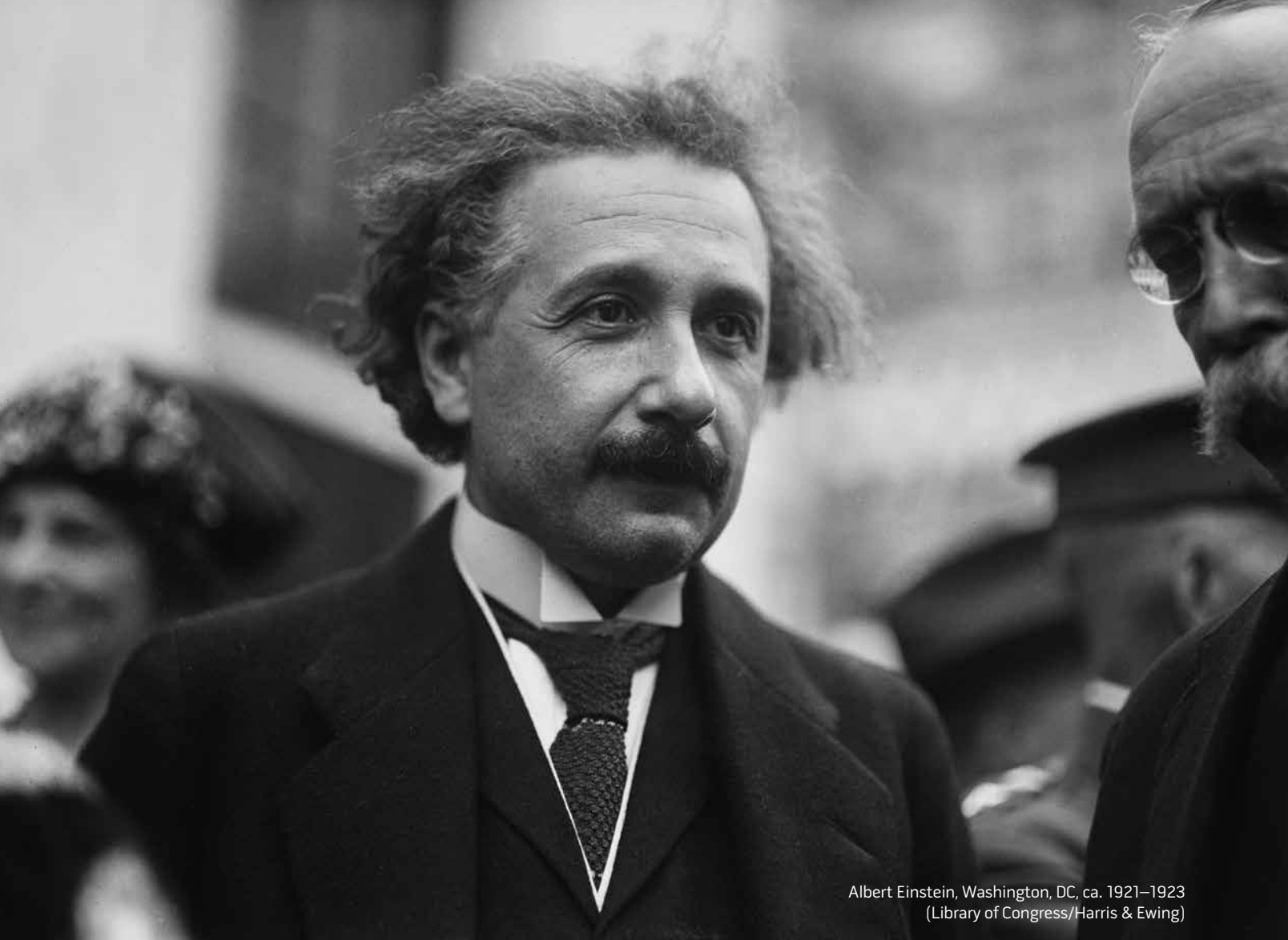
Albert Einstein, Washington, DC, ca. 1921–1923
(Library of Congress/Harris & Ewing)

Executive Summary

One of the great efforts undertaken every year is the mission of joint professional military education (JPME) faculty members to advance the critical and creative thinking skills of their students. Why and how do they do this? For the why, I turn to one of the greatest minds we have known, Albert Einstein, who in 1955 stated to *Life*, "The important thing is not to stop questioning. Curiosity has its own reason for existing. One cannot help but be in awe when he contemplates the mysteries of eternity, of life, of the marvelous structure of reality. It is enough if one tries merely to comprehend a little of this mystery every day." It seems that a key to genius is in constantly seeking out answers even to questions that we may already know the answers to.

In my JPME teaching experience, I believe many students matriculate thinking they are already successful thinkers. But what happens over that year tends to surprise them and, to the satisfaction of their faculty, is the real secret to joint force sustainment. Students are challenged at every turn by the readings as well as their faculty and classmates, whether they openly admit so or not. The seminar discussions, problem-solving, paper writing, presentations, travel to familiar and new places, and interacting with senior leaders all work together to slowly and irreversibly place each eventual graduate on a different and perhaps higher intellectual plane.

What happens in the classrooms is often quite remarkable and difficult to explain to an outsider, but essentially the faculty asks students to question everything in order to better understand the world they live in. Some might ask, "Aren't military personnel just supposed to accept the orders of their superiors and do as they are told?" The answer to such a question—"It depends"—is exactly why

we need such educational experiences. American history is replete with examples of leaders deciding to go against their training and mission brief when circumstances demand a less-than-obvious approach to solving a problem.

Such is the fundamental separation between what has happened that can be documented and what may happen that has not. Successful fighting forces in the past have learned to adapt and overcome, and PME classrooms are one of the key places where that ability is developed for those who are headed to our highest positions of responsibility in uniform. The best are expert thinkers who can also express their thoughts in such a way as to convince others to follow as needed, adapt when necessary, but always value the process of learning to become a better thinker. It starts when one questions everything with the end of learning how to fight the next war better than the last. This issue of *Joint Force Quarterly*, the first of 2020, will certainly require you to ask questions as the authors try to provide insights to the future in the decade ahead.

Leading the Forum, one of the Australian Army's leading thinkers, Mick Ryan, discusses efforts to advance intellectual development within the ranks to meet what he describes as a new industrial revolution. The problem of modeling warfare in all its forms has been an equally challenging problem, so when an author such as KC Reid offers a way to develop a unified model of warfare, we take notice. While reports of decreased funding for research and development have made news lately, the directors of the U.S. military's laboratories, William Cooley, David Hahn, and John George, provide a valuable update on what advances we can expect from their work and what they recommend other national research efforts can do to keep the United States out front technologically. As advancements in technology arrive in the battlespace, arguing against going too far down the mission command road, Trent Lythgoe suggests that fighting forces need to become less hyper-decentralized in terms of command relationships.

In JPME Today, we offer two articles that are both classic parts of the JPME experience, strategic thinking and the nature of war, but suggest cutting-edge ideas on how we approach the work. U.S. Army War College professors Andrew Hill and Stephen Gerras offer their approach on how strategic leaders should ask questions. As long as there have been staff and war colleges, Carl von Clausewitz's writings have been a part of the mix of military and political science theory, which of late has added systems and systems theory as a focus of research and planning approaches. From the Marine Corps War College, Brian Cole takes us once again to the Baron's Trinity to understand war as a complex adaptive system.

Our Commentary authors address two different subjects, both with important strategic implications. Steven Hendrickson and Riley Post have developed a simple answer on how best to apply operations analysis to special operations. Ryan Tice tells us that we should get serious about the growing likelihood of Great Power competition in the Bering Strait, as he lays out the case for a permanent joint task force in the area.

Features contains a diverse set of discussions about the role of chaplains on the modern battlefield, the Vietnam air war, the revival of al Qaeda, and land force projection across the shore. Seeing chaplains as valuable in a range of tasks beyond the individual spiritual needs of the military, David Leonard describes how commanders can place them where regular troops lack the skill set to succeed particularly in interagency humanitarian operations. At the other end of the conflict spectrum, Robert Angevine takes us to the skies over Vietnam 50 years ago to offer a lesson in adaptation during war. As today's conflicts have evolved since 9/11, Jami Forbes writes that al Qaeda is regaining areas of influence in places we have already fought them and gaining ground in new places we have not, at least not yet. As I have often said to my students over the years, war is a physics problem when it comes to force projection. Brian Molloy agrees, and he discusses how the U.S. Army needs

to approach logistics in the antiaccess/area-denial problem set in the Pacific.

As is always the case with our Recall articles, the past has informative experiences for the present-day warrior to know and understand. Ben Ho takes us to the Battle of the Bismarck Sea in the South West Pacific Area to discuss how gaining maritime superiority was a game of antiaccess/area-denial long before it became a modern catch phrase. In addition, we have recently shifted our book review editor responsibilities to one of National Defense University's brightest rising research associates, Brett Swaney, who has selected three reviews of important books. Along with our Joint Doctrine Update, we bring three articles on how the joint force, joint functions, and doctrine will be adapted to deal with megacities, artificial intelligence, and interagency operations. Looking at a hole in our joint doctrine in dealing with failed megacities, Matthew Metzel, Todd McCubbin, Heidi Fouty, Ken Morris, John Gutierrez, and John Lorenzen suggest changes to Joint Publication 3-29, *Foreign Humanitarian Assistance*, as well as other areas for future joint doctrine focus. Brian Ray, Jeanne Forgey, and Benjamin Mathias help us work out the range of likely impacts of artificial intelligence on joint warfighting. And one of our most prolific joint doctrine authors, George Katsos, returns with an interesting view on interagency operations.

As you can now see, critical and creative thinking leads to writing and discussions on a wide range of issues confronting the joint force and its partners. Remember to pose questions as Einstein suggested. Then write down what you think will make the joint journey more interesting and ultimately successful. When you do, we will be here for your best questions. JFQ

WILLIAM T. ELIASON
Editor in Chief

Ensign observes Israeli INS *Lahav*, left, INS *Sufa*, center, and USNS *Leroy Grumman* from USS *Carney* during exercise Reliant Mermaid 2018, Mediterranean Sea, August 7, 2018 (U.S. Navy/Ryan U. Kledzik)

The Intellectual Edge
A Competitive Advantage for Future War and Strategic Competition

By Mick Ryan

> *In the early twenty-first century, the train of progress is again pulling out of the station—and this will probably be the last train ever to leave the station called Homo Sapiens. Those who miss this train will never get a second chance. In order to get a seat on it you need to understand twenty-first century technology, and in particular the powers of biotechnology and computer algorithms. . . . [T]hose left behind will face extinction.*
>
> —Yuval Noah Harari

Yuval Harari's warning about the future of human development in *Homo Deus* provides a clarion call for those who lead the intellectual development of future military leaders.[1] Harari and others such as Heidi and Alvin Toffler, Nick Bostrum, Andrew Krepinevich, T.X. Hammes, and Ian Morris have speculated about the potential future impacts of technology on humans and war.[2] While these visions of the future contain a wide array of predictions, they pose useful questions to inform future intellectual development within military institutions.

The world is potentially now at the start of a new industrial revolution. This revolution is underpinned by connectivity, biotechnology, and silicon-based

Major General Mick Ryan, AM, is Commander of the Australian Defence College.

technologies that include various forms of narrow artificial intelligence. Described as the "Fourth Industrial Revolution" by World Economic Forum founder Klaus Schwab, it is disrupting business, entertainment, communication, transportation, and national economies.[3] Like previous industrial revolutions, it is almost certain that this one will also change how society and its constituent communities develop and interact. Scientific advances, commercialization, and the diffusion of innovation are social processes that unfold as people develop and exchange ideas, values, interests, and social norms.[4]

The transformations that sweep through society will inevitably result in changes to how governments evaluate national security. As Kenneth Payne recently noted, "For encultured humans, technology, warfare, and society are dynamically linked."[5] This means that change will also cascade into how military organizations conduct military operations for the new era.

The impact of the new technologies of this revolution on military institutions has been explored by a range of authors, including Amir Husain, Williamson Murray, Paul Scharre, Sean McFate, and Hammes.[6] However, as McFate has recently written, "Warfare evolves before fighters do."[7] Therefore, if military institutions are to optimize the employment of these new technologies, investments in new military concepts and organizational approaches will have to be made. These evolved ideas and organizations must be underpinned by an evolved approach to the intellectual preparation of future military leaders.

The Military and Education: An Evolved Intellectual Edge

Over the next two decades, most Western militaries will be smaller than their adversaries, with a declining technological advantage. Compounding this challenge, they will fight in a new hyper-technical, transregional, and increasingly disaggregated physical-cyber operating environment. Increasingly dominated by more lethal weapons systems and the manifestations of a convergence of information and biotechnologies, the future conflict space will

largely be a technologically level playing field. Recent publications, such as those by the Commission on the National Defense Strategy for the United States,[8] have described how the technological edge that has been the preserve of Western military institutions for several centuries has declined.[9]

As General Joseph Dunford described, the pace of strategic and technological change is increasing.[10] Where military forces do generate capability advantages, they are likely to be more short-lived than has been the case in previous eras.[11] Western military institutions must therefore evolve additional sources of advantage. Lacking an enduring technological edge, and often without recourse to the massed forces of previous eras,[12] the only other option is an intellectual edge.[13]

This intellectual edge manifests in two different, but interconnected ways. The first is individual professional mastery. The intellectual edge for an individual is the capacity for that person to creatively outthink and outplan potential adversaries. It is founded on the broadest array of training, education, and experience that can be provided by institutions, as well as a personal dedication to continuous self-learning over a long period of time. Increasingly, this intellectual edge for an individual will be underpinned by cognitive support through human–artificial intelligence teaming. Increasingly, synthetic biology and artificial intelligence must be used in concert with human intellectual power to general advantage. Frank Hoffman has described this as "System 3" thinking, where the nascent field in the collaborative application of biological and machine intelligence will increasingly be central to the development of the intellectual edge in military personnel.[14]

The second manifestation of the intellectual edge is institutional. While having the intellectual edge in leadership and planning is vitally important, so too is a collective, institution-wide intellectual edge. This will allow groups at different levels to effectively harness the disparate and diverse intellects of its individuals to solve complex institutional problems in the short, medium, and long term. This institutional intellectual edge must be

applied to the challenges of force design, operational concepts, logistics, network security, the integration of kinetic and nonkinetic activities, as well as personnel development and talent management.

This intellectual edge must be constructed around the development of an ultra-professional intellectual military culture—from deployed forces to education and training institutions to strategic planning organizations. People in this system must be able to contextualize, plan, decide, act, and adapt faster and more successfully relative to adversaries.[15] The best within this evolved culture—the elite military thinkers—must be celebrated and nurtured in the same way as we currently celebrate and value elite athletes. Institutional incentives to encourage this elite thinking must be reinforced and, potentially, promotion pathways and talent management systems adapted.

Excellence in attaining military and broader national security outcomes in the 21st century will be achieved by those institutions that are able to develop their personnel in a way that supports them in the intellectual edge while applying this in a unified way to institutional problems. The ultimate expression of institutional intellectual edge will be the capacity to either win without fighting in a strategic competition or be able to apply its strengths to win any fight that it must engage in. To build this intellectual edge, military institutions will also need to appreciate two additional contextual elements that will influence the development of this evolved edge.

The first element is continuity in the wider security environment. Regardless of the disruption caused by various elements of the future environment, there are also likely to be some enduring characteristics. One is the likelihood that humans will still wage war on each other. Another is that the nature of work undertaken by humans, and the structures of military organizations, will continue to evolve as they have over millennia. It is important to understand this continuity because it provides the context that future military leaders must prepare for.

A second element is the overwhelming impact that the convergence of

information and biological technologies will have. For thousands of years, military leaders have applied their intellect and the tools of war to achieve their desired objectives. But regardless of the era, these military leaders have used machines and other tools as one part of their overall approach to win battles, campaigns, and wars. The world is now at the precipice of an era where humans and machines will work in an entirely symbiotic way. The rapidly evolving capabilities of artificial intelligence hold the promise of supporting better decisionmaking by military and political leaders. For the first time in history, humans and machines may be truly equal partners in many of the cognitive aspects of war and strategic competition. Evolving this new intellectual edge requires a range of institutional adaptations in the development of military personnel.

A Design for Future Intellectual Development

Building an evolved intellectual edge will demand a range of new and evolved approaches. But it is, at its heart, about people. Military personnel must be able to expand their skills and focus on the intellectual capacity to apply themselves to a wide array of activities that they may not have been prepared for. This requires a whole-of-enterprise approach to applying the right level of resourcing and focuses on training servicemembers who are ready for contemporary and future challenges, applying the military art and science within a broader national security establishment. The design for how this system operates within a larger military enterprise, however, must be driven by strategy. This strategy should draw its desired goals from the capability objectives of military organizations for the next two decades and will rely on a range of institutional, educational, and technological elements.

A Strategic Vision. The development of military personnel, through education, training, experience, talent management, and other mechanisms, provides the essential "software" of a military institution.[16] Therefore, an institutionally endorsed view of future military personnel—especially their leaders—is required.

This should form part of a more expansive view of future military capability and national security policy. In the U.S. context, the description of professional military education (PME) as "stagnant" in the recent National Defense Strategy provides a starting point and driving force for strategic reform.[17]

Strategic Engagement. Engagement among like-minded military institutions, different Services, and like-minded nations must continue to evolve and embrace an enhanced sharing of ideas. An array of concepts and designs in military education is being shared online, but this is not always replicated among institutions. Enhanced sharing of best-practice curricula, outstanding academic personnel, new learning approaches, and new military theories must be one of the cornerstones of the future approach to Western military alliances.

Strategic engagement must, however, extend beyond the sharing and exchange activities of like-minded institutions. Engagement with civilian universities is critical. In these civilian institutions reside centuries of learning across the humanities and sciences. Civilian universities represent a resource that can provide intellectual rigor to further hone skills for military personnel at the undergraduate and postgraduate levels. They could also provide viewpoints on national security that might differ from officially sanctioned policy, forcing military students to more carefully analyze the shibboleths of contemporary national security policy.

Futures, Education, and Adaptation. The curriculum of military institutions must be informed by an institutional view about the future environments that its people will operate in. Military education must form closer and more substantial linkages with organizations—in the military and beyond—that undertake futures work. There should be a transparent and logical pathway from informed views of the future and type of intellectual development received by the future joint officer. To retain relevance and remain at the forefront of best practices, the PME system must also complement its future work with mechanisms for adaptation. The system requires formal mechanisms to identify the

need for change, make informed decisions about change, and enact those changes in a timely and efficient way.

Continuous Career-Long Learning. Future military institutions require a continuum with functional descriptions of what future military leaders must be capable of at various stages of their professional journeys. An institutional curriculum must underpin this. It should not, however, be an industrial-age production line. It should form a "backbone" around which individually tailored intellectual development might be constructed. Williamson Murray and Allen Millet, in their examination of interwar military innovation, found that military leaders were better able to lead and invest in innovative ideas and technologies when they had undertaken continuous learning throughout their careers.[18] Continuous learning has other important outcomes as well.

First, a more holistic approach to continuous learning should have the added benefit of assisting in talent and career management systems of military institutions. Second, it permits a series of "small bets" with more course corrections on the types of learning outcomes needed by military personnel. This contrasts with current approaches where reliance on a limited number of learning interventions many years apart means institutions make "larger bets" on preparing their people for future challenges.[19] A mixture of short and long residential learning opportunities, blended with formal online learning and curated hubs for self-learning, is the optimal approach for future continuous learning.

Guided Self-Development in a Global PME Ecosystem. Formal education in military institutions cannot hope to cover all the needs in the intellectual development of contemporary or future joint officers. Therefore, formal education must be supplemented through self-study.[20] This self-study might be most effective if it is complementary to formal educational experiences. The implication is that military organizations should provide curated resources that future joint officers might "pull down" from their institution—using Internet or other sources—to supplement

Marine rolls die during game of war-themed strategy board game Memoir '44 on Camp Schwab, Okinawa, Japan, December 10, 2019 (U.S. Marine Corps/Timothy Hernandez)

their professional development. These curated hubs of professional development material can complement informal resources, be widely available across alliance partners, and be changed quickly to adapt to changes in the strategic environment or in technological developments. They might therefore comprise a resource that has a shorter adaptation cycle than military schools and academies.

Skill, Re-Skill, Repeat. The future environment is one where the construction and destruction of occupations and industries will occur more quickly than in previous industrial revolutions. As Harari has recently predicted, "Just as in the 20th century governments established massive education systems for young people, in the 21st century they will need to establish massive re-education systems for adults."[21] Therefore, future military institutions will need to possess a system that is built around skilling and rapidly re-skilling their personnel as technology and strategic

circumstances change. Current military organizations may have to re-educate entire generations of military leaders in the next 5 to 10 years because of the profound impact of these new technologies and because of the historically unprecedented acceleration in technological change.[22]

Enhanced Technological Literacy. A range of advanced technologies, such as hypersonics, space-based capability, information technologies, and biotechnology, is starting to rapidly spread through military organizations. But if institutions are to effectively use these systems, they will need informed users. Military organizations will therefore need more than just deep technical experts in the development of algorithms and the design of artificial intelligence for military systems. As a recent United Kingdom government report describes, skilled workforces using new technologies should be a mix of those with a basic understanding, more informed users, and specialists

with advanced skills.[23] Over the coming years, at almost every rank level, military personnel will require basic literacy in a spectrum of new and disruptive technologies.[24] This must include knowledge of its application, how to provide a level of assurance and quality control, and how to optimally combine it with new concepts and human organizations at every level.[25]

Accessibility. Much of contemporary joint education and individual training is delivered in a residential setting. While this provides for good learning outcomes, it results in only a small percentage of military personnel gaining access to joint learning opportunities. Military institutions must break down geographic, technical, and cultural barriers to create a truly connected force where education is continuous and self-sustaining. The system to develop future military leaders should be accessible to military members and defense civilians, regardless of role, rank, or location. There is much that military

Students of Officer Candidate School class 01-20 are first to test new Conning Officer Virtual Environment cart system at Officer Training Command in Newport, Rhode Island, September 18, 2019 (U.S. Navy/Darwin Lam)

institutions can learn in this area from the civilian education sector, while also leveraging efforts such as the Advanced Distributed Learning Initiative.[26]

Innovation in Delivery and Learner Engagement. The pace of change in technology is also disrupting longstanding approaches to training and education. Technology has enabled a more "connected" approach to learning. This is resulting in a gap between older (or heritage[27]) institutional education models and the newer digitally enabled approaches. New learning approaches are now available for students who may have been excluded from existing models in the past.

Recent digital-age technologies will underpin this more advanced approach to learning. The bio-info technology revolution offers the military profession multiple pathways to enhancing the intellectual capacity of individuals and institutions. Artificial intelligence may significantly change the way militaries educate their personnel and underpin an expanded range of potential activities to support the education of military personnel.[28] Biotechnology, particularly neurotechnology, offers capabilities such as cognitive enhancement, implanted memory, and the use of expanded knowledge of the brain to inform better artificial intelligence algorithms.[29] The

impact of these technologies on learning and developing future military leaders might be an area of collaborative innovation among Western military institutions.

But not all evolutions of learning approaches need to be based on advanced technologies. Wargaming is an effective method of applied learning that has a long history in military institutions. The use of wargaming to allow future leaders to visualize the preparation for, and conduct of, military operations is a necessary component of preparing future joint officers. These wargames need not be sophisticated computer games. Simple desktop games are often effective at engaging students and providing additional outcomes such as collaboration and influence skills.[30] While the requirement to include integrated influence operations and space capabilities might be new, wargaming methodologies can be evolved to retain relevance for future learning needs.[31]

T.X. Hammes notes that "despite assertions to the contrary, war is not disappearing. If anything, it is increasing in frequency and duration. Armed conflict will remain central to relations among states and nonstate actors. It will remain a contest of human wills and thus the domain of uncertainty, compounded by human passions, friction, and fog.

Technology will not bring clarity or brevity."[32] The global security environment continues to evolve. Warfare is becoming more technologically complex while retaining its human essence. Military organizations must have the capacity to deal with future threats that the application of technology and mass will not solve. Only through thinking better and building the intellectual edge in servicemembers and institutions will they evolve an improved capacity for securing future national security objectives. While many of the skills required may change, and the human composition of these forces continues to evolve, the intellectual preparation of the military for the demands of future conflict is an enduring requirement.

Military organizations across the globe now find themselves with a range of new circumstances affecting how their operations are conceptualized and executed and how their people are recruited, trained, and educated. In developing an intellectual edge in their future leaders in these new circumstances, military forces must think and act anew.[33] **JFQ**

Notes

[1] Yuval Noah Harari, *Homo Deus: A Brief History of Tomorrow* (New York: HarperCollins, 2017), 319.

[2] Alvin Toffler and Heidi Toffler, *War and Anti-War: Making Sense of Today's Global Chaos* (New York: Warner Books, 1995); Nick Bostrum, *Superintelligence: Paths, Dangers, Strategies* (Oxford: Oxford University Press, 2014); Andrew Krepinevich, *7 Deadly Scenarios: A Military Futurist Examines War in the Twenty-First Century* (New York: Bantam Books, 2010); and T.X. Hammes, "The Future of Conflict," in *Charting a Course: Strategic Choices for a New Administration*, ed. R.D. Hooker, Jr. (Washington, DC: NDU Press, 2016), available at <https://inss.ndu.edu/Portals/68/Documents/Books/charting-a-course/charting-a-course.pdf?ver=2016-12-08-154300-120>. Ian Morris explores the impact of technology and the potential "singularity" for its impact on humans and future strategy in *Why the West Rules—For Now: The Patterns of History and What They Reveal about the Future* (New York: Farrar, Straus, and Giroux, 2010), 592–596.

[3] Klaus Schwab, *The Fourth Industrial Revolution* (New York: Crown Business, 2016).

[4] Ibid., 91.

[5] Kenneth Payne, *Strategy, Evolution and War: From Apes to Artificial Intelligence* (Washington, DC: Georgetown University Press, 2018), 13.

[6] Amir Husain, *Hyperwar: Conflict and Competition in the AI Century* (Austin, TX: Spark Cognition Press, 2018); Williamson Murray, *America and the Future of War: The Past as Prologue* (Stanford, CA: Hoover Institution Press, 2017); Paul Scharre, *Army of None: Autonomous Weapons and the Future of War* (New York: Norton, 2018); Sean McFate, *The New Rules of War: Victory in the Age of Durable Disorder* (New York: William Morrow, 2019); and T.X. Hammes, "Cheap Technology Will Challenge U.S. Tactical Dominance," *Joint Force Quarterly* 81 (2nd Quarter 2016), 76–85.

[7] McFate, *The New Rules of War*, 250.

[8] *Providing for the Common Defense: The Assessment and Recommendations of the National Defense Strategy Commission* (Washington, DC: U.S. Institute of Peace, 2018), viii.

[9] This is brilliantly examined in Morris, *Why the West Rules—For Now*.

[10] "Gen. Dunford's Remarks at the National Defense University Graduation," Fort Lesley J. McNair, Washington, DC, 2016, available at <www.jcs.mil/Media/Speeches/Article/797847/gen-dunfords-remarks-at-the-national-defense-university-graduation/>.

[11] The term *transient advantage* is used in a 2103 article on competitive strategy. See Ruth Gunther McGrath, "Transient Advantage," *Harvard Business Review* (June 2013), available at <https://hbr.org/2013/06/transient-advantage>.

[12] Although, as Hammes has written, mass in the 21st century is potentially generated through the large-scale use of unmanned air, ground, and sea capabilities. See Hammes, "The Future of Conflict," 29.

[13] I have previously written on the rationale for an intellectual edge in *An Australian Intellectual Edge for Conflict and Competition in the 21st Century*, Centre of Gravity Series (Canberra: Australian National University, 2019), available at <http://sdsc.bellschool.anu.edu.au/experts-publications/publications/6825/australian-intellectual-edge-conflict-and-competition-21st>; and "The Value Proposition for Developing a Future Intellectual Edge," *The Forge*, November 28, 2018, available at <https://theforge.defence.gov.au/publications/value-proposition-developing-future-intellectual-edge>.

[14] Frank Hoffman, "Healthy Skepticism about the Future of Disruptive Technology and Modern War," *Foreign Policy Research Institute*, January 4, 2019, available at <www.fpri.org/article/2019/01/healthy-skepticism-about-the-future-of-disruptive-technology-and-modern-war/>.

[15] Similar logic was applied in development of the Australian army professional military education (PME) strategy in 2017. I am indebted to Lieutenant Colonel Tom McDermott in particular for his contributions.

[16] On the need for the "software" in a military institution, see Dima Adamsky, *The Culture of Military Innovation* (Stanford, CA: Stanford University Press, 2010), 142.

[17] *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), 8.

[18] Williamson Murray and Allen R. Millet, eds., *Military Innovation in the Interwar Period* (New York: Cambridge University Press, 1996), 327.

[19] For example, 1 year at command and staff college and 1 year at a war college.

[20] For an example of this global ecosystem, the Grounded Curiosity Web site has a database of the interconnected online resources available for PME across key alliance partners, including the United States, Australia, and the United Kingdom. See <https://groundedcuriosity.com/guide-military-blogs-and-podcasts/>.

[21] Yuval Noah Harari, "Why Technology Favors Tyranny," *The Atlantic*, October 2018, available at <www.theatlantic.com/magazine/archive/2018/10/yuval-noah-harari-technology-tyranny/568330/>.

[22] The accelerating pace of technological development is a theme in multiple books and reports, including Max Boot, *War Made New: Technology, Warfare, and the Course of History, 1500 to Today* (New York: Gotham Books, 2006),16; *Global Strategic Trends: The Future Starts Today*, 6th ed. (London: Ministry of Defence, October 2018), 13, available at <https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/771309/Global_Strategic_Trends_-_The_Future_Starts_Today.pdf>.

[23] Laurie Points and Ed Potton, *Artificial Intelligence and Automation in the UK*, Briefing Paper No. 8152 (London: House of Commons Library, December 21, 2017), 9, available at <https://researchbriefings.parliament.uk/ResearchBriefing/Summary/CBP-8152>.

[24] This must include knowledge of its application, how to provide a level of assurance and quality control, and how to optimally combine it with new concepts and human organizations at every level. See Mick Ryan, "Intellectual Preparation for Future War: How Artificial Intelligence Will Change Professional Military Education," *War on the Rocks*, July 3, 2018, available at <https://warontherocks.com/2018/07/intellectual-preparation-for-future-war-how-artificial-intelligence-will-change-professional-military-education/>.

[25] Approaches to achieving this are explored in Mick Ryan, *Human-Machine Teaming for Future Ground Forces* (Washington, DC: Center for Strategic and Budgetary Assessments, 2018), available at <https://csbaonline.org/uploads/documents/Human_Machine_Teaming_Final-Format.pdf>.

[26] See Advanced Distributed Learning Initiative Web site, available at <https://adlnet.gov/>.

[27] Cathy Downes, "Rapidly Evolving, Digitally-Enabled Learning Environments: Implications for Institutional Leaders, Educators and Students," in *Innovative Learning: A Key to National Security*, ed. Ralph Doughty, Lin Wells II, and Theodore C. Hailes (Fort Leavenworth, KS: Army University Press, 2015), 101.

[28] This is explored in Ryan, "Intellectual Preparation for Future War"; Michael Horowitz and Casey Mahoney, "Artificial Intelligence and the Military: Technology Is Only Half the Battle," *War on the Rocks*, December 25, 2018, available at <https://warontherocks.com/2018/12/artificial-intelligence-and-the-military-technology-is-only-half-the-battle/>.

[29] A range of issues concerned with biotechnology, including human augmentation, are explored in Robert E. Armstrong et al., eds., *Bio-Inspired Innovation and National Security* (Washington, DC: NDU Press, 2010), available at <https://ndupress.ndu.edu/Portals/68/Documents/Books/CTBSP-Exports/Bio-Inspired-Innovation.pdf?ver=2017-06-16-111126-690>.

[30] The Australian Defence College has found that simple desktop games have been highly effective, particularly in large-scale, whole-of-nation problems requiring joint as well as coalition and interagency collaborative planning.

[31] The issue of wargaming in military education is explored in multiple articles and publications. These include Elizabeth Bartels, "Getting the Most Out of Your Wargame: Practical Advice for Decision Makers," *War on the Rocks*, January 26, 2016, available at <https://warontherocks.com/2016/01/getting-the-most-out-of-your-wargame-practical-Advice-for-decision-makers/>; Elizabeth Bartels, "Building a Pipeline of Wargaming Talent: A Two Track Solution," *War on the Rocks*, November 14, 2018, available at <https://warontherocks.com/2018/11/building-a-pipeline-of-wargaming-talent-a-two-track-solution/>; Shawn Burns et al., *War Gamers Handbook* (Newport, RI: U.S. Naval War College, 2015), available at <https://apps.dtic.mil/dtic/tr/fulltext/u2/1001766.pdf>; Benjamin Jensen, "Welcome to Fight Club: Wargaming the Future," *War on the Rocks*, January 4, 2019, available at <https://warontherocks.com/2019/01/welcome-to-fight-club-wargaming-the-future/>.

[32] Hammes, "The Future of Conflict," 17.

[33] Eliot A. Cohen, The *Big Stick: The Limits of Soft Power and the Necessity of Military Force* (New York: Basic Books, 2017), 226; Mick Ryan, "Mastering the Profession of Arms, Part III: Competencies Today and into the Future," *War on the Rocks*, March 23, 2017, available at <https://warontherocks.com/2017/03/mastering-the-profession-of-arms-part-iii-competencies-today-and-into-the-future/>.

Marine with Marine Rotational Force—Europe 19.2, Marine Forces Europe and Africa, fires M240B machine gun during exercise Sea Breeze 2019, in Chabanka, Ukraine, July 11, 2019 (U.S. Marine Corps/Williams Quinteros)

Reconceiving Modern Warfare
A Unified Model

By KC Reid

The U.S. military has numerous ways it describes, conceives of, and organizes for war. Added capabilities and new technologies continually spur new terms and efforts, even new warfare types, to describe operations in a way that is helpful for organization, planning, and execution. These definitions and paradigms are useful in disaggregating the challenge or technology to understand it better, but they work in opposition to a comprehensive understanding of 21st-century warfare, even while attempting to further it.

Joint warfighting requires a new model that enables integrated thinking across the many disparate capabilities, technologies, and applications of the tools, concepts, and personnel used today and in the future, while simultaneously enabling tactical planning, operational design, strategic discussion, and execution. This article proposes a unified model of warfare, tailored for modern technologies and emerging concepts as well as strategic thought, which bring together several existing paradigms in use today. Unifying these models enables broader consideration, integration, and

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innovation in warfare, but most important, allows discussion of, planning for, and prosecution of modern warfare to be simple and mission-focused.

What is *war in the 21st century*? Often, this phrase expresses a warfare that is more complex, multifaceted, faster-paced, and more human-centric and/or more dependent on technology than warfare in earlier centuries. As used here, 21st-century warfare is simply warfare as prosecuted in the 21st century. It includes every weapon or tool from the most basic to the most advanced; state and nonstate actors as adversaries, third parties, and partners; and military, paramilitary, and ad hoc forces. It is not relegated to two irreconcilable wills; there can be many.

Existing Models

Most existing paradigms rise from a Clausewitzian championing of conventional force-on-force warfare. Carl von Clausewitz declares that "[physical] force . . . is thus the *means* of war; to impose our will on the enemy is its *object*."[1] Problematically, many newly emphasized warfighting technologies and capabilities either are not physical in nature or have a debatable physical nature—is a cyber capability part of physical warfare if the result is merely different data? What if the result is temporarily incapacitating a computing capability?

Interpreting the means of war as physical force restricts thinking to the physical realm, when the focus should be, as Clausewitz points out, "To secure that object we must render the enemy powerless; and that, in theory, is the true aim of warfare."[2] To this end, the frame used to think about, plan and prepare for, and prosecute war should focus on accomplishing the mission rather than another aspect of the fight, such as where it is prosecuted or what capabilities are used. Instead of restricting thinking about how to fight, the model should free thinking to enable integration and innovation.

This model overlays several predominant warfare models, each with a different focus area and original intent, to identify a unified paradigm that is comprehensive yet simple to understand and work within

to enable mission-focused planning and operations. These models are domains, Marine Corps forces, joint functions, the continental or general staff system, and information-related capabilities. The existing models are not necessarily unsound, but each frames warfare such that new models must be generated as modes of war develop and change. The result is many models, all of limited utility, and a resulting inability to discuss modern warfare in clear, concise language that can be shared among strategic, operational, and tactical levels.

Domains. Domains for warfighting—land, maritime, air, space, and cyberspace in joint doctrine—pose three problems when considering 21st-century warfare.[3] First, discussions of new domains needed to keep the model relevant are nearly continuous. Pundits in 2017 discussed the domain of the mind or the individual, while the special operations community discusses the human domain.[4] Military doctrinaires debate whether the electromagnetic spectrum should be a domain. In 1998, generals discussed information as a domain, as some still do today.

Second, attempts to integrate the domains succeed mostly in subordinating to one domain all the others. A white paper jointly developed by the Marine Corps and Army, though signed only by the Army, defines *multidomain battle* (MDB) as "an approach for ground combat operations," clearly emphasizing the land domain over others.[5] Although it does discuss capability integration and acknowledges the need for superiority in other domains, the MDB nevertheless focuses on how other domains can support the land domain. Vice Admiral Charles Richard, USN, former deputy commander of U.S. Strategic Command, put forward the concept of *multidomain integration*, noting, "Whether you're guiding ships, jets, drones [or] missiles, space is the domain that enables all the others."[6] One domain's dominance is not an issue in itself, but when the model focuses on how other domains support one, it skews thinking toward that predefined relationship—in support of land or space, for instance—rather than true integration.

Third, the domain structure anchors thinking in where the fight occurs, rather than what needs to be accomplished. It is useful for understanding what capabilities can accomplish in each domain, but it more often inspires a mine-theirs mentality relating to capabilities based on where they have effects. It also gives fighting locality primacy over the capability in terms of importance and thinking. When discussion focuses on "What domain are we fighting in?" rather than "What capabilities do we have to prosecute the mission?" the domain focus impedes not only integration but also innovative capability combinations.

Forces Model. The forces model used in Marine Corps Doctrinal Publication 1 (MCDP-1), *Warfighting*, is broad and encompasses many warfare aspects, such as moral and mental capacities, which are not present in most other models. In MCDP-1:

- The physical characteristics of war are generally easily seen, understood, and measured—for example, equipment, capabilities, supplies, physical objectives seized, force ratios, losses of materiel or life, terrain lost or gained, and prisoners or materiel captured.
- Moral forces are difficult to grasp and impossible to quantify, including national and military resolve, national or individual conscience, emotion, fear, courage, morale, leadership, and esprit.
- Mental forces provide the ability to grasp complex battlefield situations; to make effective estimates, calculations, and decisions; to devise tactics and strategies; and to develop plans.[7]

A key drawback, however, is that it pushes the user to focus on the physical, given that it openly states an entire aspect of war cannot be understood or measured. In a superficial cost-benefit analysis of exploring or thinking about moral forces that are "difficult to grasp and impossible to quantify," the effort hardly seems worth it.

Given the vernacular definition of *physical* meaning "tangible" rather than "governed by physics," the line

between what is physical and what is not in 21st-century warfare becomes blurry, in particular with cyberspace, cyber security, and electromagnetic spectrum operations.

Joint Functions. Defined in Joint Publication (JP) 1, *Doctrine for the Armed Forces of the United States*, and JP 3-0, *Joint Operations*, the *joint functions* are "related capabilities and activities grouped together to help Joint Force Components integrate, synchronize, and direct joint operations." They are often used in planning processes to form the planning cells and develop courses of action. They include:

- command and control: exercising authority and direction over assigned or attached forces in the accomplishment of a mission
- maneuver: employing forces in the operational area through movement in combination with fires to achieve a position of advantage in respect to the enemy in order to accomplish the mission
- fires: using weapons systems to create a specific lethal or nonlethal effect on a target
- intelligence: providing the commander with an understanding of the adversary and the operational environment and identifying the adversary's centers of gravity and critical vulnerabilities
- logistics: all activities required in moving and sustaining military forces
- force protection: the measures taken in preserving the force's potential so that it can be applied at the appropriate time and place[8]
- information: managing and applying information and its deliberate integration with other joint functions to influence relevant actor perceptions, behavior, action or inaction, and support for human and automated decisionmaking.[9]

The joint functions are helpful in forcing planners and operational planning team (OPT) members to consider various capabilities and requirements of warfare during the joint planning process (JPP). Even if intended as a paradigm to serve as a checklist, over time checklists shape and usually limit thinking to only those things on the checklist. In practice, therefore, its categories also limit thinking about capabilities. As an example, logistics usually includes health services, but the personnel accountability aspect for which personnel staff would be responsible is rarely part of the discussion. Personnel functions are required for actual warfighting, and participation in exercises enhances skills, knowledge, and experience for seasoned staff and is especially important for less experienced staff.

General Staff System. While the joint functions are used to plan for military operations and exercises, day-to-day functions in garrison are compartmentalized differently despite the fact that those same joint functions are executed in and by these same staff organizations in garrison and combat. The JPs and doctrine follow this organization in their numbering and categorization:

- J1, Personnel
- J2, Intelligence
- J3, Operations
- J4, Logistics
- J5, Plans
- J6, Communications.

Many staffs use additional sections to cover the range of activities that they engage in. While application varies widely, often the military activities included are training, finance, and civil affairs. The organization varies over time as a function of personality, activity, leadership requirements, and functional emphasis.

The staff sections coincide partially with joint functions. J1 (Personnel) is not included as a joint function, whereas J2 (Intelligence) and J4 (Logistics) are explicitly and directly such. J3 (Operations) is divided into joint functions of maneuver, fires, force protection, and (often) information. J5 (Plans) typically orchestrates the longer term planning efforts for all the functions and staff sections both in garrison and deployed environments. J6 (Communications) only roughly correlates with command and control. The J2, J3, J5, and J6 sections all have a role with the newly added information function. In fact, regarding "support for human decisionmaking," every staff section could be said to have a role in executing the information joint function, greatly complicating the actual inclusion of this in a planning process.

In garrison, as well as in operations, the general staff system is used to organize forces, yet in exercises and sometimes operational planning, not all the staff sections participate. Personnel, training, and finance staffs rarely participate in JPP applications while remaining critical in preparing for and prosecuting war. If included in operational planning, those sections may be better able to identify creative, innovative ways to enable operations.

Left out of the joint functions altogether, though addressed nominally by the "Green Cell" that is tasked with playing transnational groups, human factors are so important that some are considering an entire domain dedicated to civil affairs. Civil affairs can serve an important role in preconflict, postconflict, and fighting stages of both counterinsurgency and major contingency operations by demonstrating U.S. intent to nearby populations, engendering good will, undermining adversary efforts, engaging with groups in the vicinity of friendly forces, and liaising with international and other nongovernmental organizations.

Information-Related Capabilities. Information-related capabilities (IRCs) are a key part of information operations (IO) doctrine, which includes the physical attack and physical protection IRCs. This acknowledges that a missile on target sends a message simultaneously with the target's physical destruction. It also brings conventional physical fires into the IO tent as an IRC. Physical ways of communicating are included in IO doctrine and, if applied accurately, are integrated with it. Doctrinally, IRCs are tools, techniques, or activities that affect any of the three information environment dimensions (physical, informational, and cognitive). JP 3-13, *Information Operations*, includes fires, targeting, physical security, legal, and counterintelligence along with J4, J5,

J6, and J7 in the notional information operations cell, but specifies 14 IRCs:

- strategic communication
- joint interagency coordination group
- public affairs
- civil-military operations
- cyberspace operations
- information assurance
- space operations
- military information support operations
- intelligence
- military deception
- operations security
- special technical operations
- joint electromagnetic spectrum operations
- key leader engagement.

If taken as a modern warfare model—which is possible when aspects like physical protection and joint fires from the doctrinal, notional IO cell are included—this not only expands consideration of capabilities focused on undermining the enemy's will but also runs the danger of overemphasizing IO's communication aspects at the expense of the more tangible physical aspects.

A Unifying Paradigm

Aligning the models reveals four key elements of any military operation, while providing enough flexibility within each to enable analysis of new and emerging concepts and technologies without having to create a new warfare type or model with each technological development or change in era. This model can be used for tactical planning, operational design, strategic discussion, and execution. World War II, Cold War, and post–Cold War eras fit as easily into this model as the post-9/11 era. It addresses actions to be taken, audiences to address, capabilities to apply, approaches and perspectives to maintain, and even processes to incorporate.

This alignment of models is domain- and Service-agnostic, freeing thought about military operations from limitations, such as where it is prosecuted or by whom, and enabling focus on missions and capabilities. It can be used, perhaps,

Figure 1. Unified Model of 21st-Century Warfare

Mental and Moral Forces			
Integrated Planning and Operations			
Analyzing & Deciding	Attacking & Protecting	Communicating	Enabling/Supporting
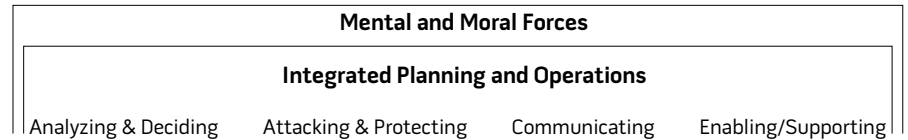
in place of all the paradigms examined above. In short, it simplifies warfare enough to understand it easily, while enabling much more detailed discussion and integration of capabilities and technologies not yet conceived.

There are two element types in this paradigm: foundation and application. *Foundation elements* are those that underlay military actions, specifically moral and mental forces and integrated planning and operations. *Application elements* are those that focus on specific actions to be taken, namely analyzing and deciding, attacking and protecting, communicating, and enabling/supporting. They are not arranged in any particular order, but are equal in their importance and contribution. Each element is defined below to enable an in-depth understanding of them. In most cases, doctrinal definitions are used because they are good, known, and relevant. Where definitions deviate from doctrine, they are defined and justified.

Foundation Element: Moral and Mental Forces. These are almost the same as in MCDP-1. *Moral forces* are national and military resolve, national or individual conscience, emotion, fear, courage, morale, leadership, or esprit. *Mental forces* are the ability to grasp complex battlefield situations; to make effective estimates, calculations, and decisions; to devise tactics and strategies; and to develop plans.[10] As used in MCDP-1, these forces exist and can be affected, but most focus is placed on undermining the adversary's mental and moral forces. Usage here differs in that it emphasizes that these mental and moral forces can be undermined as well as enhanced for enemy, friendly, and third-party personnel. Included here are activities that may not reside in the general staff system, such as enhancing individual resilience, teaching critical thinking and decisionmaking

skills, monitoring behavioral health, and so forth. Mental and moral forces—including force resilience—underpin not only the entire mission but also the entire battlespace including adversaries and third-party actors.

Foundation Element: Integrated Planning and Operations. This incorporates the J5 and J3 roles. J5 conducts, and is responsible for, integrated planning to achieve the four categories of action in support of the mission. J3 is responsible for the execution of those categories to achieve the mission.

Application Element: Attacking and Protecting. Lacking a joint definition, *attack* is, as defined in Marine Corps Reference Publication 1-10.2, *Marine Corps Supplement to the DOD* [Department of Defense] *Dictionary of Military and Associated Terms*, an offensive action characterized by movement supported by fire with the objective of defeating or destroying the enemy. *Protection* is defined in the 2019 *DOD Dictionary of Military and Associated Terms* as active and passive defensive measures to ensure preservation of the effectiveness and survivability of mission-related military and nonmilitary personnel, equipment, facilities, information, and infrastructure deployed or located within or outside the boundaries of a given operational area. This includes overcoming an adversary's attempts to negate them and to minimize damage if negation is attempted.

Application Element: Analyzing and Deciding. The term *analysis* included in the DOD dictionary relates only to intelligence. Therefore, this model leans on facilitation and instruction theory to define *analyzing* as drawing connections among ideas through various means, including but not limited to differentiating, organizing, comparing and contrasting,

Combat medic assigned to 2nd Combined Arms Battalion, 69th Armor Regiment, 2nd Armored Brigade Combat Team, 3rd Infantry Division, mentally prepares to engage in M249 squad automatic weapon and M240B general-purpose machine gun qualifications for Best Warrior Competition, May 3, 2018, at Fort Stewart, Georgia (U.S. Army/Arjenis Nunez)

distinguishing, and examining available information. *Deciding* is making a decision; a *decision* is defined in the DOD dictionary as, in an estimate of the situation, a clear and concise statement of the line of action intended to be followed by the commander as the one most favorable to the successful accomplishment of the assigned mission. In this paradigm, analysis is done specifically in informed decisionmaking.

Application Element: Communicating. Communicate was removed from the DOD dictionary in its 2019 revision, but the definition included in earlier versions is retained here: to use any means or method to convey information of any kind from one person or place to another. In this model, it includes communication internal to, and external communication from, the operating forces to any audience including the adversary, third-party actors, internal forces, and other commands.

Application Element: Enabling/ Supporting. The DOD dictionary does not include a definition of *enabling*. This model modifies the legal definition of *enabling* as conferring new powers, capacities, means, abilities, competences, capabilities, or authorities on an element of the force to enhance mission accomplishment. *Supporting* modifies the dictionary's definition of *support* as providing a force or element of a command that aids, protects, complements, or

sustains another force in accordance with a directive requiring such action. This definition replaces "the action of a force that aids" with "providing a force or element of a command that aids" in order not only to address the different verb form but also to expand the concept to incorporate the idea of giving resources to another force or element.

With the model elements defined, this overlay can assist thinking about this new model by showing how the older models fit within its construct. Each model is indicated by different text type or color. For instance, portions of the forces model are red text. Note the information joint function must be divided among the application elements; this speaks to the

premise of this article, that the existing models fall short and therefore inhibit the ability to discuss warfare in a holistic, broadly applicable yet flexible and nuanced manner.

This paradigm will be applied to different areas of planning, organization, and execution in the next sections to illustrate the ways in which it alters thinking and enables, encourages, or enhances coordination, integration, and innovation in warfare. These applications are neither comprehensive nor conclusive; there may be many other ways this paradigm can be applied to enhance warfighting. The intent is both to spur and to challenge ways the U.S. military describes, conceives of, organizes for, and prepares for war.

An Enduring Model

Military thinkers propose new warfare types and models when discussing changes in prosecuting war under certain circumstances, even when the change is simply different combinations of existing technologies and capabilities. Russia's heavy use of information operations and social media, combined with guerrilla tactics and heavy artillery to annex Crimea while managing to avoid a military response from Ukrainian allies, is labeled "hybrid warfare" or "operations in the gray zone," somewhere between peace and war. These efforts merely categorize a specific combination of capabilities but do little to enhance the ability to integrate, coordinate, and innovate in warfare.

Drones, robots, cyberspace operations, and artificial intelligence create different effects on the battlefield and should change thinking about force protection, signature management, and electronic countermeasures. Appreciating the changes that new technologies bring is critically important to shaping expectations, planning for operations and acquisition, countering effects, application, and exploring the ways friendly and adversary forces may use them. Yet introducing a new lexicon every time this occurs obscures the key elements of warfare as well as the mission.

At the core, warfare is accomplishing a mission with the resources and

Figure 2. Unified Model of 21st-Century Warfare with Other Model Overlay

Mental and Moral Forces			
Integrated Planning and Operations			
Analyzing & Deciding	**Attacking & Protecting**	**Communicating**	**Enabling/Supporting**
J2	Physical Force	Civil Affairs Section	J1
Command and Control	J6	Information (partial)	J4
Intelligence	Land	MILDEC	Training Section
Information (partial)	Maritime	MISO	Finance Section
Intelligence	Cyber	Strategic Communication	Air
	Space	Joint IA Coord Group	Logistics
	Fires	Public Affairs	Maneuver
	Force Protection	Civil-Military Operations	
	Information (partial)	Information Assurance	
	Cyberspace Operations	Key Leader Engagement	
	Space Operations		
Key:	Operations Security		
USMC Forces	Special Technical Ops		
General Staff	JEMSO		
Domains	Joint Fires		
Joint Functions	Physical Protection		
IRCs			

capabilities available. Constantly inventing new types of warfare—or new labels for application of new and old technologies and capabilities—distracts from the mission and from innovation. This model can be used to talk about warfare during the Cold War and also in an era of precision-guided munitions, drones, offensive cyberspace operations, and anti-satellite weaponry. It is technology independent, while still enabling discussion of any kind of technology within its elements.

Impact on Planning and Operations

Overlaying this model with the JPP highlights some key differences in thinking as it is now and as it would be using this model. The model does not alter the key steps in JPP—mission analysis, course of action (COA) development, COA analysis and wargaming, COA comparison and approval, and plan or order development. This model does alter the way in which these steps are executed by adjusting the frame used to engage with JPP and design. Moreover, it can be applied to friendly forces as well as enemies, adversaries, and third parties, making it useful as a check for Intelligence Preparation of the Battlespace (IPB), as well as monitoring friendly forces' readiness, which typically falls outside the JPP.

Design. This involves understanding the current and desired future states and the problem set, producing an operational approach, and reframing. It is really part of the first phase of the JPP but is continuous and always subject to revision. Using this unified model of warfare provides a more comprehensive and integrated framework within which to deconstruct (and reconstruct) the current and desired future states. In addition to standard brainstorming for current and desired conditions, the application elements are good testers to ensure that key areas are considered and included. For instance, they inspire questions such as, "How are we and the enemy analyzing and deciding?" or "In what ways are we and the enemy communicating to different audiences—friendly, enemy, third party, and so forth," and "Where might we use deception, and where might it be used against us?"

Mission Analysis. This model brings to the forefront the moral and mental forces at play in the scenario. Applied to friendly forces, what is the moral and mental status of friendly troops? How do they view the conflict in general, and what are external influences conveying about the conflict that might affect friendly force morale at the individual, unit, and commander levels? Do friendly forces have the resilience needed to take

Airman with 38th Air Defense Artillery Brigade assembles omnidirectional line-of-sight antenna to enable communication with aviation assets during unilateral joint training exercise on Sagami General Depot, Sagamihara, Japan, September 17, 2019 (U.S. Army/Raquel Villalona)

on a clever, insightful adversary who adjusts to changing situations rapidly and does not follow laws of war? Have friendly forces been adequately educated to problem-solve, innovate, and fulfill their functions at the time and place required?

For all actors—enemy, third party, host nation, partner nation, other U.S. Government organizations in the situation—what is their resolve? How does their culture view this conflict and armed conflict in general? What kinds of actions are seen as honorable or unacceptable in warfare, both overtly and covertly? How determined or committed to the cause is the enemy as a whole, and how determined or committed is it at a given unit level? What are the strengths and weaknesses of key leaders on all sides? These and other similar questions would provide insight into the moral and mental status of adversaries and third-party actors as well as regional or international groupings relevant to the scenario.

While some of these questions are often answered through IPB, not all are.

Questions (and answers) related to the cultural perspectives of varying groups, levels of commitment or determination, and morale are often left unanswered, if they are even asked, because they are difficult to measure and evaluate. They are also not solely the purview of intelligence; rather, some of these questions are answered through other resources entirely, such as culture-focused organizations, civil affairs, or even other departments or agencies. They are rarely included as part of exercises because doing so requires deep expertise on adversaries or other parties at many levels, and they are even more difficult to measure, quantify, and apply with any rigor in a fictive scenario than a real one.

Each of the elements (foundation and application) can be used to frame IPB and enable deeper analysis and better understanding of adversaries and the environment as systems, rather than discrete parts. Rather than focusing on examining an adversary with PMESII-PT (political, military, economic, social, infrastructure, information, physical environment, time)

or another similar tool, PMESII-PT could be used within each element. This would mean that enemy moral and mental forces are examined with PMESII-PT, but so would their planning and operations, how they attack and protect, their surveillance and decisionmaking processes, all aspects of their communication, and enabling/supporting their forces.

Using the application element of attacking and defending in mission analysis enables thinking about friendly or enemy capabilities as a whole, rather than offensive and defensive. This can help prevent assumptions about how a capability could be applied, which assumptions limit military planners' ability to conceptualize how the enemy might act or react in a given circumstance, resulting in unpleasant surprises. Similar results could come from using the other application elements in other areas of problem-framing, such as identifying implied tasks, assumptions, centers of gravity analysis, and more.

COA Development. Development can benefit from this paradigm by ensuring that all aspects of warfare and ways to target the enemy's will are addressed within the commander's intent and mission statement. Typically, when moving into COA development, OPTs will break into working groups along the lines of the joint functions to dig deeper into the capabilities each joint function can bring to the mission. Rather than aligning to joint functions, OPTs can divide into groups that are aligned with the application elements of this paradigm, which force greater cohesion and integration across military capabilities than the joint functions.

Analyzing and deciding brings together intelligence and the ability to control operations and forces from the initial planning stages, enabling better streamlining and integration of intelligence and friendly knowledge management for the commander's advantage.

In attacking and protecting, fires and force protection assets can work together, perhaps identifying areas in which one capability can fill two functions. Fires, cyberspace operations, space, special technical operations, and network exploitation and protection are all present,

truly integrating lethal and nonlethal (and/or kinetic and nonkinetic) capabilities to the commander's best advantage in the battlespace. Operations security and force protection are together, able to leverage mutual gains from the outset of planning, rather than as a result of deconfliction later in the process.

Communicating brings together all the capabilities that play a role in this element, synchronizing overt and covert communications for all the various audiences—friendly forces, adversaries, third-party actors, and various external audiences.

Given that maneuver is dependent on logistics, it makes sense that these two capabilities be in lockstep from the beginning phases of planning in the enabling/supporting group. Likewise with aviation capabilities, finances, personnel, and training, which are used for logistics and as enablers for all the other application elements. Training is not usually included in exercises because that staff is busy preparing units actually deploying. Having a training representative in exercise design could leverage training's expertise to identify efficiencies where mission-essential tasks for existing and potential future missions can be developed or planned for simultaneously.

COA Analysis and Wargaming. Foundation elements are particularly useful during COA wargaming, when the plan is examined in order to identify issues, shortfalls, and other challenges. While the pieces and parts of the plan will be discussed and perhaps mapped out on a table, this is a key part in which to ensure the foundation elements are consciously addressed. Is the COA truly integrating various friendly capabilities? When the staff walks through what a unit will do, are they discussing the physical impact on the enemy *and* on friendly mental and moral forces?

COA Comparison and Approval. Each mission and each commander will have a unique set of circumstances that evaluation criteria will spring from. Both foundation and application elements can be used as part of the evaluation criteria for COA comparison and approval, either as subsets of commander-established criteria or in framing those criteria. For instance, commander-provided criteria might include speed of operation, level of risk to forces (or mission, or both), and likelihood of residual resistance after the core mission is accomplished. The staff using the foundation and application elements in their COA analysis and wargaming would better support its commander's decisionmaking by being able to discuss as part of the criteria assessments for key decision points, how communicating to different audiences will impact the likelihood of residual resistance, logistical options that can speed or slow the operation, and how integrating certain capabilities undermine the enemy's mental and moral forces, saving friendly forces and resources.

Conclusion

As an institution, the U.S. military should continually seek to improve its understanding of war. Such efforts typically result in complicating an already cumbersome vernacular and dialectic, creating new silos of expertise only understood by a small portion of the forces and losing sight of the mission. This is the result of both inadequate models and the misuse and misinterpretation of models.

We have an opportunity with this model to unify and simplify that landscape without losing the ability to apply new technologies and combinations of capabilities. Although this is a new way of looking at warfare, it is also a highly flexible one that can be enduring and therefore would not have to be adjusted with the rise of yet-to-be-conceived-of technologies and capability combinations.

It is not yet clear what the most beneficial and effective application of this model is—whether it is operationally, as in the Joint Operations Planning and Execution System application; analytically, as in the problem-framing in planning; or another. Experimentation with this model will illuminate the benefits and challenges it presents when applied to different areas such as planning, handling emergent technologies, and conducting operations. **JFQ**

Notes

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U.S. Marine Corps recruits with November Company, 4th Recruit Training Battalion, complete obstacles during Crucible at Marine Corps Recruit Depot Parris Island, February 21, 2019 (U.S. Marine Corps/Bobby J. Yarbrough)

X-51A Waverider, powered by Pratt Whitney Rocketdyne SJY61 scramjet engine, prepares for hypersonic flight by riding its own shockwave, accelerating to nearly Mach 6 (U.S. Air Force graphic)

Adapting for Victory
DOD Laboratories for the 21st Century

By William T. Cooley, David J. Hahn, and John A. George

The United States must regain the element of surprise and field new technologies at the pace of modern industry. Government agencies must shift from an archaic R&D process to an approach that rewards rapid fielding and risk-taking.

—National Security Strategy of the United States of America

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In an era of renewed Great Power competition, the technological advantage of the U.S. military—long the cornerstone of our military assurance and hence world security—is threatened. Strategic competitors, chief among them the People's Republic of China and the Russian Feder-ation, are now approaching parity in many areas. Their stated intent is to reach full parity, and then achieve technological dominance themselves, in an accelerated timeframe. The consequences of that to the United States and the rest of the world are unacceptable.

The U.S. military excels from undersea to cyber to space, but as the National Defense Strategy reminds us, "America's military has no preordained right to victory on the battlefield."[1] In this challenging moment, the process by which the Department of Defense (DOD) and military Services conduct research and develop new capabilities for our warfighters must be reviewed, renewed, and reimagined. We must maintain our edge and also achieve advantage in emerging fields such as directed energy, artificial intelligence, hypersonics, autonomy, quantum capability, synthetic biology, and technologies of the future that have not yet been imagined. We, as commanders of the science and technology (S&T) laboratories of the Army, Navy, and Air Force, are working together to ensure the continued U.S. advantage in the race for military technological superiority.
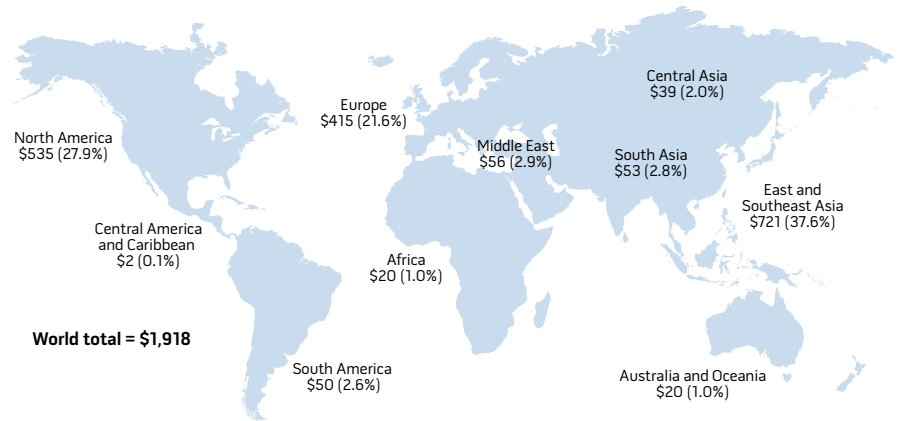
Call to Action for a New Era

Our established processes for basic and applied research worked well during the post–World War II era. DOD laboratories, in partnership with the U.S. defense industrial base, met operator requirements via S&T and research and development (R&D) programs. U.S. academia, backed by generous Defense funding, helped identify approaches to solve new problems.

However, this domestic- and government-centric approach to basic and applied research, developed and refined during the Cold War, cannot remain in stasis in today's strategic environment. The global technology landscape has changed. The world is more technologically "flat" than it once was. As shown in the figure, the United States accounts for only a fraction of today's global R&D expenditures. The U.S. Government invests less in R&D than the private sector, and the leading edge of many emerging fields is being advanced by privately funded large technology companies and nimble startups that have little or no connection to defense R&D. With modern information systems, knowledge and technology are easier and cheaper for adversaries to obtain and quickly weaponize.

Figure. Global R&D Expenditures, by Region: 2015
Billions of U.S. PPP dollars

Central Asia
$39 (2.0%)

Europe
$415 (21.6%)

North America
$535 (27.9%)

Middle East
$56 (2.9%)

South Asia
$53 (2.8%)

East and
Southeast Asia
$721 (37.6%)

Central America
and Caribbean
$2 (0.1%)

Africa
$20 (1.0%)

World total = $1,918

South America
$50 (2.6%)

Australia and Oceania
$20 (1.0%)

Note(s): Foreign currencies are converted to dollars through PPPs. Some country data are estimated. Countries are grouped according to the regions described in *The World Factbook*, available at <www.cia.gov/library/publications/resources/the-world-factbook/index.html>.

PPP = purchasing power parity.

Source: National Science Board, Science and Engineering Indicators 2018.

Driven by consumer demands and competition, many companies develop and implement new technologies at impressive speeds that are far faster than our existing government acquisition processes. Companies know they would have to slow down and fight through cumbersome Federal acquisition regulations to do business with the military. In a 2016 report, the Center for a New American Security noted that the "decreased demand, lower profitability, and high barriers to entry have made the defense market less attractive than at any time in modern history."[2]

To maintain superiority and meet the guidance of the National Defense Strategy, there is urgent need for dramatic change and acceleration in how DOD does the hard business of S&T and R&D. To be successful in today's flat tech-access world, DOD must adapt its R&D model for greater speed and agility *and* a greater capacity to leverage expertise from tech sectors unaccustomed to collaborating with the U.S. Government. This call to action has been evident in recent strategic products and actions including the National Defense Strategy, the Naval Research and Development Framework, the Air Force Science and Technology Strategy, and the establishment of Army Futures Command.

This is not the first time the Nation has faced an urgent call to adapt. As the

1947 Scientific Research Board reported to President Harry Truman, the "security of the United States depends today, as never before, upon the rapid extension of scientific knowledge. So important, in fact, has this extension become to our country that it may reasonably be said to be a major factor in national survival."[3] Our current lab structure came about in part due to that realization and helped provide decades of technological advantage. We answered the call before, and we are answering it again.

The Agenda for Change Within the Labs

It is of the utmost importance to our national security that the Navy prosecute a vigorous and well-rounded program of research and development. To fail to do so in time of peace will surely result in this country entering another war with obsolete weapons and machines of warfare. And the tempo of modern war has reached the point where this nation will probably never again have an opportunity to arm itself successfully after the start of hostilities.

—James Forrestal, Secretary of the Navy, 1944–1947

As commanders of DOD laboratories, we know that business as usual will not sustain U.S. technological advantage. In

Army Research Laboratory's electronics program seeks to generate knowledge of electromagnetic, photonic, and acoustic devices, systems, and phenomena to provide technological superiority to Army's future force (Army Research Laboratory)

fact, business as usual will lose the fight. We must change how we operate in order to maintain our technological lead. We must retool how we do the hard business of discovering, developing, and fielding new capabilities, at sufficient scale, for our warfighters. And we must do all of this quickly. The bottom line is that we must radically adapt our laboratories to today's S&T environment, embracing risk and eschewing the status quo. This is America's national challenge at this unique moment in history, as urgent as any we have faced before.

We seek to adapt in the ways that need to change, while retaining and refreshing the unique and valuable aspects of the DOD lab system that have helped our defense S&T excel. The United States has been able to defeat some of the most aggressive regimes in the world in large part due to technologies made possible by a vibrant relationship between academia, industry, and the military,

using Federal sponsorship and funding of research through DOD labs. It is a unique partnership that has served freedom well. DOD labs are part of a larger ecosystem of discovery, innovation, and collaboration—one in which investment is focused on warfighter needs without regard to the short- and long-term profits prioritized by private industry.

DOD labs, and the extramural research programs they oversee, execute the basic scientific research that helps us understand fundamental aspects of military-relevant scientific phenomena and gain the insights necessary to develop future warfighting applications. As just one example, today's laser weapons systems would not have been possible without sustained, military lab–supported basic research by Charles H. Townes and others into microwave amplification by stimulated emission of radiation, or masers, starting in the 1950s. In short, if the labs do not perform this function, no

one will. DOD labs then guide the results of basic research into more advanced R&D that applies the basic science in new devices, components, and even full-scale prototypes—ideally transitioning into future acquisition programs.

These basic functions are enduring, but we have identified many specific areas where major changes are needed in order to carry them out effectively in the technology environment of the 21st century. Some of the most critical areas are contracting and partnering, financial agility, and workforce development. While these are not always recognized as vital for success on the battlefield, they play crucial roles in the military's ultimate success or failure in developing technology for our warfighters.

For too long, DOD labs have struggled to get contracts issued in a timely manner, due to decades of steadily increasing red tape. The result is research that is often old where it was once new.

And even worse, brilliant, patriotic researchers can decide that the sluggish pace of getting contracts decided and funds delivered—coupled with a constant need to fill out forms—is not worth it and begin looking elsewhere for a more efficient workplace.

As one example, a 2018 faculty workload survey conducted by the Federal Demonstration Partnership revealed that principal investigators—that is, scientists and engineers looking for breakthroughs that will help us achieve mission success—estimate they spend 44 percent of their research time during Federally funded projects meeting administrative requirements, instead of doing actual research.[4] This is a sobering figure and a disservice to our Servicemembers who are depending on unimpeded delivery of cutting-edge tech to do their job and defend the Nation.

The underlying reason for DOD labs' success is our greatest asset: our people. However, worries and hurdles regarding workforce development have grown rather than diminished. As the demand for science, technology, engineering, and math college graduates increases faster than the supply, recruiting top-notch researchers dedicated to national defense becomes more challenging. This is particularly worrisome as we see significant numbers of our researchers and program officers beginning to retire. To retain a cutting-edge workforce, we must continue to build more flexible and modern employment models, find innovative ways to compete with private industry salaries, and ensure workforce diversity in all its dimensions.

Behind all these ideas is the reality that researchers can face daily frustrations and disincentives when working for DOD labs. Poorly functioning information technology (IT) systems, excessive training requirements, and other bureaucratic hurdles often limit the time scientists and engineers can dedicate to actual research each day. Exit interviews with DOD researchers leaving military laboratories indicate many of these researchers are not leaving DOD in search of higher salaries or more meaningful purpose—rather, they are seeking positions where their

time will be optimized. Recent initiatives to reduce online training requirements are one way to help solve this issue. While increasing the efficiency and lowering the burden of processes may not seem critical at first, innovations in these areas are important to developing the talent and technologies we need to prevail in future conflicts.

New Cooperation and New Reforms

We should remember that it was the technical superiority of our forces that provided the basis for our strategic advantage in the years following World War II. For that reason, we strongly advocate the continuation of an intensive technical effort to [e]nsure that we preserve the qualitative edge in weapon systems.

—*General Curtis LeMay, Chief of Staff of the Air Force, 1961–1965*

Faced with the self-evident need to adapt, and encouraged to drive change from the highest levels of leadership, DOD lab commanders have been meeting quarterly since November 2017 with the goal of synchronizing efforts, gaining efficiencies, and enhancing collaboration across Service labs. We have focused on defense technology priorities and have begun to align business practices that will increase information transparency.

These proactive efforts have yielded early results that are making a difference. Three examples highlight the ways DOD labs are working together to develop joint solutions, share best practices, and accelerate our shared progress. These include our work in establishing new and efficient enterprise business systems, our initiatives in R&D management data analytics, and our design and implementation of Open Campus initiatives for partnering and workforce development.

Enterprise Business Systems. A tri-Service collaboration team, led by the Air Force Research Laboratory, is putting IT tools, people, and processes in place to enable the labs to operate as highly efficient, transparent organizations—fueled by the ability to make

data-driven management decisions and execute integrated business functions. For example, an intelligent Business Process Management platform and shared development environment are being implemented, enabling a team to develop multiple integrated applications. These changes will allow real-time information on contracts, finances, and other topics—collected automatically through the conduct of daily work, eliminating burdensome taskings to collect information. They will also provide up-to-date, information-rich pictures for decision-makers, allowing business decisions to be made more quickly and effectively. Lessons learned from testing at the Air Force Research Laboratory will be shared to benefit the other Services.

R&D Management Data Analytics. Early in the history of quarterly joint meetings, the DOD lab commanders established a data analytics working group, with the objective of establishing cross-Service sharing of S&T and R&D data to improve collaboration. One of the chief challenges identified by the working group was the variation of data collected and modeled in the Services' financial systems. To address this, the group focused on defining a data catalog of the minimum viable product (MVP), containing metadata for all grants, contracts, and funding documents to external institutions. This MVP data catalog supports analytics to help identify common research interests and institutions, performer networks, and funding levels. When combined with external data sets, the MVP helps identify emerging technology areas, rising stars, and core research institutes. The working group is currently deploying this capability to a government cloud environment, allowing for collaborative data-driven decision-making across the three Services.

Open Campus Initiatives. These efforts were spearheaded by the Army Research Laboratory several years ago to pilot new approaches to building a broader science and technology ecosystem—thus enabling DOD laboratory scientists and engineers to work collaboratively and side by side with visiting scientists and other partners in

lab facilities and likewise allowing DOD researchers to work at collaborators' institutions. These also involve creation of flexible career path options that allow easier transitions between government, academia, and industry. As a result of collaboration between the Services, lessons learned are being shared that are helping other DOD labs implement the most successful practices that have emerged from the Army's experiences and develop new ideas to expand the concepts even further.

These are only the start. Many other activities are under way across our labs that are breaking new ground. For instance, DOD and the individual Services are rapidly establishing innovation centers across the Nation—physical locations meant to bring together leading minds to facilitate collaboration and accelerate products. From the Defense Innovation Unit to the Air Force's AFWERX to the expansion of the Army's Open Campus to the Navy's new NavalX Agility Office featuring regional technology hubs called Tech Bridges, we are paving new roads (sometimes literally) to connect the warfighter with innovators. These centers tap into commercial technology and innovation, following best-practice business models that reduce bureaucracy. They have storefronts in many major cities to make connections with industry. They can also facilitate partnerships, focus projects on warfighter needs, and ensure technology transitions.

Congress has also given DOD labs special authorities to increase speed and agility for contracting and partnership agreements and the associated financing. The labs have been granted special authorities to recruit and hire the best scientists and engineers available, using hiring processes outside the regular government hiring pace. Each Service brings its own experiences implementing these authorities that other labs can leverage, enabling the joint team to progress together.

All these changes have begun to enable faster delivery of more lethal capabilities across the Service labs. Additional initiatives are being pursued within individual Services, with an eye toward

sharing their benefits and results with our peer labs in the other Services.

First, the Army's modernization strategy is focused on one goal: to make Soldiers and units far more lethal and effective than any adversary. The establishment of the Army Futures Command (AFC) is the largest organizational change the Service has undertaken in more than 40 years. AFC is charged with leading a continuous transformation in order to provide future warfighters with the concepts, capabilities, and organizational structures they need to win on the battlefield. The elements of the Army's Future Force modernization enterprise have moved from separate commands into AFC to achieve the unity of command and effort that leaders believe are essential to meeting these global challenges.

Under AFC, the Combat Capabilities Development Command (CCDC), formerly the U.S. Army Research, Development, and Engineering Command, is in the second year of an internal campaign of reform, realignment, and process improvement. As part of AFC, CCDC has positioned itself to integrate more effectively with the operational Army and to mature relationships with AFC cross-functional teams, which have been given the mandate to improve delivery of the Army's six modernization priorities: long-range precision fires, next-generation combat vehicles, air and missile defense, Soldier lethality, network, and future vertical lift.

The Army also analyzed the process to pinpoint bottlenecks and identify workarounds. In an article released in 2018, the Service noted that "successful transitions begin early during science and technology development with the establishment of strong working relationships between technologists within the research laboratories and program executive officers and program managers."[5] Additionally, there is an opportunity for the DOD R&D community to enable the development of smarter requirements by increasing the use of prototyping and experimentation venues and incorporating warfighter feedback, while also leveraging innovative research from our industry and academic partners.

Second, the Naval Research Enterprise (NRE) has significantly reorganized to streamline and accelerate the way it discovers, develops, and delivers new capabilities for Marines and Sailors—including using new congressional authority to eliminate the need to recompete contracts for development of initial prototypes within already existing, approved research. This is only common sense because it is difficult to imagine why any organization would have to recompete to do a prototype within the timespan of its own already approved research program. After these and other changes, the Chief of Naval Research announced in 2018 dramatically shortened timelines for critical Future Naval Capabilities (FNCs)—high-priority, fast-tracked research—to reach programs of record: It is now 3 years or less, vice the previous standard of 5 years, from "we need this" to "here you go."

Other naval efforts bearing fruit include naming an outside-the-box-thinker senior executive as the new "naval accelerator"—a senior leader with deep familiarity of successful private industry practices—charged with finding new ways to utilize private industry practices within the Service. The NRE is optimizing business operations and personnel management practices, facilitating "bridge award" authority to ensure projects near the end of a term can be brought to completion, and even trying to solve something as mundane as increasing the limits on purchase cards—long a sore spot for performers whose work comes to a screeching halt due to an inability to legally purchase a small piece of equipment without significant delay and paperwork. (This one change alone has facilitated the execution of hundreds of transactions at the Naval Research Laboratory, allowing expedited purchase of critical scientific and engineering materials and saving an estimated 1,000 days of processing time.)

These and other steps have enabled the NRE to move at speed to deliver lethal, sustainable capability. In fiscal year 2018, the NRE accelerated 30 FNCs to the fleet, while realistically deciding 21 others were not ready and taking them out of the accelerated pipeline. In fiscal

Dr. Courtney Webster makes adjustments to Warrior Web physical augmentation suit from Harvard's Wyss Institute in Boston, Massachusetts (Army Research Laboratory/David McNally)

year 2019, just a few of the new FNC capabilities reaching our Marines and Sailors included rocket imaging seekers, avionic trainers, logistics support tools, and detection and classification algorithms. And in fiscal year 2020, 19 new FNCs include new capabilities in sonar systems, electromagnetic warfare, fleet training technologies, diver safety, unmanned systems, and more.

Third, the Air Force recently completed an 18-month study with higher education and industry that resulted in the Science and Technology 2030 Strategy. The Air Force Research Laboratory (AFRL), Air Force Warfighting Integration Capability (AFWIC), and the Office of the Assistant Secretary of the Air Force for Acquisition, Technology, and Logistics (SAF/AQ) are using the strategy to develop and deliver on the five transformational strategic capabilities outlined in 2030, reform the way S&T are led and managed, and

deepen and expand the scientific and technical enterprise. To affect these changes, and ultimately drive competition to address interdisciplinary joint force challenges, AFRL is launching multiple lines of effort.

The new AFRL Transformational Capability Office (TCO) will provide enterprise management of advanced technology development programs, ensuring integration of required competencies from the AFRL Technology Directorates. The TCO will also manage the Air Force's Vanguard programs, another core element of the S&T 2030 Strategy. Vanguards are short duration, highly focused programs that drive forward innovative capabilities to advance emerging weapons systems and warfighting concepts through demonstration, experimentation, and prototyping. AFRL is working closely with AFWIC, SAF/AQ, and major commands through recurring summits and workshops to ensure

technology development programs, including Vanguards, fulfill warfighter requirements. AFRL is embedding highly qualified scientist and engineer liaisons on major command staffs to synchronize with operational requirements and ensure support for successful technology transition.

Additionally, AFRL is using Modeling Simulation and Analysis (MS&A) tools to predict the relative impact of potential technical capabilities on future Air Force operations. MS&A offers insights into technical concepts before making large investments. Coupled with wargaming exercises, these approaches bring the operational community into the research process, allowing them to influence the design and employment concepts to increase mission compatibility of the products sooner. We expect these approaches to reduce timelines and costs.

AFRL recognizes the importance of leveraging the research investments of

external organizations. Consequently, we are emphasizing strong partnerships with other government agencies, international partners, academia, and the commercial sector with close attention to nontraditional players in the DOD ecosystem. This includes tech startups, venture capitalist firms, and small businesses. To that end, AFRL will reinforce the lead, leverage, watch (LLW) model for managing technology development. With LLW, AFRL will identify those areas with specific Air Force applications where military lab leadership is appropriate (lead) vice those being pursued by academia, industry, and other agencies that have a primarily commercial purpose but with potential for Air Force applications (leverage). For promising technologies with unclear military utility, AFRL will closely monitor their progress (watch).

Finally, AFRL is adapting recruiting and management practices to get in lock step with the demands of a 21st-century workforce. New recruiting strategies and agile workplace practices will help the lab acquire and retain top talent from across the Nation. This is especially important in high-demand technology sectors, such as artificial intelligence and data analytics, where talent is difficult to retain due to competition from the private sector.

Conclusion: A Focus on Enabling the Joint Warfighter

Progress in scientific research and development is an indispensable condition to the future welfare and security of the nation. . . . Science in this war has worked through thousands of men and women who labored selflessly and, for the most part, anonymously in the laboratories, pilot plants and proving grounds of the nation. Through them, science, always pushing forward the frontiers of knowledge, forged the new weapons that shortened the war.

—*President Harry Truman, Special Message to Congress, 1945*

Then Secretary of the Air Force, the Honorable Heather Wilson, pointed out that the "[S]ervices . . . are on the cusp of becoming integrated . . . not just interdependent, not just joint, but integrated in our operations." Because if we could do that—if we can "gather information faster, decide faster, and act faster on that information"—then we are going "to prevail in 21st-century conflict."[6] We are on the cusp of being able to think and move in that direction. The DOD lab commanders continue to expand collaboration and alignment between the Services. This partnership brings the joint force closer to the necessary integrated operations DOD needs going forward.

All this collaboration is for naught unless we can get technology into the hands of our warfighters. The growing sophistication of our potential adversaries against the backdrop of information-age warfare requires seamless integration and execution. In order to remain the world's most lethal and capable fighting force, we must be able to innovate and operate faster and more effectively than our adversaries. We must continue to work toward the big technology breakthroughs that not only keep future fights unfair and provide overmatch but also change the equation altogether.

Part of dominance is being so strong that adversaries do not dare to act with bad intent. We can and must maintain that deterrent capability.

The DOD laboratories recognize the need for change, and we are acting now. We are strengthening our workforce and business practices to keep up with and indeed set the standard for best practices. Our teams are keen to build partnerships with academia, industry, governmental agencies, and international partners to ensure technological superiority in the 21st century.

We do not have all the answers yet. However, we believe a unified strategy with fully committed agents can guide DOD toward success. The proposals outlined here are not simply theoretical. We are acting on them and making them reality, and we invite others to join us, advise us, and partner with us. We need to move forward smartly, and we look to senior DOD leaders and Congress to help us remove roadblocks.

The Nation's military labs are but one player in the overall DOD system of delivering capability to ensure victory. However, we realize the serious responsibility we have: Future military power starts here. The United States, and the DOD labs, have an advantage: We are part of multiple thriving partnerships of the best minds in the world. We can support research that is determined not by the stock market but by the marketplace of ideas. DOD labs are the only place this can occur. It is a responsibility, a challenge, and an opportunity of the highest order.

We call upon key partners within our own Services—as well as the Office of the Secretary of Defense, elected officials, other governmental agencies, large industry and small business, academia, Federally Funded Research and Development Centers, and more—to join us in this critical mission. **JFQ**

Notes

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Beyond *Auftragstaktik*
The Case Against Hyper-Decentralized Command

By Trent J. Lythgoe

The U.S. Army's mission command doctrine has sparked considerable discussion and criticism among Service professionals. Most agree that mission command is the right approach for commanding and controlling Army formations. However, some argue that the Army's de facto implementation of mission command fails to live up to its intellectual predecessor, *Auftragstaktik*,[1] a Prusso-German command philosophy that emphasizes decentralization, commander's intent, and low-level initiative.[2] These critics maintain that the Army must decentralize command as much as possible in order to realize the Auftragstaktik ideal.

This article sets out to show that the argument for hyper-decentralized command is flawed and that the concept itself is dangerous. The case for hyper-decentralization relies on a misinterpretation of Auftragstaktik, which underappreciates the role of planning and coordinating in Prusso-German warfighting. Moreover, decentralizing as much as possible is no guarantee of command effectiveness and is often harmful. This is not to say, however, that the current approach is effective. Army doctrine advises commanders to "balance" centralization and

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Israeli gun boat passes through Straits of Tiran near Sharm el-Sheikh during Six-Day War, June 8, 1967 (Israel Government Press Office/Yaacov Agor)

decentralization. This static approach fails to account for the dynamic nature of operational context. It also frequently results in overly centralized control because many Army commanders lack trust in subordinates, are uncomfortable with uncertainty, and are risk-averse.

Ultimately, mission command must enable forces to win by bridging the gap between doctrine and operational context. It must resolve the inherent tension between centralization and decentralization. Mission command must allow forces to mass combat power on decisive points while remaining adaptable to emergent opportunities and threats. Perhaps most important, it must enable the commander to operate in diverse, dynamic, and violently entropic operational contexts. An *iterative approach* to mission command is necessary to satisfy these requirements. An iterative approach would allow the commander to move continually between centralization and decentralization based on the demands of the operational context. By iterating continuously through a

cycle of four activities—synchronization, dissemination, initiative, and reporting—Army commanders would be able to continuously adjust to the demands of the operational contexts within which their formations must fight.

Auftragstaktik and Moltke's Dialectic

Born in the aftermath of the Napoleonic Wars and rooted in the theories of Carl von Clausewitz, the philosophy of Auftragstaktik was an exceptionally effective tactical innovation. One factor that made Auftragstaktik successful was its emphasis on lowering decision thresholds. By allowing company- and field-grade leaders to act without first seeking permission, the Prussians/Germans increased their tactical decision cycle speeds. In World War II, the German *Wehrmacht* gave a spectacular demonstration of Auftragstaktik's tactical potency. The Germans combined Auftragstaktik with well-trained soldiers, aggression, and mechanized formations.

The Wehrmacht penetrated, exploited, encircled, and collapsed its hapless opponents with ruthless efficiency.

The U.S. Army explicitly modeled its mission command doctrine on Auftragstaktik for good reason.[3] An unfortunate side effect of this linkage is that many Service leaders evaluate mission command vis-à-vis Auftragstaktik rather than on its own terms. They argue that mission command falls short because it fails to live up to the Prusso-German ideal. These criticisms follow a predictable script. They begin by claiming the Army's adoption of mission command is deficient. Next is a brief history of the Prusso-German way of warfighting that characterizes Auftragstaktik as a completely decentralized command philosophy. Critics then contrast the ostensibly decentralized, improvisational character of Auftragstaktik with the Army's centralized, methodical approach. Finally, the proposed fix is hyper-decentralization—lowering decision thresholds as much as possible—to bring mission

command in line with what critics imagine Auftragstaktik to be. The problem with this argument is that it relies on a flawed interpretation that equates Auftragstaktik with decentralization. While decentralization was an important part of the Prusso-German way of warfighting, it was not the sole factor that made Auftragstaktik effective.

Helmuth von Moltke the Elder is widely credited with institutionalizing Auftragstaktik in the Prussian/German army. His famous dictum that "no plan of operations extends with any certainty beyond the first contact with the main hostile force" is a favorite among mission command critics.[4] However, Moltke's views on command were more nuanced than his famous quotation suggests. For example, he observed that "it is always a serious matter to abandon, without the most pressing necessity, a once settled and well-devised plan for a new and unprepared scheme."[5] Moltke resolves the apparent conflict between this notion and his more famous dictum by acknowledging the dialectical interaction between planning and reality:

[S]*trategy affords the tactics the means for fighting and the probability of winning by the direction of armies to their meeting place of combat. On the other hand, strategy appropriates the success of every engagement and builds upon it. The demands of strategy grow silent in the face of a tactical victory and adapt themselves to the newly created situation.*[6]

For Moltke, higher level planning sets the conditions for lower level actions by creating favorable conditions for those actions. Upon execution, however, the results of lower level actions drive subsequent higher level planning. Though Moltke was writing about the interaction between the levels of war, the dialectic can also be seen in German tactical and operational warfare. Planning drives action, the results of action drive subsequent planning, and the cycle continues.

The Battle of Sedan is a characteristic example of Moltke's dialectic at the tactical level. In May 1940, the German XIX Panzer Corps—consisting of the 1st, 2nd,

and 10th Panzer divisions and led by the legendary Heinz Guderian—spearheaded the advance through the Ardennes. Knowing they would have to cross the River Meuse at Sedan, Guderian's corps had planned and rehearsed crossing operations extensively before the campaign. Upon arriving at the Meuse on May 12, Guderian's chief of staff wrote and issued a detailed operations order to synchronize crossing operations. The Panzer divisions did the same. The 1st Panzer Division order, for example, included a fires synchronization matrix, a centralized coordination tool that critics would view as anathema to Auftragstaktik.[7]

Despite being well planned, the crossing was only partially successful. Guderian's three Panzer divisions began crossing at three bridgeheads during the afternoon of May 13. At the center bridgehead, 1st Panzer had good success and penetrated several kilometers into the French rear. On the flanks, however, the defending French 55th Infantry Division checked the 2nd and 10th Panzer attacks. That night, 1st Panzer commander Friedrich Kirchner pressed his attack even further. Though he had no orders to do so, Kirchner's aggressive actions were entirely within Guderian's intent that "once armoured formations are out on the loose they must be given the green light to the very end of the road."[8] But Kirchner's thrust had placed 1st Panzer in a vulnerable position. Lack of progress on the flanks left 1st Panzer occupying a narrow salient with little more than an infantry brigade and no armor.[9]

The French, meanwhile, had spent the night reorganizing from their initial setback. By the morning of May 14, they were ready to counterattack with a combined tank and infantry task force. Guderian himself had crossed the river and was forward with 1st Panzer when German reconnaissance reported the massing French tanks. While Kirchner prepared to meet the French assault, Guderian raced back to the bridgehead and directed his staff to rapidly move 2nd Panzer Regiment's tanks across the river to support 1st Panzer. Guderian's speedy reorganization succeeded; the German tanks narrowly beat the French to a key

ridge near the town of Bulson, and the high ground proved decisive terrain from which the Germans were able to repel the French counterattack.[10]

Guderian's victory at Sedan was as much a result of planning, preparation, and coordination as it was of improvisation and initiative. Detailed planning and rehearsals set the conditions for the river crossing. However, uneven success during the initial crossings resulted in a substantially different situation than Guderian's initial plan had envisioned. Still, Guderian and his staff were able to rapidly adapt to the changed situation and coordinate the necessary changes to deal with it effectively. Those who advocate for hyper-decentralized command too often ignore the centralized aspects that made the German approach work at Sedan and elsewhere. They herald the aggression and initiative demonstrated by Kirchner but minimize or ignore the planning and rehearsals that made the crossing possible in the first place. Ignored too is the hasty coordination to get armor support forward, which saved Kirchner's aggressive penetration from being a crippling defeat.

The Dangers of Hyper-Decentralization

The idea that Auftragstaktik is a hyper-decentralized command philosophy persists despite contrary evidence.[11] Many Army officers have come to believe that decentralization is the most important tenet of mission command. For example, one Army major writes that mission command is "the practice of decentralizing decision-making and authority down to the lowest possible echelon."[12] This obsession with decentralization is not only ahistorical but also potentially dangerous. There are axiomatic reasons to be wary of hyper-decentralization.

First, decentralization is not inherently advantageous. It is true that in many cases, lower decision thresholds are necessary for operational effectiveness.[13] At the extreme, however, a completely decentralized force is little more than an unruly mob. Beyond a certain point, more decentralization

Formation of F-35 Lightning IIs from 388th and 419th Fighter Wings stationed at Hill Air Force Base performs aerial maneuvers during combat power exercise over Utah Test and Training Range, November 19, 2018 (U.S. Air Force/Cory D. Payne)

impedes operational effectiveness rather than enables it. Second, the *operational context*—the mission, the enemy, and the environment within which formations fight—is a critical factor in determining how a commander should organize command. Decentralized command is not desirable or effective in every operational context.[14]

The Israeli experiences in 1956 and 1967 illustrate the limits of decentralization. In the 1950s, the Israel Defense Forces (IDF) adopted German tactical doctrine with the aim of fighting a maneuver war against potential aggressors.[15] A rapid and decisive blitzkrieg campaign was an ideal solution to Israel's dual problems of being surrounded by enemies and lacking the depth necessary for a strategic defense. The Israelis decentralized command even more than the Germans, and this hyper-decentralized philosophy was tested in the 1956 Suez Crisis. IDF maneuver brigades operated nearly independently from one another

with little more than mission orders and commander's intent. The results, however, were middling. While some brigades were successful, others were not. Brigades did not mutually support each other, and fratricide was rampant. Although the IDF prevailed, Israeli soldiers paid in blood for the lack of coordination.[16]

After the war, IDF commanders decided that brigades had been given too much independence. The Israelis subsequently revamped their command philosophy by *increasing* centralization to coordinate operations more effectively. The IDF implemented this new approach in the 1967 Six-Day War. This time, division-level commanders ensured brigades were mutually supported, and corps-level commanders synchronized actions among divisions. The results were nothing short of spectacular.[17] IDF commanders demonstrated the value of being able to dynamically centralize or decentralize command based on the operational context. In the Sinai, for

instance, Brigadier General Israel Tal's division conducted an armored penetration and exploitation along the Mediterranean coast toward El Arish. Faulty intelligence and unexpected events made Tal's fight a series of improvisations that in the end only vaguely resembled his original plan. Major-General Ariel Sharon's division, on the other hand, conducted a tightly controlled set-piece attack on the Egyptian strongpoint at Umm-Qatef. Both commanders were successful because they adapted the IDF command philosophy to suit their unique operational contexts.[18]

The IDF experience demonstrates both the limits of decentralization and the importance of considering the operational context. The principal shortcoming of hyper-decentralized command is that it drives commanders to decentralize as much as possible in all contexts. Yet not all operational contexts demand decentralization. This argument is elaborated below, but it bears mentioning the German case at Kursk (1943), where

decentralization and individual initiative mattered little in the teeth of a well-planned and prepared Soviet defense. Commanders must consider the operational demands of a given situation when determining where to place decision thresholds.

Army Doctrine: A Tale of Two Traditions

Command is a means to an end, which is to *win*. The character of command is therefore strongly influenced by the methods by which winning is achieved—that is, a force's fighting doctrine. A command philosophy must bridge the gap between how a commander *wants* to fight (doctrine) and how the force *must* fight given the operational context. The Army's fighting doctrine presents a unique challenge because it is an amalgamation of two traditions—the Jominian and the Clausewitzian. Each tradition views winning through a different conceptual lens. This dichotomy leads to different command philosophies and an inherent tension in how Army doctrine approaches mission command.

The Jominian tradition subscribes to the "one great principle" of war—to throw the mass of one's force on the decisive point. The Jominian imperative to "arrange these masses . . . at the proper time and with energy" requires synchronization, centralized control, and unity of effort.[19] For Jominians, command primarily *coordinates* the application of combat power. The centralized control required to do so, however, risks sacrificing adaptability. Moltke's dictum underscores the idea that the chaos of battle will eventually render preplanned controls obsolete, at which point they merely limit freedom of action. Lower level commanders are unable to adapt to changed conditions without permission, and enemies can exploit this inaction. Thus, the principal problem for Jominian command is *how to coordinate the application of combat power at decisive points without sacrificing adaptability.*

The Jominian tradition's answer to the adaptability problem has historically been a technologically centered effort to push better situational awareness up the chain of command. The idea is that technologically enabled higher level commanders can make decisions with the big picture in mind but at the speed of adaptability. These efforts, however, have largely proved fruitless and even counterproductive.[20] Technology has in some ways inhibited rather than enabled command by creating enormous information appetites that lower level commanders must continually feed.[21]

The second approach is the Clausewitzian tradition. Clausewitzians are skeptical of coordination because combat is inherently uncertain, and reality is unlikely to unfold according to any plan.[22] For Clausewitzians, improvisation is necessary to cope with unanticipated conditions, and therefore *adaptability* should be command's central concern.[23] Since lower level commanders will be the first to recognize the need to adapt, higher level commanders enable adaptability by allowing their subordinates to act independently. The risk is that lower level commanders may fracture the higher commander's unity of effort. Each lower level commander may act correctly according to his or her understanding of local problems but without appreciating how this might affect the higher level situation. Divergent actions may render disparate units unable to provide mutual support and make them vulnerable to defeat in detail. The Clausewitzian approach, therefore, has the opposite problem of the Jominian approach: *how to adapt to the uncertainty of combat while retaining the ability to coordinate the application of combat power at decisive points.*

The Clausewitzian tradition's answer to its coordination problem is implicit control enabled by shared understanding and commander's intent. The idea is that higher and lower level commanders come to a shared understanding of what needs to be done based on the higher commander's intent, then use this understanding as a conceptual handrail when circumstances change. This is said to enable "decentralized and distributed formations to perform as if they were centrally coordinated."[24]

The problem with implicit control is that it degrades over time. Commanders formulate their intent and build a common understanding with subordinates based on a shared visualization of the future situation. This estimate, however, is no more likely to be accurate than the one that underpins Jominian controls. Combat is violently entropic; it relentlessly moves toward disorder and chaos. The commander's intent and shared understanding may *initially* synchronize action. But as disorder increases, reality diverges from the shared visualization. The implicit synchronization of otherwise disconnected actions erodes and eventually ceases. Unless commanders and subordinates periodically refresh their shared understanding, they will eventually cease to be on the same conceptual page. Implicit controls have the same limitation as the explicit controls favored by the Jominians; they have a short half-life in combat. In other words, the only thing that will make formations perform "as if they were centrally coordinated" is to centrally coordinate them.

Doctrinal and De Facto Shortcomings

The Army's competing concepts of command create a paradox: neither centralization nor decentralization is independently sufficient, yet both are necessary. The Army's command philosophy must provide enough control to synchronize combat power at decisive points, but at the same time be decentralized enough to deal with the uncertainty and chaos of battle.

Unfortunately, Army doctrine fails to resolve this tension in both theory and practice. It advises commanders to "use the guiding principles of mission command to balance the art of command with the science of control."[25] This "balancing" approach imagines a continuum of command with decentralization at one extreme and centralization at the other. The commander adjusts the level of control up or down based on the situation.[26]

In theory, the balancing approach is a modest (if still flawed) improvement over hyper-decentralization. It at least directs the commander to consider operational
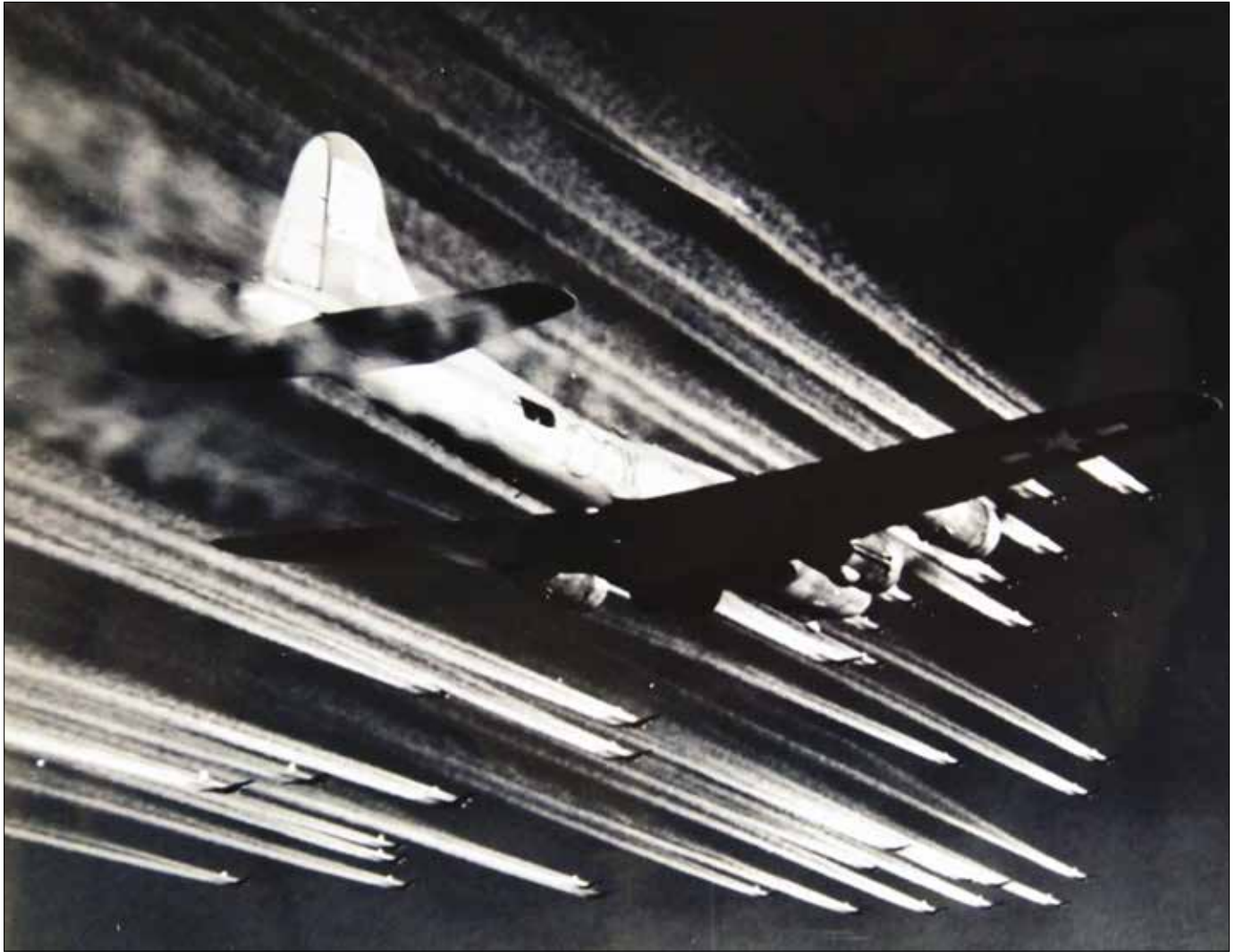
B-17 leaves trails over Brunswick, Germany, during World War II (U.S. Army Signal Corps/Library of Congress)

context to determine the degree of control necessary. Its weakness, however, is that it is missing the entire latter half of Moltke's dialectic. It describes how control limits adaptability but fails to describe how adaptability must also shape control. In practice, the balancing approach frequently results in excessive control. Army commanders tend to overcontrol because they either lack trust in subordinates, are risk-averse, or both.

Adjusting the level of control based on trust (or lack thereof) is the same inward orientation error seen in hyper-decentralization. That is, it structures command based on internal concerns rather than operational demands. Moreover, it makes little sense. The purpose of decentralization is to increase adaptability in response to uncertainty. If

we accept that war is inherently chaotic and uncertain, then we must also accept that some decentralization is required to win. Therefore, *trust is required to win*. Commanders who do not trust subordinates enough to decentralize are at a severe disadvantage. Lack of trust cannot be mitigated with additional controls.

While tightening control based on risk is a sound practice, too often commanders impose excessive controls because they are either risk-averse or because they mistake *risk* for *uncertainty*. Risk is a function of the probability that an event will happen and the consequences if it does. For example, a commander may judge that a subordinate unit that advances beyond a certain point may be vulnerable to counterattack and beyond the range of mutual support.

If such a scenario is likely to happen (probability) and could result in that unit's destruction (consequences), then a control (such as a limit of advance) is prudent.

Nevertheless, the urge to overcontrol is strong. One reason is risk aversion.[27] Research suggests Army leaders are particularly risk-averse. Officers selected to attend the Army War College score lower than the general population on openness to experience using the Five Factor Model personality test, and those selected for brigade command score even lower.[28] Research on personality and risk-taking shows that openness to experience correlates with less risk-taking behavior.[29]

Commanders also overcontrol because they are uncomfortable with uncertainty. Risk is not necessarily higher

under conditions of uncertainty, but commanders often perceive it to be because they lack the information necessary to estimate risk. Many commanders instinctively tighten controls, *but this is precisely the opposite of what they should do.* Uncertainty increases the possibility of unforeseen threats and opportunities. Lower decision thresholds enable lower level leaders to respond quickly to these emergent demands, while more centralized control limits their ability to do so.

Operational Context and Iterative Command

The idea that the Army's command philosophy must bridge the gap between fighting doctrine and operational context creates two challenges. First, the philosophy must resolve the tension between the Jominian and Clausewitzian imperatives. Second, it must do so in whatever operational context Army forces must fight. Adapting to the operational context is the more formidable task. While Army fighting doctrine is relatively stable, operational context is nearly the opposite. Operational context is *diverse*, *dynamic*, and *violently entropic*. Each operational situation is unique, constantly evolving, and continually moving toward disorder.

Neither hyper-decentralization nor the balancing approach has the means to address these challenges. Hyper-decentralization is explicitly biased toward the Clausewitzian imperative, and as a result it fails to account for synchronization and mass. It is inwardly oriented on maximum decentralization rather than outwardly oriented on the demands of the operational context. The balancing approach is likewise inadequate. It does not account for the dialectic between adaptability and control and in practice frequently results in overly centralized control, which is no better than hyper-decentralization.

The solution to these problems is an *iterative approach* to mission command. This approach enables the commander to move continually between centralization and decentralization based on the demands of the operational context. The iterative approach is a continuously repeating cycle of four activities: synchronization, dissemination, initiative, and reporting.

Synchronization is the process of implementing the minimum necessary control to mass combat power at decisive points and maintain mutual support while preserving as much freedom as possible for subordinates. Importantly, *minimum necessary control* is not the same as *minimal control*. The operational context drives how much control is minimally necessary. In some cases—such as a combined arms breach or an air assault—the minimum controls will be necessarily stringent. In all cases, however, the commander must avoid overcontrolling and should decentralize as quickly as the need to control diminishes.

The second activity, *dissemination*, involves the higher commander communicating his or her intent and mission orders to subordinates. Commander's intent and mission orders should be short, easily understood, and contain the minimum necessary control measures to enable synchronization. When disseminating orders, commanders should not rely exclusively on voice and data communications. The best commanders move around the battlefield and communicate their intent to subordinates face-to-face.

The third activity is *initiative*. Commanders empower subordinates to take the initiative to respond to emergent conditions. Subordinates seize fleeting opportunities and mitigate emergent threats immediately and effectively when they do not have to seek permission or await directions from their higher command. Initiative allows units to adapt to uncertainty and change.

Finally, *reporting* means subordinates communicate information rapidly and accurately to the higher commander. Reporting mitigates the risk of units acting on their own initiative. By communicating and reporting, subordinates allow the commander to update his or her visualization of the battle and determine what additional decisions are required to maintain mutual support and unity of effort across the formation. The commander relies on this updated visualization to *resynchronize* the force, and the iterative cycle begins again. Each cycle is an opportunity for the commander to adjust the level of control. As the operational context changes, the commander can continually adjust his or her command approach to compensate.

Iterative command is in some ways already "out there" in the force. Commanders already synchronize, disseminate, take initiative, and report. The real change is the mental shift required from both junior and senior leaders to make iterative command work. Junior leaders often believe mission command means no higher level control and perceive reporting requirements as micromanagement. These misconceptions must be dispelled. Mission command is not equivalent to minimal control; some situations require more control and some less. Likewise, reporting requirements are not micromanagement. Reporting is necessary for the higher commander to create an accurate visualization, resynchronize the force, and maintain unity of effort.

Senior commanders must also change how they think about mission command. They must accept that mission command is both top-down and bottom-up. It is top-down in that higher commanders synchronize the activities of subordinate units. However, it is bottom-up in that subordinate initiative drives resynchronization. The higher commander must be responsive to and support lower level initiative. In this way, lower level initiative "pulls" higher level synchronization rather than the opposite and more conventional "push" from higher to lower. This arrangement may feel alien to many senior commanders who prefer the more conventional "higher says, lower does" hierarchical approach. However, allowing initiative to drive synchronization is required for mission command to succeed.

Conclusion

Calls for the Army to adopt hyper-decentralized command are misplaced. The case for hyper-decentralized command rests on a misinterpretation of Auftragstaktik, which underestimates the importance of planning and control in the Prusso-German approach while

overestimating the importance of improvisation and low-level initiative. Moreover, hyper-decentralization provides no means to coordinate mutual support among units or mass combat power at decisive points. It relies on questionable assumptions regarding the degree to which the commander's intent and shared understanding can coordinate actions.

The Army's implementation of mission command is also problematic. Army doctrine's balancing approach fails to resolve the inherent tension between centralization and decentralization and often results in overly centralized control. But the solution to this problem is not hyper-decentralization. Though Auftragstaktik has some qualities worth emulating, it should not be the ideal for which the Army strives. The degree to which a command system mirrors that of the Prussians or Germans is less important than its usefulness in enabling Army forces to win.

Instead, the Army should adopt an iterative approach to mission command that allows the commander to empower subordinates to take disciplined initiative while retaining the ability to coordinate and mass combat power. These opposing but necessary imperatives cannot be achieved through hyper-decentralization. Nor can they be achieved through the balancing approach found in doctrine. An iterative approach based on a continual cycle of synchronization, dissemination, initiative, and reporting is the most promising way ahead for mission command. **JFQ**

Notes

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Aircrew member of C-130J Super Hercules assigned to 774th Expeditionary Airlift Squadron prepares to depart for various bases throughout Afghanistan, August 2, 2019, at Bagram Airfield (U.S. Air Force/Keifer Bowes)

Asking Strategic Questions
A Primer for National Security Professionals

By Andrew Hill and Stephen J. Gerras

If one wants to solve a problem, one must generally know what the problem is. A large part of the solution lies in knowing what it is one is trying to do.

—Fred Kerlinger and Howard B. Lee, *Foundations of Behavioral Research*

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Your teachers lied to you: some questions really are stupid. At best, a bad question wastes time and energy by distracting from what is important. At worst, it sets one up for failure, either by asking the wrong question or presuming the wrong answer to the right question. These problems are even more pronounced in the military, where a powerful culture of obedience responds to a leader's curiosity with a frenzy of activity that may or may not be useful.

Because leaders have so much power over which questions organizations ask, it is essential that leaders understand the

Figure. Detail of Memorandum by Theodore Sorensen, October 18, 1962


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                                                    TCS - 10/18/62

Two big questions must be answered, and in conjunction with each other:

1.  Which military action, if any:
       -- Limited air strike: Rusk, probably Ball and Johnson, Acheson originally
       -- Fuller air strike: McNamara and Taylor (who convinced Acheson)
          Bohlen's 2nd choice
       -- Blockade: Bohlen, Thompson, probably Martin, probably McNamara and
          Taylor 2nd choice
       -- Invasion: McCone, maybe Nitze

2.  Should political action -- in particular a letter of warning to Khrushchev --
    precede military action?
       -- If blockade or invasion, everyone says yes
       -- If air strike
          -- Yes: Bohlen, Thompson (also K. O'Donnell)
          -- No: Taylor, McNamara, presumably Acheson
          -- Undecided: Rusk
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Source: Image courtesy of the John F. Kennedy Presidential Library.

basic characteristics of good strategic questions. We use the term *strategic* to differentiate the questions that shape and inform strategy—the focus of this article—from the wide variety of questions that organizations may explore. For example, what are the essential characteristics of 21st-century military leaders? Are we selecting for and developing these characteristics? What are U.S. military options in dealing with [nation X]? How will [nation X] respond to different military actions? What are the most significant current capability needs of the U.S. Army? How should we prioritize those needs? These are all strategic questions—difficult to answer, but useful to ask and explore. In this article, we propose guidelines for asking questions designed to improve an organization's performance amid competitive uncertainty.

Asking good strategic questions is not just a useful leadership habit; in the national security profession, it can save lives or alter the course of history. On October 16, 1962, President John F. Kennedy was briefed on the photographic findings of U-2 flights over Cuba. The President was shown photos that appeared to reveal Soviet medium-range ballistic missile sites. Over the next 13 days, President Kennedy and his advisors would ask hundreds of questions. What

is happening? What does it mean? What will happen if we do nothing? What can we do? What will happen if we do X? Finally, what could go wrong? In that situation, the short answer was "a lot," including a nuclear war with the Soviet Union. The prospect of Armageddon gave the other questions a great deal of urgency. President Kennedy avoided the worst-case scenario for the Cuban Missile Crisis, in no small part because of the way he guided his leadership team through a grueling process of strategic inquiry. He asked excellent strategic questions.

Three Categories of Strategic Questions

Definition questions ask what is happening. These include:

- Defining nature: What is the thing we are analyzing? How is it interacting with the world around it? *Example: What is China's current policy toward Taiwan?*
- Defining extent: How big is the problem? What are the likely costs of inaction? *Example: How many sexual assaults occurred among Active-duty Servicemembers last year?*
- Defining urgency: How is the problem unfolding in time? Is it getting better or worse? How quickly? *Example: How have the oper-*

ational readiness levels of Air Force aircraft changed in the past 5 years?

Causation questions ask why a thing is happening or what it may lead to in the future. These questions include:

- Explanation: Why is it happening? What are the causes? *Example: Why are African American officers underrepresented in the combat arms branches of the Army?*
- Prediction: What is likely to happen because of this situation or event? *Example: What kind of senior leaders is the current Army personnel system likely to produce?*

Intervention questions involve proposals for solving or mitigating a problem (or exacerbating a problem for an adversary). Intervention questions extend causal analysis to examine one or more proposed actions (such as a policy change or a new program). Intervention questions fall into one of three areas:[1]

- Effectiveness: Does it work? *Example: What is the likely effect of new sanctions on Iran?*
- Efficiency: What is the relationship between the benefits and the costs? *Example: What are the readiness improvements resulting from more frequent Army unit rotations at the National Training Center? How do those improvements compare to the costs of those rotations?*
- Robustness: Is the proposed intervention still sufficiently efficient or effective if we relax key assumptions? *Example: How effective is our campaign plan if we lose access to bases in [country X]?*

Five Characteristics of a Good Strategic Question

While definition, causation, and intervention questions require different research approaches, all three question types should have five characteristics in common.[2]

A Good Question Is Grounded in the Competitive Context. A good research question reflects a preliminary understanding of the context of the problem

or issue. That is, the question is *grounded* in a basic understanding of the situation. The purpose of asking these questions is not to become an expert on a topic—that is what the subsequent research is supposed to do. Nor does grounding necessarily sacrifice creativity. Grounding is akin to conducting a reconnaissance of a problem or issue. Research scholar Andrew Van de Ven writes, "The purpose of these activities is to become sufficiently familiar with a problem domain to be able to answer the journalist's basic questions of *who*, *what*, *where*, *when*, *why*, and *how*."[3] Depending on the topic, this may involve a review of prior work on the subject, some direct interaction with the problem area, review of relevant data, and discussions with people familiar with the problem.

There is tension between knowing enough to ground analysis and knowing so much that one becomes a slave to the tyranny of expertise. Much can be said for bringing in the novel perspective of a nonexpert. Grounding is intended to give leaders enough of an understanding to judge whether a question has the potential to generate useful insight and to avoid replicating others' work or falling into a trap that prior researchers have encountered.

It would be incorrect to say that grounding is the most important part of asking strategic questions, but hastily passing over the grounding questions may set one up for big problems. The failure of U.S. policymakers and military planners to anticipate the effects of the 2003 overthrow of Saddam Hussein and the ruling Ba'athist party in Iraq was rooted (among other things) in a failure to ask basic contextual questions before the invasion that would have led to an entirely different set of questions about the strategic plan for a post-Saddam Iraq.

Grounding also underscores a common problem in large organizations: their frustrating tendency not to know what they know. What characteristics and behaviors are necessary for effective military leadership? How do we select for the right characteristics? How do we develop the right behaviors? The U.S. military is constantly examining these questions, yet it tends to approach them as if no prior work had ever occurred. A key part of grounding questions is developing familiarity with the *good* work that has already been done. This saves time and energy and is more likely to produce original and important insight. Instead of redoing the good work of our predecessors, we should build on it.

A Good Question Has Two or More Variables. A good strategic question has at least one "explanatory" or "independent" variable and one "response" or "dependent" variable. In the Cuban Missile Crisis, the independent variable was the action chosen by the United States, and the dependent variable was the result of that action. In experimental terms, the explanatory variable is the "treatment" condition, and the response variable is the "outcome" measure.

A Good Question Is Stated Clearly and Unambiguously in Question Form. This seems like an easy rule to follow, but it is not. For example, we ask, "How does a U.S. military presence in Afghanistan affect violence in the country?" Is this a good research question? On the face of it, it seems to be. Two variables? Check. Clear and unambiguous? Maybe not.

It is, in fact, a vague research question. Which two variables are we going to explore? We have lots of choices. How are we going to measure "military presence"? Are we interested in all U.S. military activity, or do we focus only on U.S. troops in regular contact with noncombatants? What about measuring violence? Are we interested in violence in general or only in political or military violence?

Maybe we want to know about how different forms of military activity influence violent behavior, so we want to examine how foot patrols compare to mounted patrols in affecting violence in different areas. Or perhaps we are testing the "broken windows" theory of civil order, exploring the connection between the intensity of policing low-level offenses and the occurrence of violence.[4]

When formulating or evaluating a research question, consider whether a question clearly identifies the phenomenon of interest. A question that does not yield specific research implications is a poor one.

A Good Question Implies the Possibilities of an Observable Answer. A good question will convey some information about how the relationship between the two (or more) variables is going to be tested. It tells us something about the key variables and about how we are likely to model the relationship between them. Above all, a good question suggests the possibility of a positive or a negative result, and a willingness to accept either one.

The question "How does the type of patrol (foot patrols vs. car patrols) affect the prevalence of violence in similar neighborhoods with otherwise similar military presences?" contains a lot of information about the statistical model a researcher is likely to use. It tells us something about the explanatory variable (percentage of patrol time spent on foot, controlling for overall patrol time) and the dependent variable (violence rate). It also suggests other measures (called "control variables") that will be included to try to isolate the effect of policing: total police presence, geographic size of the area, demographics, income levels, and so forth. All of that can be quantified and modeled.

A Good Question Acknowledges the Uncertainty Inherent in Competition. "The enemy gets a vote" is a wise military adage. Most significant strategic questions inevitably involve some matters that are partially (if not entirely) outside of our control. When posing strategic questions, it is useful to have in mind the limits of what we can know at any time. The answers to most important strategic questions are inherently provisional. Good strategic questions invite us to consider how to improve our competitive position or manage a problem better. They do not ask us how to "win" where winning is not possible or "solve" where no permanent solution exists. For example, "How do we solve the improvised explosive device (IED) problem?" is *not* a good question. It is better to ask, "How can we improve the protection of our forces against IED attacks?" "How can we reduce the number of IEDs being

Afghan National Army 10th Special Operation Kandak commandos conduct small arms barrier firing drills during series of weapons proficiency ranges at Camp Pamir, Kunduz Province, Afghanistan, January 13, 2018 (U.S. Air Force/Sean Carnes)

placed?" "How can we identify emplaced IEDs prior to detonation?" Note that the answers to each of these questions will change over time.

Thus far, we have explored five characteristics of good questions. What about bad ones?

Five Signs of a Bad Question

Formulating a good strategic question takes time and effort. Asking a bad question is easy. Bad strategic questions often have one of the following characteristics.

A Bad Question Displays Little Grounding in the Context of the Problem or Issue. Just as it is arrogant to assert that nothing new can be said about an issue, it is equally hubristic to assume that no prior work is relevant to a problem now. Do the homework. Ask the journalist's questions. Assume that predecessors' experiences dealing with their problems may help deal more

effectively with the current problems. Badly grounded questions often begin, "Why don't we just . . . ?" For example, "Why don't we just control our own budget?" "Why don't we just push legal approvals down to the lowest level?" "Why don't we just impose a common standard?"

A Bad Question Is Vague Regarding Key Variables. "Why is counterinsurgency not working in Afghanistan?" is a bad analytical question. What does "not working" mean? The question does not suggest any specific measure of performance, and we have numerous options: violent noncombatant deaths, Afghan military casualties, coalition casualties, number of cities and villages under Taliban control, total population under Taliban control, and so forth. Without knowing more about the basic question motivating the analysis, the question of variable specification has no right answer. If the analytical question opens an endless

discussion about which variables are the right ones for analysis, then it probably needs to be rephrased.

A Bad Question Presupposes the Answer, Includes the Answer, or Signals That Only Certain Answers Are Acceptable.[5] "Why is counterinsurgency not working in Afghanistan?" presupposes an answer to two other questions: first that the U.S.-led coalition and Afghan national forces are executing a large-scale counterinsurgency, and second that the counterinsurgency is not effective. The author of such a study (and many others) may see both assumptions as settled issues. However, avoid embedding assumptions in any question that are (1) not beyond doubt and (2) not central to the question.

It may sometimes be necessary to break a strategic question into multiple parts. This is fine, if follow-on questions logically reflect the answers to opening questions. For example, "How well does

the current U.S.-Afghan operation match the canonical principles of counterinsurgency?" is a decent *definitional* opening question regarding what is happening in Afghanistan. Thus, if we find that the U.S.-Afghan effort is not a counterinsurgency, focusing more on killing the enemy and less on protecting populations, then we may ask questions about the effectiveness of this approach.

Another research foul is a question that clearly indicates the unacceptability of certain answers, such as, "What makes the aircraft carrier essential to American power?" This question (a bad one) strongly implies that it is unacceptable to conclude that the aircraft carrier is not essential to American power.

In policy and program analysis, as in all research, the potential value of the work is proportional to its potential to find a surprising result. Again, Van de Ven advises, "Permit and entertain at least two plausible answers to the question. Alternative answers increase independent thought trials."[6]

A Bad Question Includes Causal Claims or Solutions.[7] "Given that prisons are the higher education system of crime, how does incarceration affect the probability of a first-time offender's future imprisonment?" This question is interesting but flawed. It both answers the question (imprisonment increases the probability of future imprisonment) and explains why it is the answer (newer criminals learn from more experienced criminals). One should avoid embedding causal claims or solutions into questions. This will skew the analysis, artificially narrowing the focus. It will also reduce credibility.

An embedded causal claim (bad) and a hypothesis (good, if phrased correctly) are not the same. An embedded causal claim is usually *not* the object of analysis. It is a proposition that we are sneaking into the question, often without proving it or asking whether it is legitimate. In the prison question, we sneaked in the claim that prisons are criminal universities.

In contrast, a hypothesis is a claim that is being tested in the analysis. Good research questions have good hypotheses that rephrase them as testable assertions.

Thus, "How does incarceration affect the probability of a first-time offender's future imprisonment?" may have a corollary hypothesis: "Incarceration increases the probability of a first-time offender's future imprisonment." That is a testable claim, and it does not carry any unnecessary or unfounded assertions about *why* it may (or may not) be true.

In discussing the hypothesis, a leader may acknowledge many reasons for an expected relationship. In this example, such discussion may include the "prison is college for criminals" concept. This is fine. But we must always bear in mind what is and is not being tested in any analysis. For example, finding that incarceration increases the probability of future imprisonment will corroborate (but not prove) the hypothesis, but it will not justify a specific causal claim for that relationship. That would require a second research question and a second hypothesis.

A Bad Question Includes Moral or Ethical Claims or Value Statements That Complicate Quantification. Many of us have an understandable aversion to the modern tendency to count everything. "Not everything that counts can be counted," someone wise once stated. The analytical rejoinder is, "If it cannot be counted, it will not count." Intangibles are often the last refuge of obsolete ideas.

Watch for questions that include value statements or ethical or moral assertions. According to Kerlinger and Lee, such questions use "words such as 'should,' 'ought,' 'better than' (instead of 'greater than'), and similar words that indicate cultural or personal judgments or preferences."[8] "Who is the greatest basketball player of all time?" is a great question for living (or bar) room conversation, but terrible for analysis because it resists quantification. Several quantifiable questions may be connected to it: Who won the most National Basketball Association championships as a starter? Who is the all-time leading scorer? Who is the all-time leader in points per game? Any one of these questions may help us identify the "greatest." But none of them are, in themselves, going to tell us who the "greatest" actually was.

Leaders who ask good strategic questions prompt productive inquiry and set a positive example when they reveal their justifiable ignorance. Leaders cannot be expected to be experts in all things, but guiding or assessing a strategic question is one area in which they must be active and involved. A lack of research expertise is no barrier. Leaders are responsible for shaping good questions to prompt an intelligence report or a research study and for reviewing the questions that guided completed work. Strategic questions drive organizational attention, energy, and resources and can make the difference between competitive success and failure. **JFQ**

Notes

[1] Adapted from Eugene Bardach, *A Practical Guide for Policy Analysis: The Eightfold Path to More Effective Problem Solving* (New York: Chatham House, 2000), 20–25.

[2] Characteristic one adapted from Andrew H. Van de Ven, *Engaged Scholarship: A Guide for Organizational and Social Research* (Oxford: Oxford University Press, 2007), 77–79. Characteristics two through five are adapted from Fred Kerlinger and Howard B. Lee, *Foundations of Behavioral Research*, 4th ed. (New York: Wadsworth Publishing, 1999), 16.

[3] Van de Ven, *Engaged Scholarship*, 78.

[4] George L. Kelling and James Q. Wilson, "Broken Windows: The Police and Neighborhood Safety," *The Atlantic*, March 1982, 29–38, available at <www.theatlantic.com/magazine/archive/1982/03/broken-windows/304465/>.

[5] Bardach, *A Practical Guide for Policy Analysis*, 6–7.

[6] Van de Ven, *Engaged Scholarship*, 96.

[7] Bardach, *A Practical Guide for Policy Analysis*, 6–7.

[8] Kerlinger and Lee, *Foundations of Behavioral Research*, 21.

Marine with 2nd Low Altitude Air Defense Battalion Counter–Unmanned Aerial Systems Detachment, attached to Special Purpose Marine Air-Ground Task Force Crisis Response–Central Command, conducts functions check on Mine Resistant Ambush Protected vehicle, Southwest Asia, February 17, 2019 (U.S. Marine Corps/Jack C. Howell)

Clausewitz's Wondrous Yet Paradoxical Trinity
The Nature of War as a Complex Adaptive System

By Brian Cole

But in war more than in any other subject we must begin by looking at the nature of the whole; for here more than elsewhere the part and whole must always be thought of together.

—Carl von Clausewitz

I n *On War*, Carl von Clausewitz introduces readers to widely recognized axioms such as how the simplest things become hard in war and how the fog and friction of war transform minor difficulties into major, nearly insurmountable obstacles. Within many of these axioms, Clausewitz describes the nonlinear nature of war. It is, however, the last five paragraphs of his first chapter that holistically describe the nature of war as a nonlinear system. His description and understanding of the social dynamics of war give complex meaning to the interaction of various social elements in war, characterizing it as a complex adaptive system. Political and military leaders and policymakers should be mindful of the nonlinear nature of the social interactions in war. In doing so, they will be more prepared and adaptable to unpredicted yet material developments throughout a conflict.

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Clausewitz describes war in holistic terms as a paradoxical trinity comprised of the tendencies of the people, the commander and his army, and the government. In war, the most violent of social interactions—the three elements of the Clausewitz's trinity—interact within and among the other elements to create a pattern of behavior that is understandable yet difficult to predict. Clausewitz warns that while it is hard enough to understand the nature of each of the three elements of war's paradoxical trinity, a "theory that ignores any one of them or seeks to fix an arbitrary relationship between them would conflict with reality to such an extent that for this reason alone it would be totally useless."[1] John Miller and Scott Page echo Clausewitz's sentiments by exclaiming that to understand a complex adaptive system, we must know both the nature of each element and the meaning of their interactions.[2]

Clausewitz uses still-contemporary ideas and terms in his manuscript, but his descriptions of the trinity, its attributes, and its emergent behavior are what complexity theory describes as a *complex adaptive system*. Complexity theory was originally developed for the natural sciences, but social scientists find it useful to understand social systems. Complexity theory provides a framework to help us understand the root causes of phenomena—not replace traditional theories—and to help us understand the nature of war.

Modern military strategists, commanders, and staff officers must be familiar with the abstract conception of war and be willing to release the concrete, tangible tactics for the operators. War must be considered as a whole or, as Michael Handel writes, a *gestalt*, to appreciate the complexity and nonlinear nature of war. Handel argues that "because of its infinite complexity and non-linear nature, war can only be understood as an organic whole, not as a mere compendium of various elements."[3]

This article provides an overview of Clausewitz's wondrous yet paradoxical trinity, complexity theory, and complex adaptive systems. In the end, it revisits Clausewitz's paradoxical trinity and the nonlinear nature of war, explains how his trinity is a complex adaptive system, and illustrates how complexity theory can be applied as a framework to examine his observations of the interactions among chance, politics, and passion in unity.

Clausewitz's Trinity

Clausewitz argues that war is a phenomenon consisting of three central elements or dominant tendencies. This triad, or trinity, is a paradoxical relationship "composed of primordial violence, hatred, and enmity . . . chance and probability . . . and of its element of subordination, as an instrument of policy."[4] It is paradoxical because while war is an extension of policy—a rational tendency—it is propelled at times by primordial violence and hatred—irrational tendencies—or by chance. Primordial violence is the blind natural force, whereas the subordinated nature of war as a political tool is what makes it subject to pure reason, and chance is always a factor under extremely violent and dangerous conditions.[5] Each of the three elements are "manifested in a corresponding subject within society: respectively, the people, the commander and his army, and the government."[6] Clausewitz's trinity is a compressed concept of a number of central ideas that are integrated by a logic of interacting contrasts.[7] The trinity is a social system that exhibits complex interactions and adaptive, emergent behavior. The system is sensitive to initial conditions, and chance and luck can always alter the system's behavior in unpredictable ways.

The Nature of War Is Constant

Clausewitz wrote *On War* in a time when wars were interstate conflicts fought by clearly defined armies. War was confined to battlefields and uniformed combatants. The characteristics of war have changed since the 19th century, but its nature has not. It is constructive to challenge the relevance of Clausewitz to modern war, and doing so forces one to revisit his nonlinear theories of war.[8] The first book in *On War* is a conceptual framework created to understand the nature of war, and the wondrous trinity can be used as a methodological starting point to studying post–19th-century war.[9] Ultimately, war is characterized by a combination of the three tendencies of the trinity with varying influences dependent on conditions such as the state of weapons technology and the historical relationships between opponents.[10]

War is an act of violence, of that there is no question, but it is first an extension of policy, a rational and purposeful act of violent means used to forcefully compel one's opponent to its will. The primacy of politics may start as the most influential tendency of war, but the nature of the conflict will be determined by the initial conditions and the subsequent interaction of the trinity's three elements.[11] The combatants' subordination of rational policy may be usurped by chance and luck, or by the primordial tendencies of hatred and enmity.

Three Levels of the Trinity

Thomas Waldman establishes a typology for the trinity's elements. The typology is defined as the objective, subjective, and contextual levels of the trinity. Passion, chance, and politics constitute the *primary* or objective trinity. The primary trinity is manifested into the societal elements of the people, the commander and his army, and the government, respectively. The societal elements, Waldman explains, make up the *secondary* or subjective trinity, whereas *context* constitutes a third level. Context is not a trinity, but it is the conditions under which the other two levels of the trinity exist and interact. The trinity as a system is highly sensitive to its conditions, and thus context is vital to explaining changes that occur at the secondary level and provides an understanding of the inherent flexibility of the trinity.[12]

The third level, context, influences the system the most. Context provides the setting in which "the three primary tendencies—passion, chance, and politics—are manifested in reality through secondary level subjects."[13] Clausewitz explains context by showing that

historically, societies tend to conduct wars in their own particular ways, using different methods and pursuing different aims than their opponents.[14] He describes context in the opening sentence of his section on the trinity, writing, "War is more than a true chameleon that slightly adapts its characteristics to the given case."[15] Waldman argues that Clausewitz uses the chameleon to demonstrate how war is connected to its surroundings.[16] Justin Kelly and Mike Brennan write that war must be viewed as a complex system that emerges from "infinitely small changes in its environment, truly 'more than a chameleon.'"[17] Initial conditions are too varied to apply a single methodology on which to approach a conflict. The context constructs the initial relationships, acting as a catalytic force of emerging, largely unpredictable behaviors among and between elements of the trinity. The hope, as Kelly and Brennan remind us, is not to achieve absolute control but to influence tendencies toward desirable outcomes and away from undesirable ones.[18]

A Review of the Inherent Properties of Complex Systems

What makes a system complex and not complicated? Complicated systems may seem complex, but they are not unless they possess certain inherent properties of a complex system. Complex systems come in a wide variety of forms, and at times they can be difficult to recognize or distinguish from complicated systems. A *complex system* is an open system that interacts with its environment, whereas complicated systems are usually closed systems. A *complicated system* is reducible; its parts can be disaggregated, and by understanding the nature of its parts, one can determine the nature of the system in the aggregate. A complex system is irreducible. One cannot determine the nature of the system in the aggregate by understanding its disaggregated parts because the elements of a complex system interact in developing ways that give rise to emergent behavior.[19] Unlike a complicated system, a complex system often exhibits nonlinear characteristics that can lead to positive feedbacks and instability, similar

to the economic theory of increasing returns, making it difficult to predict its behavior. The theory of increasing returns relies on a principle of indeterminacy and accounting for random events affecting markets. The properties of complex systems also make them capable of self-organizing and adapting without a central authority.

Complex Adaptive Systems. Complex systems are found in many places. In the natural world, such systems include the brain, immune systems, ecologies, cells, developing embryos, and ant colonies. In the human world, they include cultural, economic, and social systems such as political parties or scientific communities. Complex systems are everywhere in all sorts of contexts, but complex systems that adapt share central properties.[20] A complex adaptive system consists of a network of agents acting in parallel. Agents, depending on the context, can be nerve cells, individuals, firms, or even whole nations. In a complex adaptive system, "Each agent finds itself in an environment produced by its interactions with other agents in the system. An agent is constantly acting and reacting to what the other agents are doing."[21] As a result, nothing in a complex adaptive system is fixed, and control is highly decentralized.[22]

In *Harnessing Complexity*, Robert Axelrod and Michael Cohen describe a complex adaptive system as the interlocking sets of processes that generate productive actions in a world that cannot be fully understood. The three key processes that constitute a complex adaptive system are *variation*, *interaction*, and *selection*. The framework by which Axelrod and Cohen study complex systems is made up of three elements called *agents*, *strategy*, and *population*. An agent interacts with its environment and with other agents. It can respond to what happens around it and can act, to some extent, purposefully. A strategy is the way an agent responds to its surroundings and pursues its goals. Populations are part of an agent's environment.[23] The agent-strategy-population framework is known as the *population approach to complex adaptive systems.*

Aggregation of Agents. A complex adaptive system is an aggregation of agents within a given environment. The modeler decides what to focus on and what to avoid. *Aggregation* is a building-block approach in which aggregates act like agents at a higher level, or as meta-agents. Modeling is an art form, and what is aggregated is dependent on what a modeler wishes to examine. Aggregation is also about the actions of a complex adaptive system. In aggregation, a modeler can identify and understand a system's emergent behavior as a whole, which is commonly different than the behavior of the individual agent.

Tags. Boundaries can be defined for specific aggregations of agents or populations. When one defines the boundaries of an aggregation, it is referred to as *tagging*. For example, a flag or guidon is used to unite in effort an army or group of people under a political system. Billiard balls on a table are a population of billiard balls, but adding stripes to half the balls manipulates the symmetry and tags the aggregations into stripes and solids. In the field of complexity theory, tags are used to manipulate symmetries in order to study certain details while ignoring others. Tagging manipulates symmetry by creating boundaries and thus defining the system or a particular aggregation that we seek to observe that might otherwise be hidden.[24] Clausewitz tags the elements of the second level of the trinity by delineating the objective level of passion, chance, and politics to designated aggregates. Those aggregates are the population, the military, and the government. The division is not an arbitrary device; rather, it is meant to isolate and study the interactions both within a particular system and between the systems.

Flows. The concept of flows is important to understanding complex adaptive systems. For example, flow can refer to the movement of goods into or out of an economy, or flow could refer to information or transportation with networks and connectors. Tags can be used to define the system and the networks that connect and direct flows. Two properties can affect flows. The first is the multiplying or multiplier effect, which is common in

Commander Task Force 51 Marine Major General Carl E. Mundy III addresses Sailors and Marines during all-hands call on flight deck of USS *Essex*, Pacific Ocean, February 26, 2015 (U.S. Navy/Jason M. Graham)

economics when discussing circular flows; the second is the recycling effect.

The *multiplier effect* is the overall increase in returns for every unit of currency spent. For example, as John Holland explains, if you were to contract someone to build a house, you would pay the contractor, who in turns pays varying subcontractors. Those subcontractors use part of that money to buy food and other things, and so on. By taking a fraction of the original contract and using that same fraction at each subsequent phase, we can determine the multiplying effect. For instance, if the fraction to be applied to each step in the spending process is r = 80 percent, we can calculate $1 + r + r^2 + r^3 + r^4 + \ldots$ or using the equation $1/(1 - r)$, we get a multiplying effect on the overall system of $1/(1 - 0.8) = 5$.[25] The result in this example is that for every \$1 spent, the effect to the overall economy is \$5.

The other property of flows is the *recycling effect*. Once again, as Holland points out, it is easiest to understand by using an example. A steel producer sells some fraction of his steel to a car manufacturer. The cars are built, then driven and sold repeatedly to the point that they are no longer useful and finally given up for scrap metal in a junkyard. The junkyard then recycles a portion of the steel used to make the cars and sells it for some other use. In the end, each cycle traps resources to be recycled again and again, creating a multiplying effect on the original resource sold to the car manufacturer.[26] This cycle can occur several times over, depending on the system and resource.

Variation. Variation of a population is an essential attribute of a complex adaptive system. Variation, Axelrod and Cohen write, "provides the raw material for adaptation."[27] There are, however, limits to the extent variation in a population will facilitate adaptation.[28] Those who want to shape the behavior of a complex adaptive system must work to increase or decrease the variety of agents in a population, but not simply by accommodating variety. A population with varying types of agents creates a system that gives rise to events that unfold in often unpredictable ways.

Interaction. Interaction is essential to Axelrod and Cohen's framework because the events of interest within a system come from the interactions of agents with other agents and artifacts. For example, trade occurs when a buyer meets a seller, strategies of bidding and offering take place, and eventually goods change hands. Most complex adaptive systems have distinctive interaction patterns, which are "neither random or completely structured."[29] Axelrod and Cohen provide two examples: asymmetric interaction and uniform interaction. *Asymmetric interaction* occurs, for example, when a leader is able to broadcast messages simultaneously to many who

Marine Corps Communication-Electronics School student racks billiard balls before match during Single Marine Program's weekly pool tournament held at 5th Street Zone, Twentynine Palms, California, July 16, 2015 (U.S. Marine Corps/Levi Schultz)

likely do not have the same capability to broadcast information back to a leader. This type of highly asymmetric interaction is different from symmetric interactions, in which all agents can interact equally with all others. *Uniform interaction* is established when, for example, there is a neighborhood in which there are stores, schools, and churches. In all these places, people are able to meet and develop a network with a strong local bias. People know many others near where they live and very few people, in comparison, who live elsewhere around the globe. Interactions, the authors write, are what make complex adaptive systems come alive. David Earnest describes the

complexity of global life as *interaction complexity*, or the condition in which the effect of a factor on a social system is dependent on the state of other factors.[30]

Selection/Adaptation. The properties described so far are necessary for a system to be complex, but for such a system to become adaptive, it must have a mechanism for selection. Axelrod and Cohen use evolutionary biology's concept of natural selection to understand the nature of complex adaptive systems. While not identical to the process of natural selection, complex adaptive systems do operate in a similar way. Natural selection requires a means to retain agents' essential characteristics, a source of variation,

and amplification or some change of frequencies of type.[31] Natural selection relies on the selection of the agent, but a more direct method of adaptation is the selection of the strategy. Instead of waiting for agents to reproduce, a good strategy can achieve successful results much faster.

In either the agent or strategy level of selection, to retain effective adaptation reproduction needs to occur. Natural selection occurs in the absence of centralized control and authority. The absence of central authority is what allows a complex system to adapt. However, defining criteria for success is essential to harnessing complexity, as the title of Axelrod and Cohen's book implies. The framework

they present offers a way to "analyze institutions and how they shape—and are shaped by—the actions of individuals."[32] Complex systems are constantly shaped by the interaction of agents. One agent acts as a result of another's action. In other words, actions are informed by other actions, and so on.

Axelrod and Cohen write that a system is complex when there are strong interactions among its elements, such that "current events" heavily influence the probabilities of later events. A change in strategy results from a system's selection process, which leads to an improvement according to some measure of success. Axelrod and Cohen call this process *adaptation.* A complex adaptive system then, is a system that contains agents, or populations, that seek to adapt.

Nonlinearity. The nonlinear characteristic of the relationship among the three tendencies in Clausewitz's trinity is potentially the most significant and dangerous attribute. The nonlinear interaction is analogous to when "a magnet is released over three equidistant and equally powerful magnets, it moves irresolutely to and fro as it darts among the competing points of attraction."[33] Predicting the trajectory of such a magnet is essentially impossible, even though one could anticipate its pattern. Any infinitely small variation in initial conditions can cause significant subsequent variations. Waldman explains that this can occur in war because it is an open system that is sensitive to differences in initial condition and external influences. The magnet model analogy captures the complexity of war. As Waldman notes, such complexity makes it difficult to make "neat" analyses of war. Clausewitz conceived of the trinity with complexity in mind, "a fact that belies its seeming simplicity."[34] No single tendency can be understood in isolation because, as Waldman points out, in war all three tendencies simultaneously interact, creating a nonlinear, unpredictable complex system.

A moderating tendency can create a stable system. This means that a moderating tendency can prevent minor disturbances from amplifying into major disturbances. In other words, a stable

system has a dampening property so that the system maintains its essential properties. When the actions of others in a given population influence others, as in the Standing Ovation Problem (described later), a tipping point may occur that could lead to a cascading effect and undermine system stability. When agents do as other agents do, they can become locked into path-dependent behavior. Path dependency can lead to a nonlinear, magnifying effect amounting to a social tipping point.

The model of a steel ball suspended above three equally spaced magnets provides a good visualization of the trinity. When the ball is pushed in one direction, the magnets all act on the steel ball and the ball reacts to the magnets. The path the ball takes is highly dependent on, and sensitive to, its initial conditions, but the path is difficult if not altogether impossible to predict in real life. There are many variables involved in the initial conditions, such as wind, temperature, symmetry of the ball, and strength of the magnets. Once the ball is set in motion, it is unlikely to gain momentum while it gyrates wildly. In this model, friction is one of the moderating forces that acts to stabilize the ball and prevent it from reaching a tipping point. In war, an unmoderated trinity could manifest in irrational acts of large-scale violence. The violence may continue until it expands into new boundaries where there are moderating forces that will dampen and end the violence. It can be difficult to predict under what conditions violence will extend beyond the rational tendency.

The Trinity as a Complex Adaptive System

Because of the overarching inherent element of danger in war, no other human endeavor is more turbulent, ambiguous, or reliant on luck than war.[35] Human behavior in the face of danger is largely an unpredictable variable across a given population. The subjective nature of courage plays differently among everyone. No matter the extent of mathematical calculations in planning, the roles of luck and chance interject probabilities into the equations,

making war most like a game of cards in which chance is as dominant a force as calculation.[36] Acting courageously in war is one aspect of unpredictable human nature; another is the level of indiscriminate violence that people have shown to be capable of committing.

A complicated system, as mentioned, is one whose individual parts (when broken down) can be studied and understood. By understanding all the parts, it is possible to understand and thus predict the behavior of the system in its aggregate. This is possible because the parts are actually independent from each other, even when they are in the aggregate. A piston rod, when connected to the camshaft, does not change the nature of the camshaft itself or the piston attached to the other end. These parts behave as would be predicted given the context in which they function. The tendencies of Clausewitz's trinity cannot be isolated because the boundaries among them are indistinct—all three elements help define the others.[37] In complex social systems like Clausewitz's trinity, the parts or tendencies are interconnected and interdependent.

Clausewitz writes that war is a human social activity. According to him, the fundamental understanding of war is based on the human element. He observes that war is "an activity in which each aspect influences and is influenced by others, and this interrelationship extend[s] to the social and political matrix of war."[38] In war, like life, all parts are interconnected and constitute a whole. Waldman argues that the trinity is not "simply a combination of these elements placed side by side. It is much more than this and is intended to reflect the incredible complexity of war in reality."[39] One cannot reduce the tendencies to individual elements and seek to understand them—the trinity is a unity and must be comprehended as such.

Isolating each tendency is not only an insufficient way to attempt to understand the trinity as a whole, but it is also paradoxically impossible to understand each element in isolation of the others. The scientific approach of reductionism begins to fail "as we move from the realm of complication to complexity, and

reductionism no longer gives us insight into construction."[40] The tendencies do not exist independently; they are in continual tension and interaction with each other. Their interaction is dynamic and continually varying over time. Clausewitz creates an image of two wrestlers to illustrate the interaction of the tendencies. He explains how the actions of one wrestler are dependent on the interaction with the other. Not only would the actions of a wrestler seem odd if not in the context of a match with another; the actions would be impossible, for they rely on the interactive participation of the other. Much like in any complex system, the actions of agents are dependent on, and a result of, the interaction of the other agents.

They are not always in competition with each other; sometimes they are even mutually supportive. The boundaries of each tendency are defined by the others. For instance, policy is thought to be the rational and goal-oriented attribute in war. Yet policy cannot define war in isolation because war as a whole is "pervaded by great chance, uncertainty and friction, while inescapable emotions impact behaviour."[41]

War, Clausewitz writes, is never an isolated act. Opponents are aware of each other. Individuals may be strangers, but they are not abstract entities. Clausewitz points out that war does not spontaneously break out unexpectedly. Each side has an awareness of the others' motives, but an element of uncertainty always exists. This uncertainty, Clausewitz emphasizes, creates a moderating tendency on each side that can prevent a tipping point.[42]

Space and distance affect the interaction between opponents and shape the interaction of the tendencies of the trinity. The Standing Ovation Problem that John Miller and Scott Page created is a general model that can be used to study the effect that proximity has on many social issues, such as drug use, schooling choices, whether to recycle or not, and a variety of other issues. In the example of the piston rod and camshaft, no matter how close the two parts are moved together, there will be no effect on how they behave toward each other; there is

no adaptive property that emerges as a result of their proximity. Clearly, when the two parts are attached as designed, they physically act and react in accordance to Newton's laws of motion. But at the macro level, the actions of the parts interact linearly (this example is only considered at the macro level because at the quantum level the interacting elements may, in fact, exhibit complex adaptive characteristics). The Standing Ovation Problem is based on the premise that following a performance, an audience will respond with applause that may lead to a standing ovation. Each audience member can choose whether to applaud standing or remain seated. The social dynamics can lead an audience member to feel pressured to stand and join her immediate neighbors even if she despised the performance, whereas if an audience member was farther away from those standing, the pressure to stand would be diminished as a function of distance.[43] The model can provide interesting insights into how the irrational tendency of primordial violence can predominate actions and reactions in war.

The authors cite Robert Putnam's 1939 writings on social capital as a public good, where social capital is measured by the proximity and activation of agents. Putnam believed that social capital is largely a byproduct of social interaction that creates ties, norms, and trust within a particular network. Interaction within a social network can be measured in terms of proximity and activation factors. Proximity factors determine how agents are likely to interact, and activation factors determine the sequencing of their activity. In addition to physical proximity, many other types of relational networks establish proximity. Activation groups many processes together that affect the timing of agent activity or the temporal structure of events.[44] Social capital, then, is a result of the interaction of the features of social organization, such as networks, norms, and trust, that facilitate coordination and cooperation occurring in both time and space.

Much like the Standing Ovation Problem, proximity of opponents in war can influence which tendency will likely

be stronger than the other. Intuitively, the greater the distance between opponents and their respective use of force, the more likely rationality will predominate. When in personal contact with the enemy, the hatred and enmity for each opponent can lead to excessive aggression and carry the violence to levels beyond what are necessary, or legal, to achieve rational political objectives.

Proximity can also lead to groupthink or mob behavior. If the elements of hatred and enmity lie carefully below the surface, bringing them to the surface would not take much effort. If one person or small group is more likely than another to act out primordial violence on another group, it may be enough to encourage another group to act the same way though they are at first reluctant. One act of primordial violence may unleash the hatred and enmity of a population against its opponents. The irrational aspect of base human violence toward another may inspire a neighbor, a friend, or a family member to act in a like manner. The violent actions may spread, the deviation of laws and norms will soon become normalized, and what was once an unthinkable act will become commonplace within the context of the tagged system. Once the violence subsides, and the conflict ends, a society may look back on its actions in disgust and disbelief. Under normal circumstances, they would not have acted like they did, but the interaction and proximity to the violence created perceived social pressures to act in a similar way. This is a hypothetical and theoretical example, yet there are many examples that demonstrate how probable, under the right conditions, such actions can occur.

Conclusion
The question that should arise while reading Clausewitz's description of the three tendencies regards the extent to which the trinity shapes the outcome of war. Of course, the most obvious answer is, "It depends." While this answer is true, it is not helpful. However, if we understand what Clausewitz defines as the trinity and the tendencies that make it a complex

adaptive system, then by using complexity theory as a framework, we can understand how initial conditions affect the interactions. Efforts to identify the conditions under which events occur is often a frustrating endeavor. The Arab Spring took many by surprise because they did not recognize the conditions that led to the events. Many other conflicts have destabilized entire regions unexpectedly. In 1914, a series of seemingly unrelated events inadvertently sent European powers spiraling to war. David Earnest writes:

The spiral theory of inadvertent war provides one of the most compelling arguments about emergent phenomena in world politics: micro-decisions produced macrobehaviors that none of the political actors desired. One cannot simply reduce the war to preferences of the tsar, Kaiser, emperor, or king. Thirty-seven million people died.[45]

World War I resulted from nonlinear and recursive relationships between causes and effects. Nonlinear effects are difficult to predict and limit the ability of individuals to consider the full range of outcomes of their actions.[46] Clausewitz does not assert that the interactions of the elements of the trinity are random but that those elements self-organize and create complexity. Self-organization is a phenomenon that Earnest believes is a largely ignored reality of world politics.[47]

Coming to terms with a turbulent and ambiguous world does not mean giving up on traditional understandings of international relations. It means embracing the nonlinear predilection and unpredictability of international relations.[48] Understanding both the nature of complex adaptive systems and the trinity allows students of international relations to increase their tolerance of ambiguity. James Rosenau advised that in order to understand international relations, one must be concerned with probabilities and distrustful of absolutes. Rosenau, furthermore, stressed the need to be genuinely puzzled by international phenomena and open to being proved wrong. The Clausewitzian trinity is a paradox, and it is wondrous in that it is a puzzle of

rational and irrational forces from which unpredictable behavior emerges. In other words, both Clausewitz and Rosenau are stating that to study international relations and war, one must be willing to live in and with change to come to terms with the "turbulence of global life."[49] In the end, the trinity is only an abstract model of the complex social structure of society, designed to help political and military leaders understand and appreciate the decidedly unpredictable, emergent nature of war. **JFQ**

Notes

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[38] Ibid.

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[40] Miller and Page, *Complex Adaptive Systems*, 117.

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SEALs participate in ground mobility training with Mine Resistant Ambush Protected armored vehicles, Forward Training Area, March 28, 2012 (U.S. Navy/Meranda Keller)

A Blue-Collar Approach to Operational Analysis
A Special Operations Case Study

By Steven J. Hendrickson and Riley Post

F or many military commanders, the word *assessment* induces bouts of eye-rolling, daytime drowsiness, and, in some cases, mild nausea.

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This condition typically results from years of exposure to well-intentioned analysts briefing either overly complicated analysis that is unintelligible to all but the presenter or, on the other end of the spectrum, overly simplified stoplight charts and thermographs aggregated into trivial and often deceptive "trends." As analysts responsible for organizing the commander's assessments at Special Operations Command Central (SOCCENT), we have, at times, been those briefers, struggling to provide value to the command. However, through trial and error over 4 years and with three different commanders, we narrowed in on an analytic process that both informed decisions and catalyzed organizational change at SOCCENT. Our goal in this article is to distill those years of experience into a set of simple principles that are useful

to any commander and applicable across a wide variety of requirements.

This article stands on two assumptions about value-added operational analysis: the analysis has to be right, and commanders must use it.[1] Since commanders, not operations research and systems analysts, make assessments, analysis results are only valuable if they are trusted and allow the commander to produce faster or more informed decisions. Commanders are, above everything else, decisionmakers, and good analysis will lead to better or quicker decisions. We hope this article helps both commanders and their staffs avoid some of our mistakes along the path to more accurate and useful analysis, allowing for improved decisionmaking across an organization.

Context

Our earliest attempts at operational analysis in SOCCENT were neither overtly right nor useful to the commander. Relying on a traditional doctrine-guided approach, we attempted to answer "how are we doing?" by translating task accomplishment to objective achievement through measures of effectiveness (MOEs) and measures of performance (MOPs). This method focused extensively on activity, such as number of engagements and partner-nation units trained, rather than understanding effects the unit created in the operational environment. Then we attempted to translate that activity to an estimate of progress toward achieving objectives.

As we forced doctrine to fit our problem, we began to recognize five underlying behaviors that undermined the value of our work:

- We did not seek to answer—or even understand—the most pressing question for the commander. Although our process reflected the campaign plan goals, we wasted energy answering questions of little consequence to the commander.
- We passively used the data we had rather than actively collecting the data we needed. When we should have been asking, "What data do

I need to learn?" we were asking, "What can I learn from the data?"
- We isolated ourselves from the rest of the staff and made no effort to build relationships with forward elements. This relegated us to being graders of the commander's homework rather than an integrated evaluation and feedback mechanism for plans.
- We compounded these mistakes by quantifying and aggregating everything through a complicated system of questionable mathematical models.
- We did not ask, "At what cost?" and so we could not help the commander understand the amount of resources applied to create the outcomes we observed.

Not surprisingly, for the first few years neither the SOCCENT commanding general (CG) nor any other senior leader within the organization found our work to be particularly useful. As keepers of the data, we would get the occasional request for information, but rarely did anyone use our analysis to make meaningful decisions. Moreover, despite our best efforts to convince people otherwise, none of our forecasts (read: guesses) of future outcomes gained traction. In short, we were a marginalized team, spending our days nurturing a complicated model that nobody seemed to care about. Something needed to change.

A Better Way

In late 2015, we scrapped our existing methods and charted a new path. We stopped adhering to common practices, including the strict mechanical process rooted in MOEs and MOPs. Instead, we developed what we view as a "blue-collar business case" analysis focused on measuring and articulating SOCCENT return on investment (RoI)[2] to resources in areas of operation (AOR).[3] In doing so, this process:

- described SOCCENT's allocation of resources across the AOR
- articulated current progress toward objectives according to the commander's stated priorities

- identified gaps relative to desired outcomes in the AOR
- recommended measures to address those gaps with future investments or divestments across the AOR.

Despite its flaws and room for improvement, the SOCCENT commander deemed our new process effective because it produced digestible and analytically sound outcomes that commanders and staffs across the enterprise used for making resource allocation decisions, communicating outside the organization, and building future plans. These outcomes manifested at multiple levels of the enterprise, from civil affairs teams adjusting their areas of focus to the CG redirecting Marine Special Operations Teams (MSOTs) across the battlefield.

In the course of building our new way ahead, we identified seven keys to success or guiding principles:

- Answer *the* question of interest to the command.
- Tie all analysis to clearly defined and agreed-upon requirements.
- Be proactive about data collection.
- Be value-added at multiple levels.
- Build collaborative networks to execute, verify, and validate analysis.
- Resist the tyranny of averages and aggregation wherever possible.
- Understand that products matter, but not as much as the process.

The remainder of this article focuses on presenting these seven guiding principles and illustrating how to replicate our process in almost any command.

1: Answer *the* Question of Interest to the Command

At SOCCENT, we found answering a single question, the one most prominent in the CG's mind, provided a coherent logic for motivating both staff and subordinate commanders to actively participate in the analytic process. In essence, if the boss cares about a topic and is constantly asking about it, the individuals in the unit want to be part of the answer. Fortunately, we enjoyed an environment of shared information and openness to inquiry. This allowed

Servicemembers assigned to Naval Special Warfare Group 2 conduct military dive operations off East Coast of United States, Atlantic Ocean, May 29, 2019 (U.S. Navy/Jayme Pastoric)

our team to attend strategy sessions with the CG, his team of directors, and subordinate commanders. It also gave us the space to iterate with the CG to identify what analysis he found useful. Through this combination of passive and active elicitation, we identified the following question of interest to the CG: "Given a finite number of special operations forces [SOF] and a nearly infinite demand for their capabilities, how does SOCCENT allocate its SOF to maximize achievement of planned objectives in the U.S. Central Command [USCENTCOM] AOR?"

The scarcity of SOF relative to demand prevents SOCCENT from applying high-end human capital to every problem set in the AOR. For every application of SOF against one problem, there is an inherent opportunity cost of *not* investing somewhere else. The question, then, is not simply, "How is SOCCENT doing relative to its stated objectives?" but rather it is a more expansive inquiry that considers the opportunity cost of accomplishing those objectives. In simplest terms, this is an RoI question, the answer

to which requires a clear understanding of resources available, CG priorities, the expected returns to any given investment of SOF, and an evaluation of what actually materializes in the operational environment. In theory, there existed some optimal allocation of SOF that maximized SOCCENT's effect in the AOR. We built our analysis to move the command toward that allocation.

2: Tie All Analysis to Clearly Defined and Agreed-Upon Requirements

Every organization faces requirements. In the financial world, the requirement is clear: apply human and physical capital to generate a profit, and measuring returns is a simple accounting drill. In organizations not driven by profit, such as the military or other public-sector entities, measuring and articulating RoI is more challenging. For example, no commonly agreed-upon method exists for measuring and comparing investments and returns between training a partner SOF unit, conducting a key leader engagement with partner special force commander, or exploiting the informa-

tion environment to degrade support for violent extremist organizations.

To standardize RoI measures, we defined returns and currency in an operational context. Returns were either *desired* or *actual*:

- Desired returns: Objectives in regional plans, or the state of the operational environment that SOCCENT expected to materialize by applying SOF resources to them.
- Actual returns: The observable impact SOF resources—through the execution of operations, actions, and activities (OAAs)—had on objectives.

Using these definitions, we were able to standardize and defensibly articulate comparisons of outcomes to the commander's expected outcome.[4]

Next, we defined a standardized measure to make comparisons of investments across units. We settled on man-days of SOF as the unit of measure for resources applied to an OAA. For example, a 12-man Special Forces Operational Detachment–Alpha (ODA) conducting a 10-day training engagement in

Lebanon would count as a 120-man-day (12 men x 10 days) investment applied in Lebanon.[5] Although this approach did not capture every SOF investment in the region, it did encompass the majority of activities and, more important, focused on the operational units that could be shifted from one mission set to another. Furthermore, it was a way of measuring SOF investment across all types of OAAs, campaigns, and phases of war.

Critically, the process of measuring investments and returns relative to desired outcomes pinned the analysis to clear requirements, lending validity and, ultimately, utility to decisionmakers. The direct reliance on the SOCCENT plans to drive analytic requirements also allowed us to provide constructive feedback to the planners at the end of the analysis cycle.

3: Be Proactive about Data Collection
Once we determined the critical question and defined requirements, we identified the data we needed and the person or unit most likely to have that data. In person, proactive data collection fundamentally changed our process. We argue that it is *the* differentiator that enabled a useful analysis and elevated our team to an integral element of the command.

In April or May of any given year, staffers around the Department of Defense receive the dreaded annual analysis data call tasker from "higher." Almost without fail, it comes in the form of a lengthy, confusing email with an equally confusing Excel spreadsheet attached, or an equally unhelpful Task Management Tool message. In turn, these staffers push similar requests throughout their organizations and subordinate units until some poor captain or major is stuck with the task. Not surprisingly, the returning data vary greatly in quality and are wholly dependent on the knowledge, competence, and motivation of the respondent. The result is a mixed bag of high-quality, detailed data and check-the-box drivel—the combination of which precludes useful analysis.

To overcome this plight, we physically went to the source of the data. In practice, this often required traveling across the AOR to conduct in-person interviews with forward commanders and operational units executing SOCCENT orders. In other cases, the only travel required was foot movement to another staff section, such as the J2 or J4. In all instances, though, we built data collection platforms tailored to the type and source of data we needed and followed up in person.

Regardless of data type, we supplemented all primary source data by data mining open-source and classified reporting before and after in-person visits. Doing so allowed us to capture data already provided through situation reports, intelligence information reports, and other data provided by the operator, allowing us to focus personal interactions on data gaps rather than burdening the operator with questions already answered in reporting. Lastly, because our interview sample size was small, we found the supplementing data useful for a broader perspective and clarification.

This multisource data collection approach reaped several benefits to include increased detail and veracity of data, insight for subordinate commanders, the development of a collaborative analytic network, and increased buy-in to the process across the command. The active approach to data collection also gave the analytic team unique insights into a wide spectrum of issues across the command, affording it the opportunity to contribute to teams and projects outside of its normal analytic requirements.

4: Be Value-Added at Multiple Levels
In SOCCENT, forward operational units held the keys to the best data available. However, these operational elements are mostly ODAs, MSOTs, and SEAL platoons—tightly knit groups wary of "outsiders." These teams typically operate at a tempo and in an environment that is not conducive to site visits from data collectors.

To solve this access problem, we flipped the traditional analysis approach on its head, focusing on providing an analytic service to the forward node rather than simply seeking data for the higher headquarters analysis. In part, this approach originated from an unanticipated stroke of good fortune. In October 2015, a U.S. SOF commander in Lebanon asked our team to review the progress of his command and provide recommendations for resource allocation as well as future campaign activities. This commander also happened to be one of the more vocal leaders in the SOCCENT enterprise. When our analysis and products exceeded his expectations, he became our best advocate, using our products to articulate his progress and intent to his peers, the CG, and leaders of outside organizations, including the Ambassador and Embassy staff. His advocacy opened doors throughout the command, allowing our team to visit SOCCENT subordinate units in every corner of the AOR.

With our foot in the door, we established relationships with other forward commanders—the primary consumers and advocates of our product—to apply concentrated analytic capability to their most pressing concerns. When meeting with the commander, "How can we help you answer your mail?" was always one of the first questions we posed. Most of our subordinate commands lacked the staff manning to dig deeply into anything other than immediate mission requirements. As an analytic team, we viewed ourselves as a temporary staff element for the forward commander and took on whatever analytic challenge he faced at the time.

We reaped significant benefits from focusing on the analytic needs of the forward command. Because the concerns of the forward command overlapped significantly with those of SOCCENT, the data we collected fed analysis for both the forward node and SOCCENT commander. Additionally, because the work we did directly supported the forward commander, he and his team were engaged in verifying and validating the products we produced post-visit. Without exception, we received clarifying or correcting comments from the commanders that ensured our analysis was current and accurate before release to the CG.

Figure 1. Analysis Framework

Terms of Reference

Objective: Goals the commander wants to achieve.

Intermediate Military Objective: Decomposition of the objective into distinct, manageable, and measurable elements.

Effect: Conditions that must materialize to achieve the IMO.

Criteria: Metrics, measures, and study questions that define what it means for an effect to materialize.
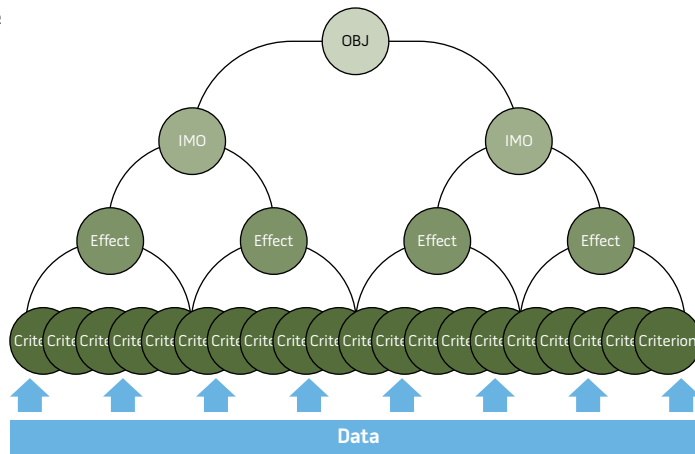
As forward commanders used our products to brief the SOCCENT CG on their progress and concerns, the boss became acquainted with the results prior to our engagements with him. Rather than a formal brief, discussions among our team, the CG, and the forward nodes became environments of shared consciousness and the dialogue centered on future action rather than a review of the past.

5: Build Collaborative Networks to Execute, Verify, and Validate Analysis

The process of active data collection also builds a network of collaborators useful for executing, verifying, and validating analysis. The network is undefined in advance of the analysis, but, in our case, it included forward commanders and their units; staff officers and analysts within the SOCCENT staff; and subject matter experts from across DOD, the interagency community, and private sector. The combination of internal and external collaborators provided what we believe was an optimal mix of first-hand knowledge and outsider perspective. It also allowed our team of two to three people to conduct in-depth analysis for a command spread across the U.S. military's most active region of the world.

As important as our data collection approach was, it would not have been possible without support and buy-in from both the forward commanders and key staff members at MacDill Air Force

Base. At SOCCENT, the J5 director rightly mandated collaboration between planners and analysts. That collaboration was critical for building measurable requirements, garnering buy-in from the planners, gathering data, and validating results. We also built similar relationships within and across the SOCCENT J2 and J3 directorates, with USCENTCOM and U.S. Special Operations Command (USSOCOM) staffs, and with subordinate units.

In many cases, though, we relied on analysts from across DOD, the interagency community, and private sector to provide external analyses of the operational environment relative to SOCCENT objectives. Using external analysts and companies mitigated confirmation bias and provided multiple lenses through which we viewed the problem set. We also employed two specialized private research firms to help us understand the human element of the operational environment. Combined with our own internal analysis, the networked approach provided multiple perspectives on complex problems, increasing our confidence in common findings and driving further research in areas of divergence.

6: Resist the Tyranny of Averages and Aggregation Wherever Possible

The challenge for analysts at component or higher headquarters, such as a Theater Special Operations Command or combatant commands, is to use as

granular data as possible but communicate useful findings at operational and strategic levels. Unfortunately, averaging and aggregating results destroy the fidelity and value of otherwise valid analyses. Some analysts refer to this as *color math* where, by bending the laws of math, a series of red, amber, or green indicators are "averaged" to produce a single color indicator for a strategic issue.[6] The reality is that the strategic issue, represented by a single color, is actually a collection of small issues, each possibly on a different part of the spectrum. In this case, establishing clear requirements, collecting high-quality data, and building a networked team of commanders and analysts are all for naught because the process of aggregation has diluted or obfuscated findings, making them inaccurate and dangerous.

To fight the tyranny of aggregation and preserve the fidelity of findings, we used a combination of nuanced narrative and supporting visualizations. We intentionally did not use averaged numbers, thermographs, or other techniques common to DOD analyses; they are misleading, arguably inaccurate, and are for good reason viewed with significant suspicion by most SOF commanders. Instead, we relied on a logical framework that guided our translation of raw data to influence objectives through criteria, effects, and intermediate military objectives (IMOs). Figure 1 shows a simplified version of this framework.

The framework decomposed plan objectives into IMOs and their related effects.[7] We developed criteria for each effect that answered the question, "What does it mean for this effect to materialize?" For example, if plans called for a partner force to conduct counterterrorism, criteria may have been the unit's ability to execute lethal and nonlethal find, fix, finish, exploit, analyze, and disseminate functions. After we collected, validated, and adjudicated the data, we did not aggregate the results. We kept our sleeves rolled up and wrote nuanced, qualitative descriptions of progress and gaps at the effect and IMO levels. While we would further distill these narratives for specific reports, detailed, qualitative

Soldiers with Special Operations Command South prepare to board Army helicopter assigned to Joint Task Force—Bravo's 1st Battalion, 228th Aviation regiment, during joint airborne operations exercise at Soto Cano Air Base, Honduras, February 22, 2018 (U.S. Army/Maria Pinel)

evaluation at the objective level and below gave commanders the detail they needed for reallocation of resources.

Instead of stating we were yellow on a scale of red to green, we found that a narrative focused on successes and gaps in the context of each objective was the most effective form of articulating RoI. In addition to presenting findings in the context of cost, this method yielded palatable and pragmatic recommendations for commanders to make the most efficient use of their limited resources, whether at the country, regional, or AOR level.
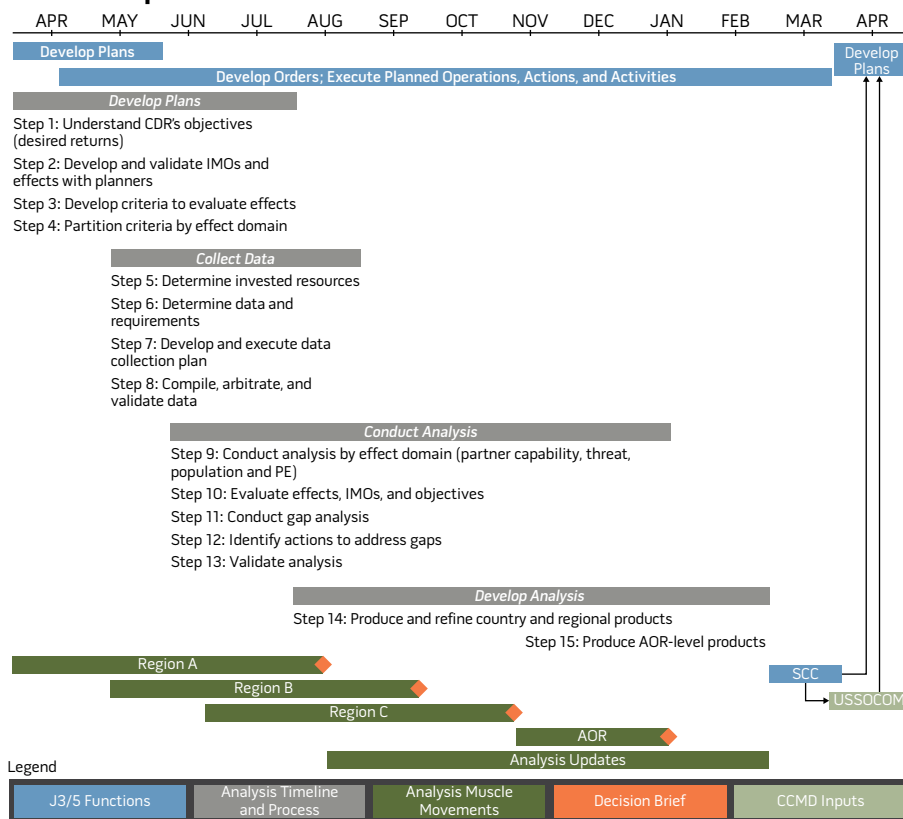
Our approach also heavily leveraged information graphics to augment results. Using visualizations that preserved important differences within broader themes allowed the consumers, often commanders within the SOCCENT enterprise, to determine what mattered and what did not within any larger strategic issue. However, we always emphasized the importance of the narrative over the visualization.

We also avoided aggregation by communicating results of analysis often, at multiple levels, and in varied forms. While we socialized initial drafts of the analysis with SOCCENT staff action officers, we never considered analysis complete and ready to brief to the CG until the forward commander had reviewed and approved it. In every case, forward commanders welcomed the "good" with the "bad" news in the reports, likely because they viewed them as accurate reflections of reality. These reports were rich in detail and light on summaries. With concurrence and participation from the forward nodes, we engaged the CG with executive-level briefs that focused on the most important returns on the investment to a given problem set. Because the forward commanders typically video-teleconferenced in, these briefings became an opportunity for the CG, staff, and forward node to agree on a common understanding of the ground truth and to craft courses of action for increasing returns moving forward.

Once briefed to the CG, we circulated the findings with other USCENTCOM components, USSOCOM resource managers, and anyone else that would benefit from understanding how SOCCENT was using SOF resources. The analytic cycle culminated with an AOR-level summary presentation at the SOCCENT Commander's Conference (SCC). For that brief, we distilled findings at the objective level for each forward node into five pages of analysis for the CG that focused on each of his strategic objectives. Because almost every commander in the room had seen earlier, more detailed variants of the analysis, the presentation facilitated a productive discussion about reallocation of SOF resources across the command.

7: Understand that Products Matter, But Not as Much as the Process Rather than producing a single product briefed to the commander at the end of the cycle, we developed and executed a qualitative, evidence-based analysis *process*. The process supported planning

Figure 2. Analysis Timeline and Process Example for Phase 0 Operations

APR MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR APR

Develop Plans

Develop Orders; Execute Planned Operations, Actions, and Activities

Develop Plans

Develop Plans

Step 1: Understand CDR's objectives (desired returns)

Step 2: Develop and validate IMOs and effects with planners

Step 3: Develop criteria to evaluate effects

Step 4: Partition criteria by effect domain

Collect Data

Step 5: Determine invested resources

Step 6: Determine data and requirements

Step 7: Develop and execute data collection plan

Step 8: Compile, arbitrate, and validate data

Conduct Analysis

Step 9: Conduct analysis by effect domain (partner capability, threat, population and PE)

Step 10: Evaluate effects, IMOs, and objectives

Step 11: Conduct gap analysis

Step 12: Identify actions to address gaps

Step 13: Validate analysis

Develop Analysis

Step 14: Produce and refine country and regional products

Step 15: Produce AOR-level products

Region A

Region B

Region C

AOR

Analysis Updates

SCC

USSOCOM

Legend

| J3/5 Functions | Analysis Timeline and Process | Analysis Muscle Movements | Decision Brief | CCMD Inputs |

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and informed resource allocation decisions throughout the year and at multiple echelons of the SOCCENT enterprise. Championed and advocated for by J5 leadership at its onset, the collaborative process unified planners, executers, and analysts into a coherent cycle.

Because of budgetary and manning cycles, we believe the ordering of this process matters. Figure 2 captures what we found to be a rigorous and repeatable way to execute the analytic process while remaining integrated with planning and resourcing. Of course, any unit applying this process will need to modify it to its specific requirements and, importantly, to the commander himself.

In our case, the resourcing cycle turned on the SOCCENT SCC. During the conference and after briefings by all subordinate commanders, the CG would establish priorities and provide guidance for the coming year. Therefore, as shown in figure 2, we completed analysis for subordinate commanders the preceding

fall and were able to brief the country and regional findings along the way to both the CG and subordinate commanders. By the time we briefed the final AOR-level analysis to the commander before the SCC, he knew it reflected reality on the ground.

During the conference, commanders used the information generated by our process as a basis to have an informed discussion about what resources they needed to achieve their objectives, while planners used it to calibrate objectives for the upcoming year's plans. Outside of SOCCENT, the commander also used the results to justify his resource requirements to USSOCOM post-conference. Much of this was possible because we were included as members of the operational planning teams from the beginning of each plan that SOCCENT produced in the spring. Integration with those teams also gave us the legitimacy to make recommended changes at the end of the analysis cycle.

Conclusion

A commander's job is to give guidance and make decisions, and operations research and systems analysts should make those jobs easier by providing data that inform those decisions. We are confident that adhering to the seven principles described here will put any commander and his staff on the right path to conducting useful analysis that leads to better and/or more timely decisions. Like most valuable innovations, the process that we settled on was the accumulation of failures, tinkering, and refining. And while there is certainly more space for improvement, the advantages of the current approach are clear.

First, the analysis is more useful. Instead of answering a vague "How are we doing?"-type question, we provided the commander an ability to understand real-world outcomes, the opportunity cost associated with those outcomes, and information about how, if at all, he might produce better results with a reallocation of resources. The process is useful because it ties outcomes to requirements that matter to the commander.

The process produces more accurate and timely analysis built on better and more current data. Where passive data collection produces stale, incomplete data, in-person interviews allow the data collector to ask questions of primary data sources that he ties to the commander's requirement. Building a networked team of supporting analysts also increases diversity of observations, reducing the chances that one perspective creates a biased depiction of reality.

Finally, relying on rich narrative and supporting visualizations drives analysis away from the color math and death-by-aggregation that dooms traditional analyses. In most cases, granular, contextual data are the only means of conveying the nuance of a situation. Since the process is iterative and not a once-a-year event, commanders at all levels can take in the details necessary to understand summarized documents later in the process.

We should like to finish by making a few suggestions about the people and skills needed to conduct analysis

Navy seaman guides Egyptian Naval Force S-70B Sea Hawk helicopter onto flight deck of USS *Carney* during exercise Bright Star 2018, in Mediterranean Sea, September 10, 2018 (U.S. Navy/Ryan U. Kledzik)

like this. Over the course of the 4 years that we tried, failed, innovated, and improved, our team took on multiple configurations. We have had military and contractors as properly trained operations research and systems analysts, social scientists, mathematicians, and lawyers on the team. Regardless of the titles, the team needs members with two primary skills: interpersonal skills for building teams and networks, and logical/analytic skills for building frameworks and conducting analysis. Neither skill set is sufficient by itself, and both are necessary for the team to work properly.

Ultimately, providing useful analysis that allows commanders to make better decisions does not require a Ph.D. or a mastery of rocket science. It requires answering questions that matter with quality data in a manner that articulates rather than averages the truth. Adhering to the seven principles in this article and applying them through a disciplined process with an enthusiastic and hard-nosed

analysis team will do that for the commander in almost any environment. **JFQ**

Notes

[1] Although we understand there are infinitely many types of analysis conducted across the Department of Defense (DOD), this article focuses on *operational analysis*. We define this as analysis conducted to inform the commander's decision cycle at the operational and strategic levels of war.

[2] Return on investment (RoI) is a quantitative metric used to describe efficiency of an investment. Although further research is warranted to fully define the military application of RoI, the principles still apply in this context. We are comparing what was invested, what was returned, and what was expected to be returned. Like RoI in a financial context, this yields an understanding of force efficiency but in the context of campaign plan objectives. Furthermore, our application of RoI is based on economic costs vs. accounting costs and therefore does not lend itself to a quantitative comparison as does RoI in a financial context.

[3] Neither the Special Operations Command Central (SOCCENT) commanding general nor

the authors view national security as a business. That said, some commonly understood business terms can be useful for conceptualizing a security problem.

[4] Our process did not claim to identify causal relationships between operations, actions, and activities (OAAs) and the state of the operational environment. We also did not weight actual returns or attempt to articulate that one OAA had more of an impact on an objective than another. Because the importance of any objective could change at any time, we preferred to clearly state the actual returns rather than weight their importance to the objective, and allow the decisionmaker, typically the commanding general, to determine the relative importance of any given outcome.

[5] We understand there are other investments, such as equipment, training, and so forth, but for analysis scoping reasons, we decided to focus on the scarcest and most important resource: special operations forces operators.

[6] As one enlightened staff officer at SOCCENT stated, "Averaging colors is about as useful as comparing apples to dump trucks."

[7] We understand that the terms *objective*, *intermediate military objectives*, and *effect* have meaning in joint doctrine. However, we found it necessary to create specific definitions based on the logic of our analysis framework.

The Bering Strait
An Arena for Great Power Competition

By Ryan Tice

M aritime corridors such as the
Straits of Hormuz and the
Bab al-Mandeb have long been
vitally important to the interests of the
United States and the global commu-
nity. Now due to Russia's and China's
interests and activities in the Arctic, the
Bering Strait is an emerging maritime
corridor that is becoming increasingly
vital to the economic and national
security interests of the United States
and its allies. Once a region of coopera-
tion between the Soviet Union and the
United States, rapidly changing envi-
ronmental conditions and the resulting
increase in human activity have made
the Arctic an arena for potential Great
Power competition between Russia,
China, and the United States. The
Navy foretold the Bering Strait's sig-
nificance in 2013 when it published its
U.S. Navy Arctic Roadmap: 2014–2030,
asserting that

*this 51-mile-wide strait between Russia
and the United States . . . will become a
more important security planning con-
sideration as maritime activity continues
to increase. . . . As the Pacific gateway for*

Russia's Northern Sea Route, the Bering Strait will become increasingly important for seaborne trade between Europe and Asia.[1]

Any threat, perceived or real, to the freedom of access to these maritime corridors usually elicits a strong and swift response by the United States and its allies. Although the importance of the Bering Strait is increasingly being recognized throughout the Department of Defense (DOD), the United States still faces several obstacles to achieving the strategic objectives outlined in the Navy's roadmap, namely to "ensure United States Arctic sovereignty and provide homeland defense," "provide ready naval forces to respond to crises and contingencies," "preserve freedom of the seas," and "promote partnerships within the United States Government and with international allies and partners."[2]

In particular, because the Bering Strait lies at the boundary of three geographic combatant commands (GCCs), increased adversary activity around the strait creates challenges for unity of effort among those combatant commands. Moreover, since the collapse of the Soviet Union, the United States has invested little in Arctic capabilities, and since 2014, the United States and its allies have focused personnel and resources on deterring Russian aggression around northern Europe.[3]

As a result, the United States finds itself in a position of weakness in the region. If steps are not taken to correct these vulnerabilities, the Bering Strait will almost certainly become a region like the South China Sea or the Baltic region, where competition, harassment, and intimidation threaten its status as a place of peaceful cooperation and exploration. To meet the challenges posed by the rapidly changing security environment in the Arctic and the Bering Strait in particular, U.S. Northern Command (USNORTHCOM) should establish Combined Joint Task Force (CJTF) in Alaska. A CJTF in Alaska, like CJTFs in other parts of the world, would enable the necessary conditions to integrate the full effects of the joint force across land, sea, air, space, and cyberspace warfare domains; create a venue for military cooperation among partners

with Arctic interests; and ensure that U.S. adversaries do not exploit gaps created at the far boundaries of the GCC areas of responsibility (AORs).

External Challenges: Russian and Chinese Interests in the Arctic

To fully appreciate the exigency of establishing a CJTF in Alaska, it is necessary to understand Russian and Chinese interests and activities in the Arctic. Russia's military assertiveness in the region is a strong indicator of its ambitions. In December 2015, President Vladimir Putin stated in his National Security Strategy that

leadership in exploiting the resources of the world's oceans and the Arctic is acquiring particular significance. . . . An entire spectrum of political, financial-economic, and informational instruments have been set in motion in the struggle for influence in the international arena.[4]

To achieve its geostrategic objectives in the Arctic, Russia has established the Northern Fleet Joint Strategic Command, embarked on large-scale investment in Arctic airfields and ports,[5] and initiated the development of discrete Arctic military capabilities such as the Northern Fleet's Arctic Motorized Rifle Brigade[6] and "Arctic-proof" drones that can withstand the region's severe climatic conditions.[7] This Arctic investment was on full display during Russia's strategic exercise Vostok-18, when units of the Arctic Motorized Rifle Brigade conducted an amphibious insert on the Chukotka Peninsula and executed a tactical foot movement from its insertion point to an undisclosed location along the Pacific coastline while the Northern Fleet conducted multiple amphibious landings and search-and-rescue missions throughout the exercise.[8]

In addition to developing Arctic capabilities, Russia is investing in Arctic infrastructure to enable operations and has developed a system of military facilities—radar stations, air bases, and ports. Its militarization of the Arctic sends clear signals to the other Arctic littoral

countries that it seeks to assert itself as the dominant Arctic power.

But Russia is not the only power with its eyes on the Arctic. Potential economic and ambiguous international regulations, as well as a lack of institutional governance, are already enticing China to position itself as a powerful stakeholder in Arctic affairs. China is looking north to use the Arctic sea lines of communication as a third belt in its massive infrastructure network dubbed the Belt and Road Initiative.[9] All Chinese maritime traffic utilizing Russia's Northern Sea route will have to transit the Bering Strait in order to travel between the Chinese port at Dalian to the port in Rotterdam, Netherlands. To further its economic interests in the region, China is wielding its soft-power weapons to gain leverage. It has invested in nuclear-powered icebreakers and increased its foreign direct investment in such countries as Finland and Norway, with ambitions to establish a Chinese-Arctic corridor that connects China with European markets.[10] In only a few years, such trans-Arctic shipping will become an economically viable alternative to the Suez Canal and cut travel time between Shanghai and northwestern Europe by approximately 18 to 27 percent.[11] Thus, it was unsurprising that, after visiting with President Donald Trump in April 2017, Chinese President Xi Jingping stopped in Alaska to meet with Governor Bill Walker, attempting to find opportunities for Chinese investment in Alaska.[12]

China's interests in the Arctic may not be purely economic, however, but might also involve national security. China views the Aleutian Islands as the northernmost extent of the first island chain, a series of islands extending from the Aleutians in the northeast down through the Philippine archipelago in the southwest.[13] The Chinese, a historically seafaring nation, see these islands as barriers used by the United States and its allies to limit their power projection capabilities by restricting their maneuverability.[14] Seen from this perspective, freedom of maneuver through the Aleutian Islands and Bering Strait in order to access the Arctic's natural resources and trade routes is of great strategic importance for China.

Crew of U.S. Coast Guard Cutter *Maple* follows Canadian Coast Guard Icebreaker *Terry Fox* through icy waters of Franklin Strait, in Nunavut Canada, August 11, 2017 (U.S. Coast Guard/Nate Littlejohn)

Both China and Russia are taking the long view in their Arctic strategies, setting the necessary conditions to assert themselves in the region. As noted in the British publication *The Observer*, "A great chess game is being played with countries staking claims to the Arctic to make sure they are not left out. . . . Some countries, like China, are looking 50 years ahead."[15]

External Challenges

In other regions where they have interests, both China and Russia secure those interests through increased militarization, employing antiaccess/ area-denial (A2/AD) capabilities from sovereign territory to control strategic maritime corridors, and they could take the same approach around the Bering. In late 2017, China constructed military infrastructure on Subi, Mischief, and Fiery Cross reefs in the South China Sea.[16] This infrastructure, including a military airfield, is believed to consist of hardened facilities for the deployment of radars, antiship and antiair missile launchers, and combat aircraft. China uses these activities to secure its claims to natural resources and extend its influence over that strategic maritime corridor in an attempt to reduce U.S. sway over what China considers to be its rightful area of influence.[17]

Similar to Chinese actions in the South China Sea, Russia's deployments of A2/AD capabilities in the Black Sea and Kaliningrad offer operational planners insight into what a Russian land-based A2/AD "bubble" in the vicinity of the Bering Strait might look like: a nearly impenetrable, three-dimensional area where the United States and its allies would be under the threat of attack across surface, sub-surface, air, and electromagnetic domains.[18] With Russia's increased investment in infrastructure in the Arctic, it has the ability to create such an integrated network of sensors and shooters in and around the Bering Strait. The Sopka-2 radar system on Wrangel Island is a three-dimensional dual-use S-band air-route radar with a range of 350 kilometers.[19] Though not a significant threat in isolation, this radar—potentially employed as a part of an integrated network of Russian land-based antiship cruise missiles, electronic warfare systems, and ground-based mobile air defense systems in the Bering Strait—would pose a formidable obstacle to the United States and its allies' ability to access the Arctic.

That said, given the concentration of Russian A2/AD assets being employed elsewhere, it is unlikely that Russia will employ them around the Bering Strait in the near term. Instead, Russia will likely

adopt the role of Arctic intimidator, using a complement of electromagnetic sensors and electronic warfare capabilities to collect information about and probe and harass countries it deems competitors in the region. There is evidence that this is already happening. During the North Atlantic Treaty Organization (NATO) multinational large-scale exercise Trident Juncture-18, Russia was accused of employing global positioning system jamming measures from the Kola Peninsula, a border region with Norway and Finland, on NATO aircraft flying in support of the exercise.[20] The former head of NATO's Emerging Threats Division characterized Russia's behavior as follows: "We've seen transmitters going down mysteriously in Sweden, hacking of soldiers' personal devices in the Baltics, disruptions to mobile phone networks in Lithuania during maritime exercises and so on."[21] Without a complement of responses from the United States and its allies, the sum effect of these more aggressive tactics in the Bering Strait is a normalization of bad behavior that threatens access to the region, potentially creating a situation in which the United States and its allies would only be able to access this maritime corridor under the threat of nonkinetic or even kinetic attack.

Internal Challenges: Command and Control and Balanced Forces

In addition to the challenges China and Russia pose in the Arctic, the United States faces a number of internal challenges. One is that the Bering Strait exposes a potential seam at the edges of three GCC AOR boundaries: U.S. Indo-Pacific Command, U.S. European Command, and USNORTHCOM. As human activity increases and China and Russia seek to further assert themselves in the Arctic, the task of effectively identifying and tracking potential threats across multiple warfare domains will challenge the coordination and unity of effort of these commands. The 2011 update of the U.S. Unified Command Plan boundaries illuminates the command and control (C2) challenges the Bering Strait presents.

For example, a Russian navy surface combatant traveling from the Northern Fleet port at Murmansk along the Northern Sea route toward Vladivostok to link up with the Russian Pacific Fleet would have to pass through the Bering Strait and the maritime waters of three GCCs. An individual GCC has the authority to plan operations and operate its forces whenever and wherever they are required to accomplish their mission. However, any cross-AOR operations or activities require coordination with the affected GCC.[22] Russia and China know well the Unified Command Plan and will look to exploit the gaps at the AOR boundaries. The current U.S. institutional conception of geographic responsibility will thus challenge the unity of effort required to respond to security issues in the Bering Strait.

Another challenge to U.S. efforts in the Arctic is that the Euro-centric focus on the Russian threat has diverted personnel and resources away from the growing threats that Russia and China pose in and around the Bering Strait. The eight littoral Arctic countries (Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden, and the United States) are either NATO or European powers and, as a result, have drawn U.S. attention and resources toward the European Arctic to meet their collective defense needs.

Since the annexation of Crimea and invasion of Ukraine by Russia, the Pentagon has responded by initiating Operation *Atlantic Resolve*, which has established enduring rotational units and commands to reassure the Alliance and deter further Russian aggression in Europe. Recognizing Norway's strategic position and unique security challenges, the U.S. Marine Corps has prioritized support to contingency operations in NATO's northern flank by eliminating rotational forces to the Black Sea region and reallocating forces to Norway as Marine Rotational Force–Europe.[23] The U.S. Army has committed a regionally aligned division headquarters in Poland with armored and aviation brigade combat teams with support from logistics task forces on 9-month rotations in Northern

Europe.[24] In 2018, the U.S. Navy reestablished Second Fleet with the stated mission to develop and dynamically employ maritime forces ready to fight across multiple domains in the Atlantic and Arctic in order to ensure access; deter aggression; and defend U.S., allied, and partner interests.[25] This surge of personnel and resources toward Europe has left little capacity to devote forces to address emerging threats in and around the Bering Strait. With little to no Navy or Marine Corps forces stationed in Alaska, the United States finds itself unbalanced across the Pacific and Atlantic sides of the Arctic.

The United States will have to develop an Arctic strategy that views the Bering Strait as a strategic maritime corridor serving as the bridge between the growing threats in Asia and Europe. The critical task will be to balance forces across the Arctic region to ensure that China and Russia do not exploit the physical gaps and organizational seams created by the current imbalances between forces assigned to the European and Asian regions of the Arctic and the combatant command boundaries.

Combined Joint Task Force–Alaska: Leveraging Partnerships to Win Early

Ensuring access to the Arctic by controlling the Bering Strait is a global issue, one that requires participation from U.S. Asian and European allies, including NATO, Japan, and South Korea, which have commercial and security interests in the Arctic. Therefore, we need a CJTF; it has a track record of success in addressing the very institutional issues and foreseeable threats emerging in the Bering Strait. Alaska is an ideal location to establish a CJTF to demonstrate to China and Russia that the United States takes access to the Arctic seriously.

One reason a CJTF would be effective is that it would necessitate establishing a combined joint operation area (CJOA) with sufficient land, sea, and air space—a critical first step toward ensuring unity of effort when conducting operations at the geographic boundaries of contiguous

areas of operation. As defined in Joint Publication 3-0, *Operations*, "A CJOA is an area of land, sea, and airspace, defined by a geographic combatant commander or subordinate unified commander, in which a joint force commander . . . conducts military operations to accomplish a specific mission."[26] In the case of the Bering Strait, this CJOA would create an area owned by one commander, thereby streamlining decisionmaking by routing it through only one GCC.

Another virtue of the CJTF as a solution to the Bering Strait problem is that it would create an institutional platform for cooperation among allied and partner nations, thereby providing the necessary balance of forces across the Arctic region. Japan and South Korea, both seafaring nations and close allies of the United States, look to the Arctic for access to hydrocarbons, minerals, and fisheries.[27] Their participation in CJTF–Alaska would serve to enhance their ability to protect their economic and security interests in the North Pacific and the Arctic, while the CJTF could leverage their icebreakers and ice-class ships to bolster the coalition's presence in the Arctic. Both Japan and South Korea could increase rotational training opportunities for their air forces and armies at the Joint Pacific Alaska Range Complex and further develop their amphibious capabilities in partnership with the U.S. Marines at Adak Island in the Aleutian Island chain.[28]

As with Asian allies, a CJTF in Alaska would likely draw interest from NATO and our European allies, serving as a welcome opportunity for Europe's non-NATO members to contribute to global security and cooperation outside the auspices of NATO. Finland and Sweden, non-NATO Arctic countries, would benefit greatly from cooperating with the Alliance in a non-NATO military structure. Likewise, inviting both countries to participate in CJTF-Alaska would bring valuable Arctic military experience to the team. Recognizing the growing threats to their security, the United States, Sweden, and Finland signed a nonbinding trilateral security agreement in 2018. All three countries recognized the need to increase

their military interoperability, specifically by planning and executing joint training exercises.[29] Increasing this allied presence in Alaska would balance the force posture on both sides of the Arctic and bring much needed Arctic capabilities to bear.

CJTF-Alaska is not merely an effective but hypothetical solution; it is an altogether logistically achievable one, as it could capitalize on the existing facilities and personnel force structure of Alaska Command (ALCOM), a sub-unified joint command of USNORTHCOM headquartered in Anchorage and commanded by an Air Force three-star general. ALCOM could readily serve as the foundation of a CJTF headquarters. The rest of the personnel needed could be globally sourced by USNORTHCOM through the Request for Forces process. Both the Air Force and the Army have significant capabilities in Alaska and would not require additional forces above discrete capabilities needed to compete across warfare domains. With little Navy and Marine Corps presence, the CJTF might be better served employing rotational Navy and Marine Corps forces. As noted by Walker Mills, shorter "deployment for training periods of one or two months to Alaska would still offer much better training opportunities while limiting the impact to our global force model and current deployment commitments."[30] This concept of rotational forces would also apply to U.S. multinational partners and would go a long way toward enhancing multinational interoperability.

Alaska also serves as an ideal location for a standing CJTF headquarters because it has the established military infrastructure, including 32 military facilities and 12 major bases and stations, to meet the military demands of the rapidly increasing human activity in the Arctic region. With well-established and ready-to-use resources, Alaska would facilitate security cooperation training across all warfare domains with coalition partners. Alaska's Joint Pacific Alaska Range Complex (JPARC) has 65,000 square miles of airspace, 2,560 square miles of land space, and 42,000 square nautical miles of surface, sub-surface, and overlying airspace in the Gulf of Alaska.

Accredited a Joint National Training Capability, JPARC is a resource that ensures training is conducted under realistic conditions across warfare domains.[31] The port of Alaska in Anchorage is another ready-to-use capability that the state has to offer. During the height of combat operations in Iraq and Afghanistan, the port supported more than 20 military deployments and the onward movement of 18,000 pieces of military equipment.[32] It has direct access via secure rail lines to major military installations and year-round accessibility, allowing the United States and its allies to deploy rotational forces and equipment with ease.

Redesignating ALCOM as a standing CJTF headquarters and inviting countries to participate in a coalition come with little opportunity cost in the near term; serve to demonstrate U.S. resolve to deter malign activity in the Bering Strait; set a strategic anchor on the Pacific side of the Arctic sea lines of communication; and complement the military planning and security cooperation that has heretofore been focused on the threats on the European side of the Arctic.

The CJTF headquarters is a proven model that fosters cooperation and collaboration. Establishing a CJTF headquarters in Alaska would signal to U.S. partners across the globe that Washington is taking the necessary steps to address the growing security challenges in the Arctic. The CJTF is not a novel idea but rather a time-tested model that fosters integration and unity of effort and clearly signals U.S. resolve to adversaries. Controlling the Bering Strait, in concert with sea control efforts in the European Arctic, would provide the essential security necessary to deter aggression so the Arctic remains a place where peaceful nations can coexist without fear of interference or intimidation. **JFQ**

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Notes

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U.S. Agency for International Development worker waits for flight on C-130J Hercules assigned to 75th Expeditionary Airlift Squadron, Combined Joint Task Force—Horn of Africa, in Maputo, Mozambique, March 29, 2019 (U.S. Air Force/Chris Hibben)

Peacemakers
Chaplains as Vital Links in the Peace Chain

By David R. Leonard

Commanders should consider using Department of Defense (DOD) chaplains to significantly enhance the pursuit of national objectives by providing humanitarian liaison officer (LNO) capabilities at each level of military operations. This article reviews current scholarship, missions, and limitations regarding the utiliza-

tion of military chaplains. It frames the chaplain's advantage in working with nongovernmental organizations (NGOs), interagency and international actors as prescribed by joint doctrine, and humanitarian organizational guidance. Finally, it provides recommendations for implementation at the strategic, operational, and tactical levels of employment.

In conflict regions where the U.S. Government operates, military commanders are challenged with a complex architecture of intergovernmental

organizations (IGOs), agencies, NGOs, and international foreign humanitarian assistance mechanisms. The "fog of peace" created by numerous organizations in the battlespace requires military leaders to develop and utilize tools for maximizing coordinated humanitarian assistance (HA).[1] The U.S. military, under Title 10 authority, conducts humanitarian action in support of U.S. security interests through personnel possessing "specific operational readiness skills."[2] However, humanitarian assistance and disaster response aid must not duplicate

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other U.S. humanitarian efforts or support groups engaged in military activity and consequently requires approval by the Department of State.[3] The United Nations (UN) Civil-Military Coordination guidance gives the HA designation to all "assistance, protection, and advocacy action in response to human needs resulting from complex emergencies and natural disasters."[4] Its purpose is to save lives and alleviate suffering, and it broadly encompasses the entirety of the humanitarian action in the operational environment.[5] The International Federation of Red Cross and Red Crescent Societies (IFRC) has established seven guiding principles for humanitarian actors in conducting HA: humanity, impartiality, neutrality, independence, voluntary service, unity, and universality.[6] The U.S. military, directed by different priorities, often finds itself in tension with other humanitarian actors while attempting to provide similar aid in pursuit of unaligned objectives.

Military commanders coordinate movement and economy of effort with the various agencies, who often fear that meeting with military forces will compromise their image of neutrality.[7] In a hostile or uncertain environment, the military typically prioritizes security, while NGOs often focus on humanitarian needs and resist association with the military.[8] However, the military desires to leverage the NGOs as force multipliers in the battlespace as part of counterinsurgency operations. Essentially, military and humanitarian actors exist in the same "humanitarian space," needing one another yet operating as reluctant partners.[9]

Many commanders see non-DOD humanitarian work as an extension of U.S. policy on counterinsurgency, while neutral humanitarian groups want no such perception. Often the NGOs and international organizations have more access to local populations but lack security, logistics, or situational awareness of the battlefield. The International Committee of the Red Cross (ICRC) explains that regardless of how well intentioned the military is, servicemembers will not be accepted by some in the humanitarian space who are negatively affected by military actions. Local populations often resist military humanitarian action because of its temporary nature. For instance, the military might build a school, only to have it destroyed 2 weeks later because insurgents are hiding there. Since people often perceive the military as the group bringing violence to the region, the military might lack credibility with humanitarian actors.[10] At times, HA brought by agents typically associated with violence compromises the neutrality of other humanitarian actors. This is particularly true when violence has been disguised as HA. A representative from InterAction, a clearinghouse of 195 NGOs, cited a case wherein the Central Intelligence Agency sponsored a polio vaccination program, intending to use it as a ruse to capture Osama bin Laden. Ten years later, this deception resulted in legitimate polio vaccination workers being killed by insurgents.[11]

Todd Greentree concludes that the military also lacks confidence in humanitarian groups. In 2001, the U.S. Agency for International Development (USAID) diverted cash for work funds and other unspecified priorities. These work projects were a critical tool for keeping fighting-age males from joining the Taliban. The change in policy worked against the military effort in the area. Some commanders began referring to USAID as "the source of instability."[12] Humanitarian actors often lack trust in the military while the military desires HA to work in concert with its own lines of effort.

Building mutual trust between communities with different priorities and values within the same humanitarian space is essential to HA. It requires a multitiered approach to coordinate agencies, NGOs, host-nation personnel, and local leaders. Commanders seeking to work effectively with humanitarian actors need a representative who understands the culture, mission, and values of the diverse groups participating in the humanitarian operation.[13] When asked what relationship most NGOs would like to have with the military, one representative responded, "We don't and we won't."[14] Yet in interviews, numerous members of the Red Cross and NGOs demonstrated their openness to improved relations between the two communities.[15] Effective HA therefore requires a bridge that spans both functional cultures for maximizing effectiveness in delivering aid.

The chaplain is an often underutilized soft-power resource in the commander's toolbox. Contemporary analysis on the subject lays a solid framework for the discussion of chaplains as liaison officers in HA operations. Joint doctrine directs chaplains to be used as liaisons to the interagency community, IGOs, NGOs, multinational forces, and local religious leaders "[to advise regarding] religious and humanitarian dynamics in the operational area."[16] This doctrinal mandate contrasts with a failure to develop chaplains for use in this capacity. The chaplain has superior expertise, experience, and credibility to work effectively with humanitarian actors when compared to other military members.

Missions and Limitations

Chaplains bring a robust set of qualifications and capabilities, unparalleled by any other DOD personnel. Chaplains must complete 72 hours of postgraduate work in subjects including counseling, social work, world religions, theology, and ethics. Additionally, they must be endorsed by a recognized religious body.[17] The religious endorsement places the chaplain under two sets of authorities: the military, which gives them their commission, and the religious body, which ordains them for religious work within the military. No other career field requires training in such broad subjects with ready application to humanitarian settings. Additionally, they spend 2 years of developmental training in churches that are by nature nonprofit, charitable humanitarian organizations. As the only career field required to work in a nonprofit humanitarian organization prior to serving in the Armed Forces, chaplains possess a unique set of skills as highly qualified subject matter experts for work as liaisons to humanitarian actors. The table compares the qualifications of military career fields. I have modified it

Table. Qualification of Humanitarian/Religious LNO Compared to Other Career Fields

	Training	Skills	Credentials	Accessibility	Noncombatant	Can Refrain from Collecting Intelligence	Overall Ranking
Civil Affairs	Limited	Yes	Yes	No	No	No	4
Chaplain	Yes	Yes	Yes	Yes	Yes	Yes	1
Intelligence	Limited	No	No	Yes	No	No	5
Personnel	Limited	Yes	Limited	Yes	No	No	3
JAG	No	Yes	Yes	Yes	No	No	2

Source: Adapted from William Sean Lee, Christopher J. Burke, and Zonna M. Crayne, *Military Chaplains as Peace Builders: Embracing Indigenous Religious in Stability Operations* (Maxwell AFB: Air University Press, February 2005), 13.

for this analysis with ranking based on qualifications relative to chaplains for utilization in humanitarian work.

As outlined by Title 10, chaplains provide both religious services and advising, enabling the expression of faith or religious practice for all assigned personnel.[18] Chaplains provide for the religious and spiritual support of military members, authorized civilians, and their families. In counseling, chaplains have privileged communication, which protects the adherent's confidentiality in all matters dealing with religion and conscience. As a special staff officer, the chaplain also advises the commander and staff on "issues surrounding moral and ethical decision making, [and] morale as affected by religion and personnel issues."[19] Religious advisement informs leadership concerning the impact of religion on joint operations.[20]

As the commander's primary religious representatives, chaplains may draw from this expertise to provide liaison to religious leaders, NGOs, and local civilian and military agencies "to the extent that those contacts relate to the religious or humanitarian purposes approved by the commander."[21] However, commanders use chaplains as liaisons rarely, and typically only at the tactical level. Furthermore, training and application as a tactical liaison differ between military branches. Commanders and chaplains alike have yet to realize the latent capabilities of these robust resources already present within their own organizations. As an embedded subject matter expert, chaplains are acutely aware of military objectives, religious cultural sensitivities, and

humanitarian requirements. Additionally, they possess the requisite skills to bridge the communication gap with diverse actors in the humanitarian space.

Commanders who desire to achieve synergy in civil-military operations should therefore use the chaplain's capabilities to cultivate "holistic, cumulative, and integrative" partnerships.[22] While commanders have traditionally avoided using chaplains in these types of roles, this change of paradigm represents smart risk. By selecting the most qualified specialist for this mission set, commanders gain the greatest likelihood of achieving desired outcomes. In addition to their qualifications, limitations unique to the chaplain's role in the military serve to further support their utilization as humanitarian LNOs in the operational environment.

Chaplains have protections and limitations not afforded to other career fields. International law and U.S. code limit the roles and responsibilities of chaplains in ways that enhance their ability to serve in a liaison function to humanitarian actors. The law restricts chaplains from intelligence-gathering and combatant activities. The Geneva Conventions identify chaplains as "protected personnel" in their function and capacity as ministers of religion, and U.S. law further restricts chaplains from bearing arms as noncombatants.[23] Only chaplains and medical personnel are permitted to wear the protected symbol of the Red Cross/ Crescent.[24] This distinction ameliorates many of the concerns presented by humanitarian actors in the operational environment.

Historically, chaplains have provided religious services, warrior care, and leadership advisement.[25] The leadership advisement typically given to commanders involves religious requirements and sensitivities as they relate to the assigned unit. Rarely do chaplain duties involve strategic or operational applications beyond the religious care of U.S. forces.[26]

Chaplains are appointed by their endorsing bodies to provide religious services, yet HA also serves to save lives and ameliorate suffering, roles consistent with their identity as "visible reminders of the holy."[27] To be relevant to the emerging needs of national and military strategic objectives, the DOD chaplain corps must consider moving beyond its traditional roles to additional applications consistent with their identity as peacemakers. Chaplains have failed to realize their potential as vital links in the peace chain. They could potentially save lives through participation in peace operations and by fostering partnerships in conflict areas.

Humanitarian Actors

Humanitarian actor describes the complex web of U.S. interagency, private, national, and international humanitarian relief organizations active in the humanitarian space. During foreign humanitarian crises, HA is typically coordinated by the USAID Office of Foreign Disaster Assistance (OFDA), the UN Office for the Coordination of Humanitarian Affairs (OCHA), or some combination of the ICRC and IFRC. The lead organization will coordinate unity of effort between the various agencies present. Despite some

Chaplain with 2nd Battalion, 114th Strike Field Artillery Regiment, Mississippi National Guard, reads passage from Bible during visit with Ugandan security guards in security tower at Forward Operating Base, Marez, Mosul, Iraq, September 24, 2009 (U.S. Navy/Carmichael Yepez)

outliers, most organizations will work to some degree with these organizing partners. Besides the interaction of the various elements of DOD, coordination also takes place between U.S. Government agencies, foreign militaries, international organizations, NGOs, and the private sector.[28] Many private self-governing humanitarian NGOs work to alleviate suffering; promote health care and economic and educational advancement; and advocate for human rights and conflict resolution.[29] Most legitimate NGOs are coordinated through the Red Cross or OCHA, but some work independently, such as Doctors Without Borders.[30] Between 6,000 and 30,000 NGOs annually provide more than $8 billion in aid to help more than 250 million people.[31] These various organizations coalesce around the cause of HA, but with different limitations and agendas.

The commander requires an LNO with expertise in the concerns, legitimacy, and operations of humanitarian actors. Humanitarian actors seek to preserve their neutral status in a conflict, but neutrality is not always in DOD's interest. Humanitarian actors seek a dialogue with the military without blurring the lines of neutrality.[32] InterAction explains that the association of military uniforms with NGOs in the humanitarian space calls into question the NGO's neutrality, placing its personnel in danger. It will take time, patience, and someone who speaks the cultural language of these organizations to build bridges into their community. This can only happen through ongoing dialogue and relationship-building. Currently, the U.S. military typically conducts HA through the civil affairs teams aligned under the civil affairs command.

DOD civil affairs teams serve as the commander's lead military agent in civil-military HA. According to U.S. joint doctrine, civil-military operations "establish, maintain, influence, or exploit relationships between military forces and indigenous populations and institutions . . . by directly supporting the attainment of objectives relating to the reestablishment or maintenance of stability within a region or host nation."[33] The geographic combatant commanders (GCCs) "provide regional coordination and direction to their subordinate commanders for the integration and coordination of civil-military operations into military plans and operations."[34] Civil-military operations elements are located at the Joint Staff J9, Joint Civil-Military Operations Task Forces (JCMOTF), Civil-Military Operations Centers (CMOCs), and civil-military teams (such as provincial reconstruction teams).[35] The J9 provides, communicates, and coordinates support requests and activities while also providing analysis in support of the commander's assessment. A civil-military team utilizes diplomatic, informational, military, and economic factors to stabilize the operational environment in a

Figure. Notional Composition of a CMOC
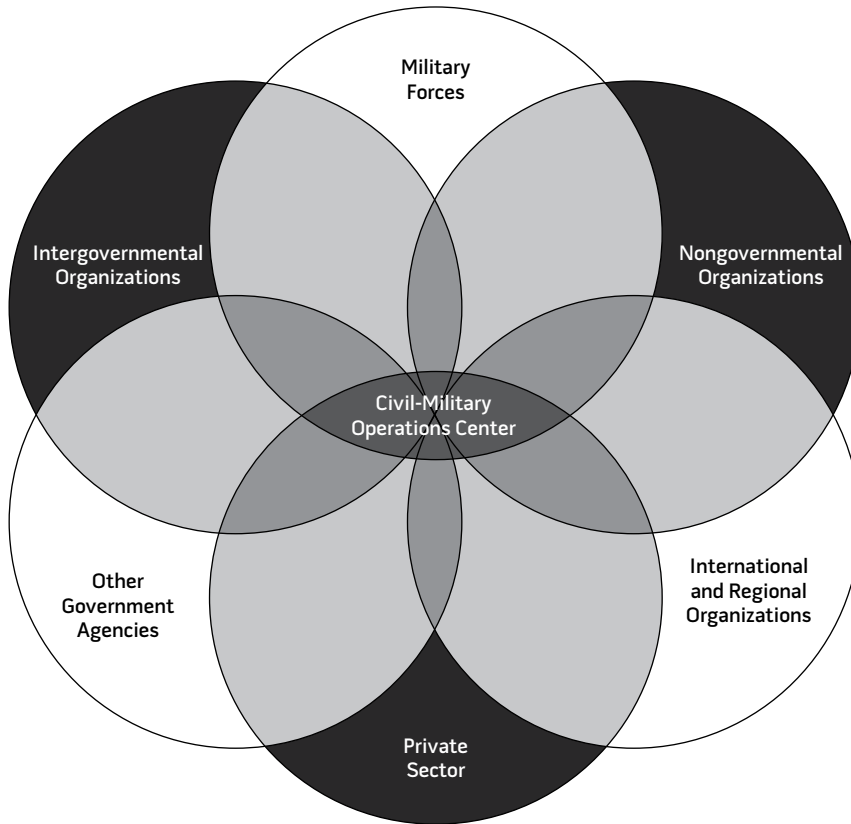
Source: Field Manual 3-07, *Stability* (Washington, DC: Headquarters Department of the Army, June 2014), A-14.

province, district, state, or locality. These teams conduct military engagement, interorganizational coordination, and HA while also assessing the impact on military operations.[36] Civil affairs teams are comprised of "special forces, military information support, legal support, public affairs, engineer, transportation, health support personnel, military police, security forces, and maneuver units"—none of which specializes in religious or humanitarian operations.[37] These functional representatives lack expertise in conducting religious and humanitarian-focused diplomacy. While the civil affairs teams do provide humanitarian capabilities, they do not represent the best option available for commanders to use as LNOs to humanitarian actors.

The U.S. Army Civil Affairs and Psychological Operations Command supports commanders at the GCC level through the Joint Staff in five GCCs. In this capacity, they "develop plans, policy,

and programs through planning and regional engagement while providing civil component analysis at the strategic and theater level." LNOs are placed alongside NGOs, U.S. Government, and host-nation agencies, serving as a bridge to facilitate unity of effort and understanding for U.S. military forces.[38] At the operational level, LNOs may function as part of a JCMOTF or as part of a coordination element such as a CMOC, Humanitarian Assistance Coordination Center, or Humanitarian Operations Center. The CMOC is the primary operational DOD tool for coordination among the key participants, Service and functional components, USAID, Embassy country teams, and interagency liaisons.[39] While augmented with other specialists such as medical and engineering personnel, chaplains do not currently serve as functional representatives.[40] At other times, USAID coordinates unity of effort for humanitarian actors when providing foreign HA

with the USAID administrator designated as the U.S. HA coordinator for emergency response.[41] By adding chaplains as permanent subject matter experts in these centers, commanders will significantly increase communication, trust, and understanding between military and humanitarian agencies.

OCHA has developed a guide for militaries that outlines engagement, coordination, and limits of civil-military coordination. The UN recognizes that the military may provide helpful assistance in HA, yet some military interests (to gain acceptance, provide security, or gather intelligence) are not connected to HA. The United Nations and NGOs fear that military HA operations blur the lines between the military and the work of humanitarian actors. This blurring of roles endangers neutrality and shows partiality.[42] The skewed perception produced hinders the work of the civilian HA teams. To mitigate this, the UN recommends that HA should primarily be conducted by designated humanitarian and local partners through the coordination of local authorities and community leaders.[43] Humanitarian actors seek to develop a humanitarian space where they can operate unhindered. OCHA operates at the global strategic, operational, and tactical levels and presents a vital conduit for developing LNO capacity. At the strategic level, most coordination is developed at an interagency standing committee comprised of 18 major humanitarian organizations.[44] At the operational level, the UN resident coordinator provides the vital link to the global level as lead representative of the UN Secretary-General. When required, a humanitarian country team brings together all major UN and non-UN organizations in the humanitarian space in a process called "cluster coordination."[45] A *cluster* is a group of humanitarian agencies active in the operational environment. Humanitarian actors prefer military engagement on their terms and will not advocate for the U.S. commander's requirements. Increased LNO capacity will facilitate better communication and civil-military understanding. As David Levine rightly observes, "Direct coordination

Marines currently under 4th Marine Regiment, 3rd Marine Division, and members of Indian military wade to shore during exercise Tiger Triumph, on Kakinada Beach, India, November 19, 2019 (U.S. Marine Corps/Christian Ayers)

[requires] personal relationships between the U.S. military and coalition military organizations, IGOs, and NGOs."[46] The military would be well served by having a representative humanitarian LNO specialist at each level of OCHA planning and coordination.

The Red Cross/Red Crescent Movement is the international authority on humanitarian relief in conflict regions. As explained by the UN guidance for civil-military relations, "The components of the International Red Cross and Red Crescent Movement—ICRC, IFRC, and the national societies are neither NGOs nor IGOs. They have a special legal status, role, and relation to the military based on the Geneva Conventions, the movement's statutes and national law."[47] The Geneva Conventions of 1949 affirm that it is a "neutral and independent humanitarian organization."[48] The ICRC provides assistance, protection, and education governing international

humanitarian law. A sister organization, the IFRC, brings together national arms of the organization, which aim to coordinate the effort of 189 national Red Cross/Red Crescent organizations. Red Cross/Red Crescent comprises the largest volunteer-based humanitarian organization in the world. The national organizations provide assistance without discrimination to the wounded on the battlefield, prevent human suffering, and protect life and health for all.[49] In a conflict region, the ICRC will usually take the lead, along with the Federation, to coordinate humanitarian effort when OCHA is not present.[50] The various elements of the Red Cross/Red Crescent Movement can operate as a trusted, neutral agent—a prolific and persistent humanitarian force at the local level throughout the world. They do not wish to meet regularly with military members and request servicemembers to be in uniform when doing so.[51] Like many

humanitarian actors, they seek to preserve their neutrality when seen meeting with military representatives. Permitting military noncombatants to wear the Red Cross emblem on their uniform as liaisons could potentially mitigate these concerns. The symbol visibly communicates the neutrality of the noncombatant to all who witness the interaction.

As various agencies strive to coordinate the work of participating NGOs in the specific humanitarian operation, competing ideologies may interfere with unity of effort. Joint Publication (JP) 3-57, *Civil-Military Operations*, states that "some NGOs may have policies that are purposely antithetical to both the U.S. military forces and U.S. Government departments and agencies, but they may have resources and capabilities that could promote the accomplishment of military objectives."[52] Not all NGOs are the same, and many must be fully vetted for legitimacy and performance. Some NGOs will

Air Force Technical Sergeant Sophia Hayner, 82nd Reconnaissance Squadron, shared her story of resilience to provide raw perspective on how suicide affects more than victims, Kadena Air Base, Japan, December 3, 2019 (U.S. Air Force/Daniel E. Fernandez)

accept money but not follow through on promised HA. Ongoing relationships with known organizations will help to determine legitimacy.[53] In achieving unity of effort, military commanders require an LNO who can accurately evaluate the actors in the humanitarian space. This requires military experts who understand issues relating to heritage, cultural resources, communication, media, law enforcement, religion, and cultural/historic property.[54] Chaplains have been trained to understand culture and religion in the operational environment and can therefore add a distinct value alongside the other staff officers in this capacity. These skills could be further developed through an increased partnership with other U.S. Government lead agencies and international humanitarian actors. Current civil-military efforts provide coordination but lack capability for military expertise in achieving commanders' objectives as shaped by civilian religious and humanitarian actors.

Civil affairs teams provide excellent military coordination and expertise in logistics but lack specific training, qualifications, and experience for engaging humanitarian actors. Religion can be a contributing factor in many conflicts due to the manipulation of ideologies. Military forces must recognize religious and cultural sensitivities and ideologies, so as not to hinder military operations. JP 3-57 recognizes that chaplains, in their distinctive role as noncombatants, "will participate as appropriate in planning for the impact of religion on current and future operations."[55] They may also "conduct liaison with key civilian religious leaders and faith-based organizations, with the goal of fostering understanding and reconciliation."[56] Current doctrine already empowers chaplains to conduct liaison activities, but commanders do not typically assign them as permanent members of civil affairs teams in the same manner as lawyers and engineers. Additionally, LNOs are not routinely collocated with the humanitarian actors. By permanently assigning chaplains to function as LNOs in the same manner as other subject matter experts, the commander can achieve economy of effort while also utilizing the best resources available. This particularly applies to humanitarian coordination elements in which the U.S. military does not have the operational lead.

Each of these humanitarian actors and government agencies brings distinctive capabilities and limitations in providing humanitarian action. The military can best utilize these soft power elements by not confusing its mission with theirs, by not compromising their neutrality, and by developing enduring LNO relationships at each level of military operations. Chaplains provide the best resource for this mission because, as noncombatants, they are restricted from intelligence-gathering yet possess superior training, skills, and education.

Not every chaplain will be a good fit for this specialization, however. Chaplains at the rank of major should be vetted for aptitude, temperament, endorser restriction, and interest in working with humanitarian actors. Specific areas should then be developed accordingly. Key areas for development include accessibility, specific civil-military training, and focused employment of chaplains as humanitarian LNO specialists.

What follows are some recommendations for employment:

- Develop a position for religious/ humanitarian LNO specialists. This requires civil-military training, strategic and operational employment, and specific utilization capability. Other countries have effectively developed their chaplains to serve in similar roles. South Africa has utilized its chaplains as religious, mediation, and negotiation experts and as NGO/ religious leader engagement specialists in peace operations. Norway has developed doctrine defining the operational role of chaplains in stability operations.[57] Training can be accomplished through focused study during intermediate developmental education (IDE) with follow-on training at USAID, OCHA, ICRC, or an NGO's global headquarters.[58]

- Develop a fellowship for chaplains similar to the existing Political-Military Affairs Strategist (PAS) program, which offers a well-established developmental track that is currently not available to chaplains. It refines selectees at the O4 or O5 level with an "international political-military affairs assignment on their first or second post-IDE assignment."[59] Like the PAS program, a fellowship for chaplains could develop a cadre of religious officers with cultural and civil-military expertise. The PAS development opportunity specifically provides future senior military leaders with valuable political-military education and experience through a single, well-managed developmental assignment opportunity.[60] A similar program

for chaplains could prepare them to bridge U.S. strategic policy with HA operations. Additionally, the curriculum should include courses on religion and humanitarian action. Developmental utilization tours for chaplains would be preferred at the OCHA, World Council of Churches, ICRC, GCC (J9 Staff), NGO headquarters, Chaplain Corps Colleges, or JCMOTF, as required. A developmental IDE track for chaplains would require the procurement of suitable post-IDE assignments.

- Employ chaplain LNOs at key strategic points. OCHA, ICRC, or the World Council of Churches could serve as executive-level assignments for chaplain colonels, giving them the ability to advocate for DOD interests with a high-level sight picture of global HA initiatives.[61] Chaplain lieutenant colonels could be positioned in joint billets at the GCCs, working alongside the J9. They would enable civil-military forces to ensure persistent coordination with humanitarian actors within the area of responsibility. These assignments could also align with those GCCs with civil affairs command elements currently assigned.[62] Chaplain majors could serve operational interests through assignment at USAID or in fellowships with ICRC, IFRC, or NGO clearinghouses such as InterAction. While opportunities to work with non-U.S. agencies do not currently exist, there has been some precedent established.[63] Agencies such as Inter-Action, Catholic Relief Services, or World Vision would make excellent training partners. These fellowships would build enduring relationships, providing coordination and communication with humanitarian actors in the operational environment. Another key area for employment could be at the respective Service chaplain corps colleges. Chaplain majors could be utilized to teach chaplain corps personnel about NGO, IGO, and religious leader engagement requirements at the

tactical level. This could also be a "rapid mobility" billet in support of joint civil-military operations task force or CMOC operational deployments. In these assignments, the assigned chaplain should determine with the hosting agency whether to wear civilian or military attire, as appropriate. When in uniform, the chaplain should display the Red Cross/Crescent emblem as noncombatant identification at all times. Implementation will require clear communication with endorsers, an expanded understanding of the Title 10 employment of chaplains, and administrative tracking of the selected chaplain's utilization.

- Dialogue with religious endorsers, clarify Title 10 requirements, and develop requisite administrative systems: "Title 10 gives the Secretary of Defense 'authority, direction, and control' over DOD, including all subordinate agencies and commands."[64] First, Title 10 authorization will need to be clarified for chaplains to define their role in providing religious and humanitarian liaison.[65] Second, the Service chiefs of chaplains should consult endorsers as to this new mode of employment.[66] In some instances, this development could serve both the military and the endorsing agent, such as developmental assignments with national church humanitarian agencies. This noncombatant role will serve to further the care and amelioration of suffering while also promoting peace. This will certainly align with the values of religious groups currently represented in DOD. Third, leaders at the headquarters level must develop and secure LNO assignments at the global, national, and military strategic levels for employment.

- Finally, selection for a humanitarian LNO specialist must be administratively connected with existing programs. Fellowship programs for field grade officers need to be expanded to include military chaplains with an emphasis on civil military affairs,

Deputy wing chaplain for Joint Base Langley, Virginia, helps carry religious items from church, October 22, 2018, on Tyndall Air Force Base, Florida, after Hurricane Michael caused catastrophic damage (U.S. Air Force/Sean Carnes)

world religions, and NGO studies. Selected chaplain LNOs should be tracked with a special experience identifier (SEI) to enable identification and vectoring. This working model will provide commanders a vital connection between the strategic national objectives and the humanitarian actors in the operational environment.

Conclusion

Military chaplains provide commanders with a powerful resource, significantly enabling peace operations as LNOs to humanitarian actors at the strategic, operational, and tactical levels. This position should come with the creation of a new SEI—the humanitarian liaison officer (HLNO), who will illuminate the commander's understanding of the operational picture and help him or her to coordinate with humanitarian

agencies in pursuit of national objectives. Military chaplains have not been frequently used outside of their historical role in providing religious accommodation. While this new utilization stretches the traditional boundaries of the chaplain's role, it does not exceed noncombatant limitations.

On a tactical level, civil affairs teams have been functioning in this space, yet strong evidence suggests that the military would be better served by adding religious specialists to increase this capability. Some humanitarian actors may avoid embracing a chaplain within their organizations. Time and proximity will build relationships based on shared interests between chaplains and humanitarian actors that will enable civil-military coordination. The opportunity costs of implementing this program will include less funding and utilization for other personnel. This program will entail fewer

opportunities for other specialties to develop as experts in HA. By making these positions joint, the manpower cost will be shared by all Services, yet there will be fewer chaplains to fill traditional billets.

To meet these requirements, current programs will need reevaluation and prioritization. Training and fellowship programs will remove chaplains from operational utilization for extended periods of time, potentially placing the most qualified officers into a permanent "HLNO track." To fill training, fellowship, and utilization manning requirements will require eight chaplains per Service branch. In utilizing resources already vetted, trained, and equipped for this type of mission, however, commanders can expect a significant return on investment. Chaplains will develop strategic relationships that will exponentially enable military HA efforts. Further research should look at ways to develop, employ,

and combine religious leader liaison, diplomacy, and reconciliation capabilities under the HLNO specialist. **JFQ**

Notes

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[4] United Nations (UN) Humanitarian Civil-Military Coordination, *A Guide for the Military 2.0* (Geneva: UN Office for the Coordination of Humanitarian Affairs, May 2017), 7, available at <www.unocha.org/sites/unocha/files/Guide%20for%20the%20Military%20v2.pdf>.

[5] Ibid.

[6] "Fundamental Principles," International Federation of Red Cross and Red Crescent Societies Web site, available at <http://ifrc-media.org/interactive/fundamental-principles/>.

[7] Ibid.

[8] Joint Publication (JP) 3-08, *Interagency, Intergovernmental Organization, and Nongovernmental Organization Coordination During Joint Operations*, vol. 1 (Washington, DC: The Joint Staff, March 17, 2006), xii, available at <https://dde.carlisle.army.mil/LLL/DSC/readings/L12_jp3-08v1.pdf>.

[9] *Humanitarian space* describes the shared operational environment that both Department of Defense (DOD) and humanitarian actors wish to shape to alleviate suffering, while also promoting peace.

[10] "Fundamental Principles."

[11] Ibid.

[12] Todd Greentree, "Bureaucracy Does Its Thing: U.S. Performance and the Institutional Dimension of Strategy in Afghanistan," *Journal of Strategic Studies* 36, no. 3 (2013), 345.

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[66] Reverend Donald Eubank, interview by author, March 13, 2018. Lieutenant Colonel Donald Eubank, USA (Ret.), serves as the military endorser for the International Church of the Foursquare Gospel.

Adapting to Disruption
Aerial Combat over North Vietnam

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M ilitary organizations devote substantial effort to anticipating and preparing for future conflicts, yet they rarely get things exactly right. Inevitably, the enemy does not operate as predicted, tactics are not as successful as desired, weapons do not perform as planned, and organizations and policies are not as effective as expected. Successful adaptation to such disruptions is thus a key component of military effectiveness.[1]

The 2018 National Defense Strategy calls for a "rapidly adapting Joint Force."[2] Successful military adaptation typically consists of several elements. The first is cognitive adaptation. In order to adapt to a disruption, a military organization must first recognize that the problem exists. Once the disruption is acknowledged, the organization may adapt its tactics, technology, institutions, and policies to deal more effectively with the challenge.

During the first four years (1965–1968) of the U.S. military's participation

in aerial combat over North Vietnam, both the U.S. Navy and the U.S. Air Force experienced unexpectedly high losses. The Air Force kill ratio in Korea was 4.7 to 1 from 1950 to 1952 and 13.9 to 1 from 1952 to 1953. Between 1965 and 1968, however, U.S. aircraft downed 118 North Vietnamese MiGs and suffered 55 losses, a kill ratio of just 2.1 to 1. From August 1967 to February 1968, U.S. fighters suffered an adverse kill ratio against the most advanced Vietnamese fighter, the MiG-21, losing 18 aircraft and downing only 5.[3] The cessation of bombing in 1968 gave the Navy and the Air Force a chance to respond to the disappointing performance of their fighter planes. The resumption of the bombing campaign in 1972 provides an opportunity to evaluate how well the two Services adapted to disruption. A comparison of Navy and Air Force efforts to adapt their approaches to aerial combat also illuminates who typically drives adaptation, how long it takes, what contributes to success, and what the joint force can do to avoid or minimize future disruptions and to adapt to the ones that inevitably occur.

Background

In early April 1965, U.S. aerial forces clashed with Soviet-built Vietnamese MiG fighters for the first time. During these early encounters, U.S. pilots found that engaging in close-in, turning dogfights with the old but highly maneuverable gun-armed MiG-17 was dangerous. By the end of July 1966, the Navy had downed 9 MiG-17s and lost 3 aircraft while the Air Force had downed 10 aircraft and lost 6. The more advanced MiG-21, which was evaluated as equal or superior to the most advanced U.S. fighters and carried two Atoll infrared missiles, first appeared in the skies over Vietnam in early 1966. The MiG-21s had little impact until October 1966, when they shot down an Air Force F-4C and a Navy F-4B with Atolls. In 1967, however, the MiGs adopted new tactics. The MiG-17s tried to lure the F-4s into slow-speed, turning fights by employing circling formations at low altitudes over the

likely routes of U.S. strike forces. The MiG-21s, guided by ground controllers, approached U.S. attack formations at low altitudes to avoid radar. They gained positions behind the formations, then climbed rapidly and made a single high-speed pass, often catching U.S. pilots unaware. From July 1967 to March 1968, the United States lost 26 aircraft while downing only 24 MiGs. The kill ratio remained in favor of North Vietnam until the bombing was halted on October 31, 1968.[4]

Both the Navy and the Air Force struggled to counter the MiG challenge. During the final 13 months of Operation *Rolling Thunder* (October 1967–October 1968), Navy pilots shot down only nine MiGs against six losses. Meanwhile, the Air Force registered just 27 kills and lost 24 aircraft from October 1967 through March 1968.[5]

Cognitive Adaptation

The Air Force and the Navy recognized relatively quickly that U.S. air-to-air combat performance was not as good as expected based on U.S. performance in the Korean War, and they took action. However, the two Services came to different conclusions regarding the sources of disruption and thus pursued different adaptation strategies. The Air Force quickly decided that the problems were largely technical and therefore sought to adapt its technology. The Navy, in contrast, initiated a comprehensive investigation of air-to-air performance and adopted a broader adaptation strategy.

The Air Force drew on an analysis of air-to-air engagements conducted by the Institute for Defense Analyses in response to a request in 1966 from the Deputy Director, Tactical Warfare Programs, Office of the Director of Defense Research and Engineering. The study, called "Red Baron," found that many of the Air Force losses came when MiG-21s attacked almost unseen from the rear, catching Air Force pilots by surprise. The Air Force concluded that the problems were largely technical and pursued a number of measures to increase its pilots' situational awareness.[6]

The Navy also recognized early on that its fighters were not performing as well as had been expected. In early 1966, Chief of Naval Operations (CNO) Admiral David L. McDonald directed the creation of Project Plan to review the effectiveness of Navy missiles and air-to-air tactics. As air-to-air performance deteriorated in the spring of 1968, the new CNO, Admiral Thomas Moorer, initiated a comprehensive investigation. He ordered Captain Frank Ault to examine all aspects of the situation, from the manufacturing of the planes, their radars, and their armament to the preparation of the pilots. Ault was ordered to figure out why the Navy pilots were downing so few MiGs and then to come up with fixes that would improve air-to-air performance by a factor of three.[7]

The Ault Report concluded that there was no single explanation for the poor air-to-air performance of Navy fighters. Moreover, incremental improvements of existing practices would be insufficient to solve the problems. Instead, the report concluded, "The need for new approaches and innovations appeared self-evident." It discussed extensively how to improve missiles, but a small section also focused on air-to-air training. The report argued that many of the missile problems and overall air-to-air problems in the Navy were because F-4 crews were poorly trained in air-to-air combat, and it recommended immediately establishing a training program.[8]

Tactical Adaptation

Tests conducted soon after aerial combat began over Vietnam indicated that standard Air Force fighter tactics were not effective. The primary Air Force fighter formation at the beginning of the Vietnam War, the Fluid Four, was the same one used in World War II and Korea. The Fluid Four formation called for four airplanes, divided into a lead element and a second element of two planes each, to operate together. The two pairs supported each other, but the flight leader usually made all the decisions for all four planes and was the primary shooter. The wingmen were

tasked with protecting the flight and second element leaders and were not expected to fire their weapons. Because the wingmen were typically less experienced than the leaders, they often found it difficult to remain in formation when the flight and second element leaders maneuvered aggressively.[9]

In contrast, Navy air-to-air tactics called for a two-ship formation. This formation made better use of the planes' potential firepower and enabled them to provide greater mutual support than the four-ship formation. Widespread recognition of the Fluid Four formation's tactical deficiencies prompted Air Force units to increase the separation between aircraft and adopt different configurations, but the Air Force continued to use the four-ship formation until the end of the war. Tactical Air Command (TAC) and the Fighter Weapons School (FWS) at Nellis Air Force Base in Nevada were vehemently opposed to changing tactics. Many Air Force officers believed the reason for the Service's continued adherence to the four-ship formation was that the primary alternative, the two-ship formation, was so closely associated with the Navy.[10]

Technological Adaptation

Both the Navy and the Air Force also tried to adapt their technology to improve air-to-air performance. They sought to improve the planes, their armament, and the situational awareness of the pilots. Both Services made strides in all three areas.

Planes. The primary fighter plane for both Services during the Vietnam War was the F-4 Phantom. Originally designed as a two-seat fleet air defense interceptor, the F-4A was delivered to the Navy in 1960. The Air Force soon adopted the F-4 and, after making minor modifications, introduced it to service as the F-4C in 1963. The F-4 was fast (Mach 2.2), could operate over a long range, and had a powerful radar and heavy armament, but it was not designed for aerial dogfighting. The F-4 did not maneuver as well as the MiGs it faced, it lacked a gun, and it produced a smoky trail when the afterburners for its twin

engines were not engaged. Visibility from the front and rear cockpits was poor, and the layout of switches and controls in the cockpit, especially the missile firing controls, was a "nightmare" according to one F-4 pilot. The F-4 also had a tendency to go out of control when maneuvered at high angles of attack—that is, at low speed.[11]

In the short term, both Services sought to adapt the F-4 by addressing some of the weaknesses exposed during the early air battles in Vietnam. In 1966, the Navy introduced the F-4J, which emphasized improved air-to-air combat capability. Also in 1966, the Air Force announced its plans to acquire the F-4E, which solved many of the technical deficiencies of earlier Air Force F-4 models. It had a new wing with hydraulically operated slats on its leading edge that improved the maneuverability and limited the danger of spins.[12]

Armament: Missiles. Among the reasons for the disappointing performance of U.S. fighter aircraft during the first 4 years of the war in Vietnam was the ineffectiveness of the missiles the aircraft carried. Navy and Air Force F-4s carried both the AIM-7 Sparrow radar-guided missile and the AIM-9 Sidewinder infrared-guided missile. During *Rolling Thunder*, about 330 AIM-7s were fired for about 27 kills, a success rate of less than 9 percent. The AIM-9B Sidewinder was slightly more effective: about 15 percent of its shots were kills.[13]

The Services and the Department of Defense were shocked by the poor missile performance—pre-war missile testing programs had predicted much higher levels of effectiveness. Initial research and development tests for the AIM-7 produced 80 to 90 percent kill rates. Operational tests predicted that the AIM-7 would hit 71 percent of time; the AIM-9 was expected to hit 65 percent of the time.[14]

The missile testing program, however, did not reflect how the missiles would be used. Almost all the tests were against non-maneuvering drone targets at high altitudes, many of them with artificially strengthened radar returns. The missiles for the tests were carefully handled,

maintained, and stored. Any test failure was dismissed as the result of poor maintenance or an improperly executed test instead of the product of a flawed design.[15]

The ineffectiveness of U.S. air-to-air missiles provoked a number of efforts to improve their performance. The Navy and Air Force teamed up to try to improve Sparrow performance with the introduction of the AIM-7E in mid-1966, but the new version made only minor improvements over the previous model and had little impact. Another effort to improve the Sparrow was the AIM-7E2, introduced in August 1968. Called the "Dogfight Sparrow," the AIM-7E2 had a significantly shorter minimum range and was more capable against maneuvering targets, but it saw only limited use before the end of *Rolling Thunder* in 1968. It proved only a marginal improvement. During the entire course of the war (1965–1973), 281 AIM-7E2s were fired and achieved only 34 kills—a 12 percent success rate.[16]

Meanwhile, the Services followed different paths to improve their heat-seeking missiles. The Navy decided to improve the AIM-9B by adding a cooled seeker. To ensure that there was sufficient coolant for long engagements, the Navy mounted the liquid coolant bottle in the missile launch rail. The Navy introduced the AIM-9D in June 1966.[17]

The Air Force, in contrast, abandoned the AIM-9B and revived its AIM-4 Falcon infrared-guided missile, which had been beaten out by the Navy-developed AIM-9 in 1957. Like the AIM-9D, the AIM-4D had a larger engagement envelope than the AIM-9B and a cooled seeker. Unlike the AIM-9D, however, the AIM-4D stored its coolant in the missile body, which meant the supply of coolant was small and the missile had to be fired within 2 minutes of being armed or it would not work. The Air Force also chose to wire its newest F-4 model, the F-4D, to carry only the Falcon; it was not wired to carry the Sidewinder.[18]

The AIM-4D performed poorly in combat and forced the Air Force to scramble for a replacement. Less than

3 months after the Falcon's introduction into theater, Headquarters Pacific Air Forces decided to replace all the AIM-4Ds on its F-4Ds with AIM-9B Sidewinders. The F-4Ds all had to be rewired to carry the old missile. Upgrading to the Navy's AIM-9D would have required modifying all the Air Force F-4 missile rails. Navy and Air Force AIM-9 rails were incompatible until the late 1970s.[19]

Armament: Guns. The prevailing sentiment within the Pentagon in the early 1960s was that future air combat would consist of long-range radar detection and missile exchanges; thus, fighters would not need guns. By the spring of 1967, however, a number of Air Force reports had concluded that the lack of a gun on the F-4 was one of the reasons for the low kill rate in encounters with MiGs. The advocates of guns on fighters were able to cite the analysis of aerial combat over Vietnam to justify repurposing a podded gun system being developed to enhance the F-4's air-to-ground capabilities and use it for air-to-air combat. The first gun pods for the F-4 began arriving in Southeast Asia in April 1967 and were in use a month later. The pod scored four kills the first eight times it was fired.[20]

Meanwhile, the F-4E—the Air Force's newly announced version of the F-4—was equipped with an internal gun in addition to its other improvements. Reflecting the Air Force's faith in technological solutions, some Air Force pilots believed that the F-4E would solve their aerial combat problems. As Major William Kirk noted, "Eventually we're going to have the E-model airplane with the internal gun. That's the answer. That's obviously the answer." The first F-4Es did not deploy to Southeast Asia until November 1968, however, and problems with the aircraft slowed deployment. By mid-1971 there were only 72 F-4Es in theater.[21]

The Navy never did adopt a gun pod for the F-4 because it would have prevented its planes from carrying an external fuel tank on the plane's centerline, and employing wing tanks was very difficult given the cramped flight deck on

During Vietnam War, Airman fires 20mm cannon at point-blank range from F-105 while passing 15 to 20 feet below MiG, hitting left wing near fuselage as it bursts into flames (U.S. Air Force/National Archives and Records Administration)

board a carrier. The Navy also eschewed an internal gun on later models of the F-4, such as the F-4J, in part because it already had a gun-armed fighter, the F-8, and because the Navy devoted more effort to training its pilots on how to employ the F-4's missiles effectively.[22]

Situational Awareness. The Air Force also pursued a technological solution to increase its pilots' situational awareness. The Red Baron study cited earlier concluded that achieving a position of advantage first was the most important determinant of success in air-to-air combat over North Vietnam. Existing efforts

to detect MiGs and transmit their locations to U.S. fighters, such as the group of EC-121D airborne radar surveillance aircraft flying orbits over the Gulf of Tonkin, were insufficient due to technical limitations, harsh environmental conditions, and resource constraints. U.S. pilots were being shot down because they were caught unaware. The key requirement was for more timely position information on enemy aircraft. The Air Force assumed that if pilots knew where the MiGs were and could enter engagements from at least a neutral position, they stood a good chance of scoring a victory.[23]

In August 1972, the Air Force began to field a technical solution to the warning problem, an all-source fusion center—called Teaball—located at Nakhon Phanom Air Base in Thailand. Teaball fused signals intelligence, including voice communications between Vietnamese MiG pilots and their ground controllers, with ground- and air-based radar information. It then relayed the location of both U.S. Air Force and enemy aircraft to U.S. pilots over a complicated set of radio nets. Pilots received compass heading, speed, and vector information.[24]

The Navy had been using the radars and signals intelligence capabilities on its ships in the Gulf of Tonkin to improve the situational awareness of its pilots and provide ground-control intercept (GCI) along the coast of Vietnam, a capability it called Red Crown. The SPS-30 radar on the ships proved unreliable, so in early 1967 the Navy upgraded the ships with the more reliable and capable SPS-48 radar. After the upgrade, the Red Crown ships were able to improve substantially the situational awareness of pilots in their coverage areas for the remainder of the war.[25]

Institutional Adaptation

Analysis of the engagements during the first 4 years of aerial combat over Vietnam suggested that U.S. pilots, especially F-4 crews, were not adequately trained for the air-to-air mission. Debriefings of F-4 and F-105 pilots found that most of them felt poorly trained for air-to-air combat. Both the Air Force and the Navy recognized that the air-to-air training for their pilots was insufficient, yet only the Navy took steps to change the training quickly enough to affect aircrews' performance before the end of the war.[26]

Pre-war training in the Air Force did little to prepare pilots for aerial combat. The problem was not, however, the total amount of training, but its focus, quality, and realism. From 1954 to 1962, the Air Force training curriculum for fighter pilots sought to qualify them for both ground attack and air-to-air missions. Training time was divided between the two missions, but the standard 6-month

training interval included more than 100 air-to-ground missions and only 6 air-to-air missions.[27]

The quality of Air Force air-to-air training was also poor. Pilots who went through it complained that it was confusing and relied on outdated formations and tactics, such as the Fluid Four. There was little true verbal instruction by flying instructors, who seemed to believe that they had learned the hard way, so their students should too.[28]

Lastly, Air Force air-to-air training was unrealistic, largely because of the heavy emphasis on safety. The Air Force lost 824 aircraft in 1951 and 472 in 1959. Increased emphasis on safety reduced the loss rate to 262 in 1965, and no one wanted the rate to go back up. Consequently, TAC imposed strict limits on aircraft maneuvering and conducted all air-to-air training against similar aircraft.[29]

The Air Force examined proposals to change the training system during the war, but they were not considered feasible. The pressure to get pilots through the pipeline and into combat operations was too great. The Air Force had no spare assets to begin new programs.[30]

In the Navy, the Ault Report also found that F-4 crews lacked the training and tactics to cope with the smaller, more agile North Vietnamese MiGs. The Navy acted quickly to correct the deficiencies in its air-to-air training. The Navy established the FWS, more commonly known as "Top Gun," at Marine Corps Naval Air Station Miramar near San Diego, California, in late 1968. The first class graduated in April 1969. By mid-1972, more than 200 naval aviators had been through Top Gun and returned to the fleet. The syllabus emphasized training against dissimilar aircraft whose size and performance resembled North Vietnamese MiGs. Because the Navy had not adopted a cannon in the F-4, Top Gun training also emphasized employing missiles more effectively, primarily by using the AIM-9 rather than the less reliable AIM-7.[31]

Among the reasons for the Navy's more rapid implementation of improvements to air-to-air combat training was

the existence of a community that was already advocating for change. Navy squadrons were divided into fighter and attack squadrons, so fighter squadrons focused on air-to-air training. F-8 pilots, who still had cannons on their airplanes, developed a training program before the war that emphasized dogfighting. Some of those pilots had been sent to "help" Ault with his report. It is thus unsurprising that Ault's report recommended establishing an advanced FWS "as early as possible."[32]

Another part of the changes the Navy implemented was an effort to ensure that Navy GCI controllers had extensive training in controlling fighters in air-to-air combat. The Navy's ship-based Red Crown controllers worked closely with the Top Gun–trained Navy pilots and knew how and when to feed them the information they needed to be effective.[33]

Policy Adaptation

Air Force personnel policies also adversely affected pilot performance. When the air war over Vietnam began in 1965, the average Air Force fighter pilot had more than 500 hours of flying experience in his aircraft type. However, Air Force Chief of Staff Joseph P. McConnell implemented a policy stating that no pilot would be required to do two tours of duty in Southeast Asia until every pilot had done one. Aircrews returned home after one year or 100 missions; less experienced crews replaced them. By June 1968, Air Force fighter pilots facing MiGs over North Vietnam had spent just 240 hours in their aircraft type.[34]

According to several Air Force pilots who served in Vietnam, the Service's pilot rotation policy affected the quality of training. Air Force training bases sought to produce pilots as fast as possible to accommodate the policy goals of no pilot doing two tours until every pilot did one. Standards were lowered as quantity became more important than quality. Most who attended the training regarded it as a poor learning experience that did not adequately prepare them for combat. Some pilots never qualified in some of the events in the training syllabus

North American Rockwell OV-10A "Bronco" Light Armed Reconnaissance Aircraft of U.S. Navy Light Attack Squadron Four (VAL-4) fires Zuni 5-inch Folding-Fin Aircraft Rocket at target somewhere in Mekong Delta, Republic of Vietnam, June 1969 (U.S. Navy/National Archives and Records Administration/A.R. Hill)

but graduated and were sent into combat because the Air Force needed bodies to fill cockpits.[35]

In contrast, Navy aircrews flew 60–70 missions each cruise; a tour of duty in a carrier air wing typically involved several cruises. Experienced pilots rotated continuously through the combat zone. Moreover, the Navy could not lower pilot standards too far because pilots still had to land on a carrier. A relatively small cadre of Navy pilots thus flew the bulk of the missions over North Vietnam and took most of the losses. Although the loss rate remained steady rather than increasing, the losses were distributed among a smaller group of pilots, which caused morale problems.[36]

Evaluation

The resumption of the air war over North Vietnam in 1972 provided an opportunity to assess how well the Air Force and the Navy adapted to the disruption they had experienced from 1965 to 1968. When aerial combat recommenced, the Navy's kill ratio increased dramatically. During the final 13 months of major U.S. combat operations (January 1972 to January 1973), Navy F-4 squadrons shot down 24 MiGs and lost only 2 of their own aircraft for a kill ratio of 12 to 1. Meanwhile, the Air Force kill ratio declined. The Air Force shot down 48 MiGs and lost 24 aircraft to MiGs for a kill ratio of 2 to 1.[37]

There were differences in performance between Air Force and Navy aircrews in 1972–1973, one being a difference in missile performance and usage. The Air Force continued to have missile problems when the air war resumed in 1972. The Sidewinder variant the Air Force developed after the AIM-4D failed, the AIM-9E, actually had fewer kills per missile fired than its predecessor, the AIM-9B. In July 1972, the Air Force rushed another new Sidewinder model, the AIM-9J, into service. Tests indicated it was more maneuverable and had a larger launch envelope than the AIM-9E, but the tests were conducted under highly controlled conditions. The missile performed poorly in actual service. Of the 31 attempted AIM-9J launches from September until the end of December 1972, 23 were misses, 4 were kills, and 4 failed to launch.[38]

Meanwhile, the Navy's replacement for its AIM-9D, the AIM-9G, was even better than its already successful predecessor. The Navy AIM-9G was fired 50 times and had 23 kills for a success rate of 46 percent. The Air Force asked if the AIM-9G could be made available, but it

was found to be incompatible with Air Force launchers and electronics.[39]

The AIM-7 Sparrow continued to be a disappointment for both Services. Two-thirds of the AIM-7s fired by both Services malfunctioned. The Air Force never recognized the ineffectiveness of the AIM-7. An Air Force general who directed Pacific Air Forces operations noted in 1972 that Air Force aircrews felt the AIM-7 was a better missile than the AIM-9. The Air Force used the AIM-7 for 30 of its 48 kills. The Navy, on the other hand, realized by 1968 that the AIM-7 was unreliable. Top Gun instructors urged their students to avoid it in favor of the AIM-9. The Navy used the AIM-9 for 23 of its 24 kills.[40]

The Air Force credits Teaball with substantially reducing its air-to-air losses. From the time Teaball became operational on July 29, 1972, until the end of the war, the U.S. Air Force kill ratio improved to almost 4 to 1. But Teaball did not always work. The biggest problem was the ultra-high-frequency relay that Teaball used to send updates and guidance to U.S. aircraft, which tended to stop working unexpectedly. When Teaball did not work, the Air Force struggled. The Air Force lost six aircraft to MiGs after Teaball was activated; at least three and possibly four of the aircraft were lost when it was not working.[41]

The key difference, however, appears to have been training. Post-war interviews with Air Force F-4 crews showed they thought the first and most important reason for the Navy's higher kill ratio was its aggressive training program. Naval aviators returning from their second combat tour reported that their MiG encounters were "like Top Gun, only these guys weren't half as good."[42]

The experience of U.S. aerial forces in Vietnam eventually contributed to a training revolution. The Navy was so convinced that the dissimilar air combat training at Top Gun was so valuable that it expanded the technique to attack squadrons after the war ended. Although it was too late to affect fighter performance in Vietnam, the Air Force established its first aggressor squadron, the 64th Fighter Weapons Squadron, at

Nellis Air Force Base in October 1972. The aggressors initially flew T-38s, which resembled MiG-21s in size and performance, to provide dissimilar training to Air Force fighter units. The initiative for creating the aggressors came from FWS instructors at Nellis.[43]

In 1975, officers in the Air Force's electronic combat directorate—who were aware of research indicating that the majority of combat losses occurred in a pilot's first ten missions—pushed to expand test instrumentation at Nellis and used the test range and aggressor squadrons in a series of rotational training exercises, called Red Flag, for fighter squadrons. The goal was to provide pilots with the experience of their first ten dogfights, thus increasing their odds of surviving and performing well in an actual conflict.[44]

Conclusion

A review of Navy and Air Force efforts to adapt to unexpectedly poor air-to-air performance in Vietnam provides several insights for the current and future joint force regarding who typically drives adaptation, how long it takes, what contributes to success, and what can be done to avoid or minimize future disruptions. The first insight is that the time needed to adapt to disruption depended most significantly on senior leadership. Even with senior leadership's backing, however, adaptation took several years. Recognition that there was some sort of problem came fairly quickly. Within a few months of the start of aerial combat, both the Navy and the Air Force recognized that their air-to-air performance was not living up to expectations.

Gaining the requisite understanding of the problem took longer and required initiative from higher level leadership. In 1966, the Director of Defense Research and Engineering initiated the Red Baron studies that collected and analyzed the data on aerial engagements over North Vietnam. The CNO started Project Plan the same year. Initiating a comprehensive study of the problem, the Ault Report, took 2 more years and required the intervention of a newly appointed CNO.

Without the support of senior leadership, adaptation in the Air Force often depended on initiative from field grade officers and took much longer. There were advocates for guns on fighters within the Air Force, for example, but they were typically lone colonels in the distinct minority and had no platform or organization around which to concentrate. Similarly, the key figures in the creation of the aggressors and Red Flag were field grade officers. Criticism within the Air Force of training and tactics during the war was relatively muted after the war because many of the generals who had been responsible were still in high positions within the Air Force. It was not until the late 1970s, when many of the field grade officers from the Vietnam era began to reach higher ranks, that the corporate Air Force felt free to criticize its training during the war.[45]

Once the problem was understood and adaptations were proposed, implementation was relatively quick in both Services. The Ault Report was finished within months of starting in 1968. Top Gun was created late that year, and the first graduates reached the fleet by spring 1969. The first Red Flag took place just 6 months after it was approved by the TAC commander.

The importance of senior leadership to successful adaptation suggests that leadership development will continue to be a crucial element in creating a more adaptive joint force. The inclusion of case studies of successful and unsuccessful adaptation in joint professional military education could better prepare commanders for the cognitive and organizational challenges of adapting under fire.[46]

The second insight is that a broad approach to the problem and changes in more than one area produced more successful adaptation. The Air Force quickly concluded that the problems were largely technical and therefore sought to adapt its technology. The technological changes, including the addition of a gun and other modifications to the F-4 and the development of the Teaball fusion center, improved performance moderately but could not counteract the

Three fighter squadron 161 Phantom II fighter aircraft from USS *Midway* and three Corsair II attack aircraft from USS *America* drop Loran bombs during strike mission in Vietnam, March 1973 (U.S. Navy/National Archives and Records Administration/Fred P. Leonard)

negative effects of Air Force inaction in other areas, including tactics, training, and personnel policy. By contrast, the Navy changed its tactics by relying less on AIM-7 Sparrow missiles and more on AIM-9 Sidewinders, its technology by improving the naval version of the Sidewinder and, most important, its training by creating Top Gun. The result was a significant improvement in performance.

The third insight is that disregarding alternatives because they were "not invented here" significantly slowed adaptation. The Air Force adhered to outdated fighter tactics throughout the war, in part because the alternative was seen as too closely associated with the Navy. It revived the AIM-4 Falcon, for

example, because the AIM-9 Sidewinder was originally a Navy missile. The Air Force also chose to forgo cooperating with the Navy on a new Sidewinder. When neither the Falcon nor the Air Force version of the Sidewinder proved effective, the Air Force's options were limited because its planes were not wired to carry other missiles. The joint force must take advantage of all opportunities to learn and improve its ability to adapt to disruption, no matter which Service originated those ideas.

The fourth insight is that harnessing the expertise coming off the battlefield contributed to successful adaptation. Top Gun worked because the Navy used experienced combat pilots to teach students. The Top Gun instructors conveyed that

knowledge to the students and helped them learn how to teach the members of their squadrons when they returned to the fleet. The Navy's success highlights the potential value of joint lessons learned efforts that seek to transmit the knowledge won on the battlefield to the rest of the force.

Navy and Air Force experience with aerial combat during the Vietnam War also suggests some steps that might help avoid or minimize disruption in the future. One step is to consider a broad spectrum of scenarios for future conflict instead of just fixating on one. Even as today's joint force focuses on potential conflicts with peer competitors, it would do well to keep other contests and competitors in mind. Many Air Force and

Two F-4B Phantoms of VMPA-542, U.S. Marine Aircraft Group 11, 1st Marine Aircraft Wing, Da Nang RVN, on way to targets in support of Marines working in Northern "I" Corps, Vietnam, January 1969 (U.S. Marine Corps/National Archives and Records Administration/Carl Erikson)

Navy deficiencies in aerial combat during Vietnam occurred because the Services focused almost exclusively on a potential large-scale conventional and nuclear conflict against the Soviet Union during the late 1950s and early 1960s. Fighters did not need to maneuver or carry guns if they were shooting at slow-moving Soviet bombers with limited maneuverability. Unfortunately, the war in which the Navy and Air Force found themselves was not the one for which they prepared. Lieutenant General William Wallace's observation in 2003 that the irregular Iraqi enemy that U.S. forces were fighting "is different from the one we'd war-gamed against" suggests that the challenges of anticipating future opponents and scenarios persist.[47]

Finally, realistic testing and training that employ challenging situations and capable adversaries may enable military forces to avoid or more quickly adapt to future disruptions. Both the Navy and the Air Force were consistently surprised when their missiles performed poorly, in part because missile testing was often conducted against unchallenging targets under highly controlled conditions. In contrast, the implementation of more realistic, albeit more risky, dissimilar air combat training at Top Gun and, eventually, at Red Flag, significantly improved the ability of U.S. pilots to respond to the unexpected. Current and future joint training must incorporate challenging scenarios, such as operations in degraded information or contested aerospace

environments. The U.S. Navy regularly trains to operate in an electronically denied environment where command and control has been heavily impacted, and the U.S. Air Force has explored the implications of a day without space, but the joint force needs to begin developing new tactics, techniques, procedures, and capabilities to ensure coordinated efforts in such scenarios. **JFQ**

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Chadian special forces soldier receives basic rifle marksmanship training at live-fire range in Massaguet, Chad, as part of exercise Flintlock 17, March 6, 2017 (U.S. Army/Derek Hamilton)

The Revival of Al Qaeda

By Jami T. Forbes

Today's terrorist threats have changed, and terrorist groups are now more geographically dispersed and their tactics more diversified.

—National Strategy for Counterterrorism of the United States of America, October 2018

Time and territory allow jihadist terrorists to plot, so we will act against sanctuaries, and prevent their reemergence before they can threaten the U.S. homeland.

—National Security Strategy of the United States of America, December 2017

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On March 2, 2018, militants conducted near-simultaneous assaults on the French embassy and the military headquarters of Burkina Faso in Ouagadougou, the West African nation's capital. By the end of the day, 16 people were dead and more than 80 injured.[1] The attack on the military headquarters was likely aimed at targeting a gathering of senior officers, and Burkinabe officials stated the attack could have "decapitated"

their military had the meeting not been moved to a different location at the last minute.[2] Al Qaeda's West Africa affiliate Jama'a Nusrat ul-Islam wa al-Muslimin (JNIM) claimed credit for the attack, stating it was a message to France and its partners in the Sahel that the group was advancing "with a resolve unhindered by wounds and pains" inflicted by French-led counterterrorism (CT) pressure in the region. The events served as an ominous reminder of an ascendant al Qaeda that targeted the U.S. Embassies in Kenya and Tanzania more than 20 years ago.

Since its emergence in 2013, the so-called Islamic State (IS) has been at the forefront of the U.S. CT effort. The brash and often shocking tactics of IS largely overshadowed al Qaeda, which was weakened due to internal fissures, robust CT pressure, the death of Osama bin Laden, and battlefield losses in Afghanistan and the Middle East. Al Qaeda ceded its prominence in the Salafist jihadist world to a faster, flashier, and more aggressive movement and became a seemingly peripheral actor in the global war on terror.

However, while IS was promoting its use of terror as a means to become a state, al Qaeda was quietly laying the foundation for its resurrection. This article argues that al Qaeda is resurgent due in part to its ability to exercise strategic patience. While the high-profile tactics of IS made it easy to understand IS strategy and intent, al Qaeda pursued a more discreet path, making it more difficult to judge its actions. It diffused its leadership cadre out to a variety of geographic locations, empowered leaders, created cohesion among its global affiliates, and developed more durable havens by gaining inroads with vulnerable populations and exploiting fragile states. Al Qaeda's slower and more long-term strategy was much less salient than the one pursued by the Islamic State, but it is likely to be more dangerous in the long term, particularly if it helps the group to expand its support base and enhance local control through cooperation rather than coercion.

According to the December 2017 National Security Strategy, groups such as al Qaeda continue to present the most dangerous terrorist threat to the United States, and they draw from networks around the globe to "radicalize isolated individuals, exploit vulnerable populations, and inspire and direct plots."[3] As such, it is imperative that we challenge the narrative that al Qaeda has all but been defeated, seek to gain a better understanding of how al Qaeda is rebuilding its movement, and utilize diverse interagency resources to degrade the ability for a potential resurgence of the group.

Global Resurgence

Despite the broad focus on IS, al Qaeda and its affiliated networks likely hold the largest swaths of territory under jihadist control, including areas of Asia, Africa, and the Middle East. Over the past few years, the group has enhanced its footprint by cultivating local support and by forging alliances with local armed groups. In 2014, al Qaeda announced the creation of a new affiliate called al Qaeda in the Indian Subcontinent (AQIS), its first official network in Asia.[4] AQIS operates in Afghanistan and Pakistan but also has ambitions for India, Burma, and Bangladesh. The group is responsible for several small attacks in Pakistan and reportedly attempted to hijack a Pakistani vessel off the port of Karachi in 2014.[5] In Afghanistan, al Qaeda senior leaders appear to continue to benefit from Taliban-provided haven and are reportedly facing a "resurgence" in areas of Afghanistan stymied by limited governance.[6] In Somalia, al-Shabaab reportedly controls up to 30 percent of the country (a region with a coastline comparable in size to the Eastern Seaboard of the United States) and is operating with an estimated 7,000 to 9,000 fighters.[7] In Syria, despite some operational setbacks and a lack of cohesion, al Qaeda helped to broker the early 2018 creation of Hurras al-Din—a merger of smaller armed groups that has bolstered its ranks by attracting members who fought alongside al Qaeda in Afghanistan and Iraq.[8] In Yemen, al Qaeda in the Arabian Peninsula (AQAP) controls wide swaths of the southern part of the country and is reportedly garnering revenue from the extortion of state-owned firms and oil companies.[9] In Africa, al Qaeda in the Islamic Maghreb (AQIM) oversees an arc of instability that flows from the Maghreb into the Sahel. In February 2017, AQIM oversaw the merger of several armed groups in Mali, creating JNIM, which now controls a large portion of northern Mali and is expanding attacks into Burkina Faso and western Niger (an area roughly equivalent to the geographic size of Mexico).[10]

On occasion, these affiliates are willing and able to conduct high-profile operations, including external attacks. This suggests that al Qaeda's slow and patient strategy does not equate to a lack of operational activity. For example, in addition to the embassy attack in Ouagadougou, AQAP was responsible for the January 7, 2015, assault on the offices of the *Charlie Hebdo* magazine in France, which resulted in the death of 12 people and the injury of at least 11.[11] In addition, in October 2017, al-Shabaab detonated an explosives-laden vehicle in Mogadishu, causing 500 casualties—Somalia's largest terror attack to date.[12]

Adaptive Yet Consistent Leadership

One key factor that has likely enabled al Qaeda to withstand CT pressure and usher in a potential resurgence is its leadership cadre, which appears to have embraced traditional leadership while also implementing evolutionary changes. Al Qaeda senior leaders have long benefited from haven in Iran, where they have largely been inoculated from CT pressure.[13] Shortly following the attacks on September 11, 2001, some al Qaeda senior leaders sought shelter in Iran, where they likely recognized that the region would provide a sanctuary from U.S. drone strikes. Although the relationship between al Qaeda and Iran was at times contentious (with some al Qaeda leaders even being placed under occasional house arrest), the common enemies of the United States and the Islamic State likely drove a sense of collaboration.[14]

Since at least 2009, Iran has allowed al Qaeda to "operate a core facilitation pipeline through the country," enabling the group to "move funds and fighters to South Asia and Syria," according to the State Department.[15] In addition, al Qaeda officials indicated that Iran was a "main artery for funds, personnel, and communication" for the group, according to documents recovered during the Abbottabad raid against Osama bin Laden.[16]

Starting in 2015, al Qaeda emir Ayman al-Zawahiri, who has likely largely been confined to the remote tribal regions of Pakistan, appeared to empower some Iran-based leaders such as Saif al-Adel to make decisions and command operations on his behalf. Al-Adel, a former colonel and special forces soldier in the Egyptian army, is a founding member of al Qaeda who helped mastermind the U.S. Embassy attacks in Nairobi and Dar es Salaam.[17] He almost certainly has the experience and capabilities that could be central to any efforts to regenerate operational activities.[18] This has likely helped to reverse the previous isolation (and pressure) faced by al Qaeda officials who were reliant on haven in Pakistan and Afghanistan and is probably an enabler of al Qaeda's efforts to raise its public profile operational tempo. In addition to diffusing decisionmaking capabilities, al Qaeda has also expanded perceptions of its leadership cadre by drawing on images and statements from Hamza bin Laden (now deceased), using his lineage as the son of Osama bin Ladin and the al Qaeda heir apparent to inspire a new generation of fighters.

Furthermore, in early 2015, several members of the al Qaeda military council in Iran were relocated to Damascus, where they were credited with helping lead the fight against IS, and began commanding "an unprecedented number of veteran" fighters.[19] This infusion of leadership helped al Qaeda weather the loss of several senior leaders to airstrikes and mitigate the loss of some commanders to IS. It also helped al Qaeda develop a broader and more adaptive identity rather than just being an Afghanistan/Pakistan-based organization.

Cohesion Among Global Affiliates

Al Qaeda appears to be increasing cohesion among its disparate affiliates, with several issuing joint statements regarding external issues. This cohesion is likely being driven in part by the increased access to senior leaders. For example, in February 2017, AQAP and AQIM issued a joint statement eulogizing Omar Abdel Rahman, also known as the "Blind Sheikh," who died while in U.S. Federal custody. The statement called for fighters to conduct attacks against U.S. interests to avenge his death. Also, in September 2017, both al-Shabaab and AQAP issued nearly identical statements calling for support of Rohingya Muslims in Myanmar. Furthermore, when AQIM announced the merger of several armed groups in Mali in March 2017, the groups pledged loyalty to both al Qaeda and the Taliban, underscoring that even in a remote area such as Timbuktu, al Qaeda affiliates are in line with the movements' strategic messaging.

Al Qaeda is also attempting to resume its public role as the vanguard of global jihad, an effort underpinned by more robust and diverse media outreach. Al Qaeda media statements portray the group as the only force capable of fighting against tyrannical regimes in North Africa and against the United States, which was referred to as the "first enemy of Islam" in March and May 2018 statements.[20] Starting in late 2017, al Qaeda began to quicken the pace at which it disseminated media statements. For example, between mid-January and mid-October 2018, al Qaeda published 13 statements attributed to al-Zawahiri. This pace reflects a significant change from previous years when guidance and outreach from al Qaeda leaders were much more elusive (al Qaeda only issued nine statements attributed to al-Zawahiri in all of 2017).

Al Qaeda's deliberate reintroduction of its external vision is also reinforced by several statements advocating for attacks on the "far enemy" in the West. Since 2017, al Qaeda affiliates have issued at least 12 public statements calling for attacks on the United States, suggesting the long-term aspirations of the group to target the U.S. homeland have not diminished. In a March 20, 2018, statement, al-Zawahiri called for the worldwide Muslim community to unite, stating, "Let us fight America everywhere the same way it attacks us everywhere. Let us unite in confronting it, and never divide. Let us unify and never disperse. Let us gather and never become shattered."[21]

The ambitions to develop more global visions and operational capabilities are likely being adopted by al Qaeda's affiliates as well. For example, in May 2017, al-Shabaab issued a 55-minute video featuring statements from several al Qaeda senior leaders. The narration called the United States the "Satan of our time" and stated that al-Shabaab's jihad is a global one that is not restricted to geographical boundaries.

Al Qaeda is also endeavoring to reabsorb fighters from the Islamic State, calling for the unification of jihadist ranks and advocating for a common fight against the United States. This outreach has probably enabled the potential for operational cooperation between elements of IS and al Qaeda. For instance, in the Sahel region of Africa, al Qaeda and IS fighters are reportedly conducting joint operations against the Sahel G5 security forces there.[22] According to the United Nations mission in Mali, al Qaeda's affiliate JNIM and the IS branch in the Sahel (known as the Islamic State in the Greater Sahara) are reportedly cooperating and conducting "more sophisticated and deadly attacks."[23] Although a formal unification of IS and al Qaeda is unlikely in the near term, any potential cooperation between the two groups could expand operational capabilities, and the recruitment of former IS fighters could help bolster al Qaeda ranks with seasoned and experienced operatives.

Developing More Durable Havens

In addition to the leadership changes, al Qaeda has made efforts to cultivate durable havens by slowly integrating with local groups. Nowhere is there a

MQ-9 Reaper flies training mission over Nevada Test and Training Range, July 15, 2019 (U.S. Air Force/William Rio Rosado)

better example of al Qaeda's strategic patience than its efforts in Mali and Sub-Saharan Africa. Al Qaeda's strategy in the Sahel reflects a shrewd long-term vision, with the group calling its efforts there similar to caring for "a baby" that needs to mature and grow.[24] According to documents recovered in Timbuktu, al Qaeda saw the 2012 Tuareg rebellions in Mali as a "historic" opportunity to exploit vulnerable populations and develop a haven for its fighters. Since then, al Qaeda has methodologically integrated with disenfranchised tribal and ethnic groups via endeavors such as intermarrying with them, fighting alongside them in support of local grievances, and providing rule of law.[25]

Central to al Qaeda's strategy for the Sahel is the co-option of several ethnic and Salafist armed groups. In 2012, al Qaeda stated that it needed to put aside rivalries and "win allies" and "be flexible" enough to establish an organizational

relationship with groups so that it could combine the groups' regional efforts with al Qaeda's "global jihadi project."[26] This effort came to fruition in February 2017, when AQIM announced the merger of several Salafist armed groups under the al Qaeda umbrella. This merger represented a variety of ethnic and tribal backgrounds, including Arab, Fulani/Peuhl, and Tuareg identities.

The creation of JNIM has helped to advance operations in the Sahel, where since 2015 al Qaeda–affiliated attacks have expanded not only in number but also in geographic scope, shifting further into Burkina Faso and portions of Western Niger. In addition to the March 2, 2018, attack, al Qaeda is responsible for two other high-profile external attacks that specifically targeted Western-affiliated locations in Ouagadougou, including a January 2016 assault on a hotel that killed 29 civilians and a February 2017 assault on a café

that killed 18 civilians.[27] In March 2016, al Qaeda elements also targeted hotels and tourist venues in the Ivory Coast, resulting in the deaths of 22 civilians.[28] The group is also responsible for several attacks in Bamako, the capital of Mali. Following a June 19, 2017, attack against a Western-affiliated hotel, JNIM stated that it was sending a "message dripping with blood and body parts" that Western "crusaders" would never be secure in Mali. Furthermore, the group is likely holding at least six Westerners hostage, including one U.S. citizen.[29]

The development of a haven in the Sahel represents a dangerous precedent that, if left unabated, could help enable future global aspirations of al Qaeda. For instance, the recovered guidance indicated that al Qaeda leaders saw the opportunity to shape Mali and the Sahel into a base from which it could conduct training and eventually launch global jihadist operations against the West.[30]

Nigerien soldiers receive counter-IED class as part of exercise Flintlock 17 in Diffa, Niger, February 28, 2017 (U.S. Army/Kulani Lakanaria)

In line with its patient and calculated strategy for establishing a caliphate, al Qaeda's guidance directed developing strong ties to locals, while hiding broader jihadist ambitions until favorable conditions are sufficiently set. Al Qaeda stated it was better for fighters in the Sahel to currently "be silent and pretend to be a 'domestic' movement" in the short term, hiding the fact that al Qaeda had "expansionary, jihadi" aspirations for the region.[31]

This strategy is not limited to the Sahel. It mirrors AQAP's approach in Yemen, where the group also forged alliances with tribal militias to help expand its presence.[32] In addition, AQAP has been able to implement development projects, including providing access to water and electricity, and has established governance bodies to help provide goods and services to locals. The group also reportedly provides rule of law through shariah courts and has promoted humanitarian efforts such as handing out food

baskets to locals who are in need, according to Twitter users.

Outlook

Al Qaeda has likely laid the foundation for its movement to present a more durable threat. As outlined in the 2018 National Security Strategy, both time and territory help enable terrorist groups to threaten the U.S. homeland. As such, it is imperative to gain a better understanding of how groups such as al Qaeda are using "quieter" methods such as exploiting sociopolitical and ethnic grievances to develop havens. This will require a strategy underpinned on initiatives outside of military force, including diplomatic engagement, humanitarian aid to vulnerable populations, enhanced collaboration with law enforcement, and international partnerships.

To reverse the positive trend for al Qaeda, it will be important for the United States and our partners to understand that the degradation of IS

does not equate to the degradation of global Salafist jihadist movements. Al Qaeda will almost certainly continue to evolve and may emerge from behind the shadows of IS with a renewed vision, empowered leaders, a more cohesive global network, and a perceived moral high ground among fighters. Moreover, we must recognize the potential bias we have placed on IS. Saliency bias describes the phenomenon in which humans focus on items or information that are more noticeable or prominent and dismiss those that are less obvious. Undoubtedly, the actions of the Islamic State were salient—the brash and often shocking tactics of the group have made it difficult for the United States to ignore. As such, IS has been at the forefront of our counterterrorism focus. While al Qaeda was not completely dismissed, its longer term approach made it more difficult to understand the impact and pattern of its actions, possibly enabling the group to adapt and evolve.

Finally, the United States and its partners must carefully monitor the progression of al Qaeda affiliates, particularly JNIM in Mali, where al Qaeda is expanding its geographic footprint and has momentum. As outlined in the National Strategy for Counterterrorism, "veteran Al-Qa'ida leaders are working to consolidate and expand the group's presence in several regions . . . from which it aspires to launch new attacks on the United States and our allies." Should al Qaeda successfully build a haven and establish a state built on its own brand of shariah law, it could serve as the flagship enterprise that will regenerate confidence in al Qaeda as a movement, and possibly enable the group to shift from developing sanctuary to expanding its ability to conduct external attacks against the United States and Western interests. **JFQ**

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New from NDU Press

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Strategic Forum 303
The PLA Beyond Asia: China's Growing Military Presence in the Red Sea Region
By Joel Wuthnow

China has gradually expanded its military footprint in the Red Sea region, an area of critical importance for global maritime commerce and energy production. Key aspects include a People's Liberation Army role in United Nations peacekeeping, anti-piracy patrols, and a new base in Djibouti. China's military presence—its largest outside the Indo-Pacific—supports Beijing's diplomatic relations in the region, contributes to China's maritime security interests, and provides useful lessons in building an expeditionary capability. U.S. officials need to address operational safety and counterintelligence issues and determine whether China's presence—which also includes military diplomacy and arms sales—is eroding traditional U.S. advantages as a security partner. Opportunities for military cooperation should be explored in areas where U.S. and Chinese interests align, such as disaster management and maritime safety.

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Soldiers with 25th Infantry Division conduct air assault operations onto deck of 8th Theater Sustainment Command's Logistical Support Vessel-2, off coast of Honolulu, Hawaii, January 11, 2020 (U.S. Army/Jon Heinrich)

Frustrated Cargo
The U.S. Army's Limitations in Projecting Force from Ship to Shore in an A2/AD Environment

By Brian Molloy

I n recent years the joint force has rediscovered and discussed at length the challenges of contested air and sea control[1] and the antiaccess/area-denial (A2/AD) environment. With

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this renewed focus, it is entirely possible that the joint force could overcome the A2/AD threat, achieve local sea control, push Marines ashore, and land Army airborne forces in support of airfield seizures only to become stalled in its ability to offload Army combat power at its critical vulnerability: in port. In this scenario, with denied port

infrastructure, nearly the entire U.S. Army could become frustrated cargo at sea, putting the success of the joint force at risk.

Denied ports as part of an A2/AD strategy is a reality in numerous potential flashpoints around the globe. The Korean Peninsula, Taiwan, or any number of contested islands and landmasses in the

Pacific provide instructive examples. The current joint concept relies on a relatively small initial entry force to establish a lodgment with the preponderance of the combat power flowing as follow-on forces through established or hasty infrastructure.[2] This dynamic will be challenged in an A2/AD environment, which will require entry forces to mobilize over the shore without the benefit of a lengthy reception, staging, onward movement, and integration (RSOI) process, a task the U.S. Army is unprepared to perform. The Army has largely ceded the forcible entry over-the-shore responsibility to the Marine Corps; they are tasked to open a lodgment for follow-on forces. However, in an A2/AD environment, the Army will be unable to capitalize on this initial lodgment due to the likelihood of contested or denied ports and airfields inherent in these operations.

To overcome this vulnerability, the Army must harness its capacity to maneuver from ship to shore without mobilizing through port facilities. To do so, the Army needs to avoid overreliance on static infrastructure that may not be available in an A2/AD environment, prepare to reinforce the Marines at the beach for the joint force to operate as doctrine demands, and develop new training and doctrine to posture itself to fill this role.

Doctrinal Framework

Joint forcible entry operations break down into five phases: Phase I, preparation and deployment; Phase II, assault; Phase III, stabilization of the lodgment; Phase IV, introduction of follow-on forces; and Phase V, termination.[3] Joint doctrine calls for either the Marines or the Army to act as the principal element of assault, stabilization, or follow-on forces.[4] Both the assault and reinforcing forces must be postured to execute operations over the shore without benefit of a lengthy RSOI.[5] The follow-on force can then enter theater through hasty or established aerial and sea ports of debarkation and conduct RSOI in Phase IV before continuing operations.[6] Currently, however, Service doctrines of both the Army and the Marines neglect the role of Army forces in Phases I to

III, effectively ceding the responsibility to the Marine Corps. This approach is shortsighted and insufficiently joint to gain the most benefit from the strengths of each Service. The Marines are adept at conducting Phase II initial assault operations, while the U.S. Army has the staying power for protracted land operations in Phase IV and beyond. The question becomes where in the forcible entry continuum the Army is best suited to enter this power into theater. The best approach leverages the relative strengths of each Service while operating in a joint capacity to deliver the best result to the joint force commander. Waiting until Phase IV to enter the Army into the fight is insufficient and introduces a significant vulnerability into the power projection capabilities of the joint force.

Avoiding the Static Infrastructure Trap

The Army currently relies too heavily on static infrastructure, specifically well-defended decisive points at ports and airfields. From the end of the Korean War until very recently, the United States has enjoyed the luxury of fighting in environments with friendly allies willing to provide defended ports outside the envelope of enemy A2/AD weapons. The first Persian Gulf War and Operation *Enduring Freedom* in Afghanistan provide instructive examples. In the Gulf War, over 90 percent of all supplies moved through only three accessible ports, all located in Saudi Arabia. The Iraqi navy destroyed portside infrastructure and scuttled vessels in the harbor at Ash-Shauybah, denying the only deep-draft port available in Kuwait.[7] Only after a significant effort to clear it after hostilities ended did the Army reopen the port. This port denial action, while tactically insignificant, shows the ability of a poorly equipped naval force to deny static infrastructure easily. Similarly, in Afghanistan, the United States relied on only one deep-water port in Pakistan to supply the war with the vast majority of its supplies moving by sea.[8] In both cases, the majority of Army combat power, including nearly every piece of

artillery and armor, came through a port. In an A2/AD environment, these static ports, easily targeted by precision munitions, mined by submarine, or denied through scuttling commercial ships, present critical vulnerabilities to continuing operations. This significant reliance on a small number of ports for major combat operations is an unacceptable and avoidable risk in the current operating concept.

Contrasting the permissive entry in the Gulf War and Afghanistan to the denied experience entering theater during World War II and Korea, the reliance on static infrastructure becomes starker. Arguably, these conflicts were the last time the United States faced a peer threat. The invasion of Normandy provides an excellent example of this need. Planning included five reinforced divisions making up the initial amphibious assault element, with an additional 30 divisions flowing over the beach as the reinforcing force.[9] Only after 3 weeks would Cherbourg be opened to allow unopposed follow-on forces to enter through ports. A similar case occurred during the Incheon landings during the Korean War, where the initial assault elements came ashore in mid-September. It was not until October 10—25 days later—that the port at Incheon was cleared and opened to allow follow-on operations.[10] In a peer-on-peer fight, the time-force balance of rapidly pushing combat power ashore requires the ability to deliver the preponderance of combat power over the beach. In a peer conflict, the preponderance of that combat power will be the U.S. Army, and the joint force will not have the luxury of waiting 25 days to enter that combat power into theater.

Airfields present a similar challenge to ports as static infrastructure and are likely to be among the first targets of an A2/AD campaign. While aerial forcible entry can move troops and supplies rapidly, it is severely limited in its ability to move heavy equipment, particularly armor, and as such is unable to fill the gap if ports are denied. Even if airfields themselves are not denied, the Air Force cannot move armor through the air in quantity. Joint Publication (JP) 3-17, *Air Mobility Operations*, assumes as

much, stating, "Ninety percent of inter-theater cargo goes by sea."[11] Indeed, it would take 54 sorties of C-17s to replace just one LPD-17 amphibious ship in strategic lift capability, and over 500 sorties of C-17s to replace one large, medium-speed, roll-on/roll-off ship (LMSR).[12] The need to move armor rapidly into theater becomes a significant operational constraint in a peer conflict. In the case of an A2/AD environment, the option of force projecting the Army over the shore as a complement to the Marines becomes an attractive one.

Finding the Army's Role

Considering this challenge, the Army must again develop an over-the-shore capability to reinforce Marines as the assault force at the beach well before follow-on operations in Phase IV. The Army must be prepared to enter theater to assist in the expansion of the lodgment in Phases II and III to be able to capitalize on operations effectively. Amphibious assaults during the Korean War precisely demonstrated this concept. At Incheon, the 1st Marine Division executed the initial assault, with the Army's 7th Infantry Division acting as a reinforcing force early in what we would now call Phase II.[13] This approach leveraged the expertise of the Marines in amphibious operations with the combat power of the Army division to exploit the objective. In planning this operation, General Douglas MacArthur understood his limitation in the number of Marines available. The ability to put Army Soldiers across the beach following the Marines allowed him significant flexibility as an operational commander by leveraging relative capabilities of both the Army and Marines under his command.

Army reinforcement at the beach still complements Marine Corps capabilities well, with each providing different capabilities to the fight. While the Marines are adept at pushing light forces ashore, the Army's unique role is in providing substantial armor to the fight. In addition to the armor itself, the Army also maintains the most substantial maritime surface connectors in the joint inventory. While the Marine Corps surface connectors are incredibly versatile in projecting light forces to shore, they are limited in their capability with armor. Since divesting the Landing Ship Tank, the Marine Corps currently does not have surface connectors that can put more than two M1 Abrams on the beach at a time. The Army Logistics Over-the-Shore (LOTS) fleet, however, includes the LCU-2000, with the capacity to land five M1 Abrams,[14] as well as the largest surface connector in the U.S. military inventory—the Logistics Support Vessel (LSV)—that can land up to 24 M1A2 Abrams at a time.[15] The LSV is an incredibly versatile workhorse of the LOTS fleet, which is not only blue-water capable and able to operate independently, but also can operate as a surface connector in concert with gray-hulled Navy amphibious vessels, all with the ability to completely bypass ports and deliver armor directly into the fight through the surf zone. The challenge is that these vessels are not currently seen as tactical assets.[16] If reimagined, the potential to re-mission them as assault craft would provide the operational commander a significant capability. If this approach is taken, though, doctrine must be developed to harness those assets in their new role.

Confronting the Challenge of a Neglected Mission

The Army is currently unprepared to provide forces earlier than Phase IV despite the demand in joint doctrine that it must do so. Both JP 3-02, *Joint Amphibious Operations*,[17] and JP 3-18, *Joint Forcible Entry Operations*, state that either the Marine Corps or the Army can make up the landing force.[18] Despite this, the Army has neglected doctrinal development on amphibious operations, has not trained in amphibious operations, and would not be able to fully integrate into the joint fight with the Navy and Marine Corps team. The doctrinal challenge is particularly stark. The Army functionally has no amphibious doctrine. It last published an amphibious operation manual in 1966 and has since discontinued its use. In the most recent Army doctrinal framework, the word "amphibious" appears only 14 times, and 5 of those times are to define the term or its graphical symbols.[19] The Marine Corps, meanwhile, has a complete and detailed amphibious framework, albeit one that is not well suited to the Army.[20] The Marines and Army operate with different equipment, command and control, and organizational structures that would make a cut-and-paste usage of Marine Corps doctrine a good starting point, but not a complete solution to the problem. Additionally, the Army's role is not as the initial assault force, which is where the preponderance of the Marine Corps doctrine focuses. The Army must develop the doctrine to allow it to supplement existing Marine Corps and Navy doctrine where it provides unique capabilities.

Compounding the doctrinal problem, the Army recently considered significant cuts to its LOTS capabilities, further hampering the ability to conduct sustained operations in a denied environment.[21] Following the successful operations in World War II and Korea, the Army gradually shifted focus from amphibious operations to amphibious logistics. Shortly after the Korean War, the Army transferred its entire amphibious capability away from the maneuver support-focused Army Corps of Engineers to the logistics-focused Transportation Corps.[22] This transition effectively ended the Army's interest in conducting amphibious operations as an entry method to theater, yet it retained hundreds of LOTS vessels in a logistics capability. Recently, the Army again has shifted focus, announcing the near-total divestiture of its remaining waterborne fleet.[23] This divestiture widens the capability gap and reduces options to re-mission logistics vehicles for maneuver over the shore if the Army is forced to do so. The Marine Corps is not trained or equipped to pick up the responsibility of carrying Army units ashore either, as evidenced by limited surface connectors and capacity on amphibious lift. The divestiture of the LOTS fleet also opens the potential to reimagine the use of these vessels. As the Army divests these assets from the Transportation Corps, the time is right to begin the conversation of reutilizing them in a maneuver role.

During Korean War, Marines use scaling ladders to storm ashore at Inchon in amphibious invasion on September 15, 1950 (U.S. Marine Corps/National Archives and Records Administration/W.W. Frank)

The Army must also begin to train for amphibious operations. Without the benefit of a doctrinal foundation or the ready access to equipment, the hard-won lessons of past conflicts atrophied and the skills necessary to succeed in the littorals vanished. The last major planning exercise in the Army for amphibious operations was in 1964, conducted by the Army Engineer School. Even this exercise existed only on paper and was never tested on the ground with Army equipment.[24] In fits and starts, the Army has tried to get back into the business of amphibious operations, but never to the extent of standing up a headquarters or providing a proponent to maintain proficiency. Meanwhile, the Navy–Marine

Corps team has not incorporated Army forces into its annual amphibious training events. Even though joint doctrine calls for both the Army and the Marines to be capable of performing jointly with each other in amphibious operations,[25] neither is prepared to do so.

The rapid buildup of combat power from the sea to shore is a fundamental characteristic of amphibious operations.[26] The Army maintains the preponderance of U.S. ground combat power, and nearly all conflicts have required the Army to carry the burden of sustained fights. Without the ability to enter this combat power into theater, the entire Army runs the substantial risk of becoming frustrated cargo afloat on commercial ships while the Marine

Corps is left without a sufficient follow-on force to capitalize on their gains.

Moving from a "Corps" Competency to a Core Competency

Some—indeed, most—senior Department of Defense officials would argue that the Army has little business operating in amphibious landings.[27] The Marine Corps is rightfully seen as the standard bearer in amphibious operations, and most would argue that the Marines alone are capable of providing lodgments for follow-on forces. Allowing the Army to generate its own amphibious capability would compete for resources with the Marine Corps and

During Nautical Horizon 2018, distinguished visitors from 1st Theater Sustainment Command, Kuwait military, and other coalition forces, got firsthand look at U.S. Army vessels participating in logistics over-the-shore mission, Shuaiba Port, Kuwait, June 24, 2018 (U.S. Army/Charlotte Reavis)

would ultimately provide limited value in the joint fight. This argument, however, misses the point. The reality is that the Army–Marine Corps team, working together at the beach, provides more value to the operational commander than either force working alone. The current model works well when noncontested ports are available. In an A2/AD environment, this will not be the case. In a contested environment, the Army needs the ability to act as a reinforcing force earlier in the operation to expand the lodgment initially gained by the Marines. Instead of waiting for the initial assault force to secure a port, entering both the Army and the Marines in an over-the-beach approach allows the operational commander considerable flexibility in projecting the preponderance of their heavy combat power directly into the fight. Though leaders' concerns of a duplication of effort are valid, they are misplaced. The Army's role in over-the-beach operations seeks not to replace Marine Corps capabilities but rather to reinforce those capabilities as a force multiplier. Conventional wisdom would state that it is not the tip of the spear that does the killing but the weight of the shaft behind it. The Marines have developed the capability, specialty, and expertise to continue to be the tip of the spear

in amphibious operations. The Army, however, must be capable of providing the spear's shaft. Just as a spearpoint is ineffective without its shaft, so too is the joint force ineffective when it neglects its greatest contributor of ground combat power during amphibious operations.

Recommendations to the Joint Force

The Army has always wrestled with its role in over-the-beach operations. It is at a crossroads again, but if the joint force is to be successful against a peer enemy, the Army must confront the reality that unopposed port and airfield operations are unlikely to be available. As was the case in 1942, the Army today finds itself unprepared to fight over the shore despite the foreseeable situation where the need is manifest. Prior to World War II and during the Korean War, the Army adapted and developed the capability to project force in a denied environment. The Army cannot stay complacent and overreliant on the static infrastructure used for the last decades of war. The only viable alternative is to maneuver over the beach as a complement to the Marine Corps, and the Army must develop the doctrine to support such actions. The joint force must likewise plan and implement truly joint capabilities that comple-

ment the strengths of all the uniformed services to dominate the beaches.

First, the Army must lean on the Marine Corps in development of its own Army-specific doctrine. Before World War II, the Army directed the establishment of the Army Engineer Amphibian Command.[28] Today, the Army should direct a proponent under the auspices of the Maneuver Support Center of Excellence to develop Army doctrine for how it will integrate into the joint fight in maneuver over the shore. The Army does not need to start from scratch, as doctrine already exists, but it must adapt the existing doctrine to modern capabilities. Beyond doctrinal changes, it needs to integrate the other levers of the joint capabilities framework: organization, training, material, leadership and education, personnel, and facilities.[29] The Army is lucky to have a partner in the U.S. Marine Corps that it can lean on to develop this expertise. It should leverage this expertise by training Army officers in planning and executing amphibious operations by embedding them on Marine Expeditionary Unit deployments to gain operational experience in maneuver from ship to shore and developing competency in amphibious planning.

Second, the Army must immediately reverse its course on the divestment of its LOTS capability, and instead re-mission the fleet to perform a dual function. The Army needs to view its waterborne fleet as more than solely a transportation and logistics asset,[30] and instead view it as a vital maneuver support asset. Assessing the fleet as a maneuver support asset allows Army combat power to maneuver over the shore in Phases II and III of an amphibious assault and transition to LOTS activities in Phase IV. The Army must also become adept at operating off nonstandard platforms. Due to the well-documented shortage of amphibious lift capability for the Marine Corps, it is unlikely that the Army will be able to utilize the large, gray-hulled amphibious ships commonly used by Marine forces.[31] General Mark Milley went to great pains to explain this at his confirmation hearing to be Army Chief of Staff.[32] Because of this, the Army needs to practice operating from roll-on/roll-off

Military Sealift Command vessels, converted civilian vessels,[33] or the amphibious vessels of allies.[34] Congressional support for investing in new large-scale Army maritime fleets is doubtful.[35] However, the use of nonstandard platforms combined with a re-missioned LOTS fleet provides a viable short-term alternative.

Finally, the joint force must welcome the Army back into the fold in joint exercises in the littorals. The Marine Corps hosts annual amphibious exercises, such as the 2019 Exercise Pacific Blitz,[36] where the Army has generally not participated in an amphibious capacity, performing a more traditional role supporting airborne forces, and with logistics behind the beachhead. Just as the Army trains to enter theater from the air, so too must they train to enter through the littorals. Professional military education programs, starting with the Maneuver Support Center of Excellence, must begin to conduct exercises to discuss its role in the entry to theater over the beach. These exercises were regularly conducted in the past with the last—Operation *Sunset*—occurring in 1964. It is now time to resurrect these exercises and again gain the planning proficiency for amphibious operations. Training and education are critical to the Army operating as a viable member of the joint force in the littorals.

Despite the myriad challenges discussed above, all is not lost. As was the case in 1942, the Army now has the time to correct these deficiencies. The Army's role as part of the joint force in the littorals is clear. In order to fulfill this role, it cannot remain reliant on static ports, and therefore must work to reinforce the Marines at the beach. These operations are not in conflict with the mission of the Marines; instead, they are complementary, just as joint doctrine describes it. The Army can conduct these operations, and it must now build the doctrine and training to execute them. The fight of the future will be rife with challenges. The Army must accept the reality that it will need to fight if only to get to the fight. Failure to understand this could result in the Army remaining frustrated offshore, never able to disembark, while the joint force waits for its arrival. **JFQ**

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Attaining Maritime Superiority in an A2/AD Era
Lessons from the Battle of the Bismarck Sea

By Ben Ho

Great Power competition is back after a hiatus of over a quarter of a century since the end of the Cold War. The United States has acknowledged this fact with the release of the 2017 National Security Strategy and the 2018 National Defense Strategy, which speak of revisionist powers such as China and Russia seeking to challenge the current U.S.-led world order.[1] These two documents are in line with what various individuals in and outside of the U.S. defense establishment have been asserting in recent years about the state of international geopolitics. For instance, former Chief of Naval Operations Admiral John M. Richardson contends in the 2016 *A Design for Maintaining Maritime Superiority* that "Russia and China both have advanced their military capabilities to act as global powers," adding that their "goals are backed by a growing arsenal of high-end warfighting capabilities, many of which are focused specifically on our vulnerabilities."[2] In the same vein, the 2018 edition of this strategic document, *Version 2.0*, notes that "China

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and Russia seek to accumulate power at America's expense and may imperil the diplomatic, economic, and military bonds that link the United States to its allies and partners and that "while rarely rising to the level of conflict, Chinese and Russian actions are frequently confrontational."[3]

Admiral Richardson also stresses in the 2016 document that naval combat must address "'blue-water' scenarios far from land and power projection ashore in a highly 'informationalized' and contested environment."[4] This contested environment is invariably framed by the antiaccess/area-denial (A2/AD) challenge that Beijing and Moscow pose to U.S. maritime dominance. Indeed, Admiral Richardson stresses in *Version 2.0* that the U.S. military's "competitive advantage has shrunk and in some areas, is gone altogether."[5]

How best to deal with this state of affairs has been a major debate in the U.S. national security community in recent years. Defense thinkers often look to history to solve current military problems, and insights from a less popular but crucial engagement during World War II in the South West Pacific Area (SWPA) could guide Pentagon leaders toward mitigating this threat. This is the almost forgotten Battle of the Bismarck Sea of March 2–4, 1943, which saw Allied airpower decimating the Japanese convoy designated Operation 81 in the waters off New Guinea.[6]

Three insights from the battle stand out:

- land-based aircraft can play a key role in maritime interdiction
- we must innovate and improvise to deal with current and urgent problems
- the enemy should be overwhelmed with multidomain threats.

While one can argue that the Allies at the Bismarck Sea engagement were more akin to the A2/AD force by today's definition of the term, their actions during the battle and the lessons learned are relevant to today's counter-A2/AD forces. After all, the concept of A2/AD can work both ways. To illustrate, while the submarine

Map. Battle of the Bismarck Sea

Japanese ship movements (black) and Allied air attacks (red) during the battle

Source: Douglas MacArthur, *Reports of General MacArthur: Japanese Operations in the Southwest Pacific Area*, vol. 2, pt. 1 (Washington, DC: Government Printing Office, 1994), plate 51.

is widely regarded as the quintessential access-denial platform, it can be similarly deployed to circumvent the A2/AD barrier. In the same vein, while Beijing may employ an A2/AD strategy to keep enemies far away from its shores, the concept can be turned on its head to keep the People's Republic of China bottled up within the so-called First Island Chain.[7] This article begins with a brief account of the Battle of the Bismarck Sea and then works through the three lessons delineated above with brief policy recommendations vis-à-vis each of them.

Historical Narrative

Despite the overwhelming success of the Americans at the Battle of Midway, the Japanese were still a force to be reckoned with in the Pacific after June 1942, especially in the SWPA of operations where they were ensconced in several key bases such as Rabaul. In August 1942, the United States went on the strategic offensive, with Marines capturing Guadalcanal in the Solomon Islands. Over the next 6 months, the Americans were embroiled in a fiercely fought campaign that saw both sides taking heavy losses, but that the United States ultimately won. Concurrently, and

several hundred kilometers away, the Allies were fighting to defend the crucial New Guinean city of Port Moresby that could be used to threaten Australia should it fall into Japanese hands. With the successful defense of Port Moresby, the Allies went on the offensive in New Guinea with the goal of neutralizing Rabaul. Following the decision in January 1943 to withdraw from Guadalcanal, Tokyo decided to focus its efforts in the SWPA on the New Guinea campaign. Therein lies the strategic context of the Battle of the Bismarck Sea.

General Douglas MacArthur called the Battle of the Bismarck Sea "one of the most complete and annihilating combats of all time."[8] Similarly, one Japanese navy captain termed his country's defeat in the battle as "unbelievable," adding that "never was there such a debacle."[9] Operation 81 consisted of eight troop transports and a similar number of destroyers as protective escorts.[10] There were 6,900 Japanese soldiers traveling with the convoy from Rabaul, and they were meant to be reinforcements for the vital garrison in Lae, New Guinea, from which imperial forces were trying to halt the Allied offensive in that former Australian territory (see map). Some 100 Japanese fighter planes

Part of cowling for B-25 bomber motor is assembled in engine department of North American Aviation's plant in Inglewood, California, October 1942 (Library of Congress/Alfred T. Palmer)

provided air cover for the convoy, though the numbers overhead differed at various times. Operation 81 was detected on March 1, 1943, and almost 100 U.S. and Australian bombers attacked the convoy in the following days.

When the smoke had cleared, all the transports and four destroyers had been sunk. Of the 6,900 Japanese troops with the convoy, only 1,200 made it to Lae, while another 2,700 were rescued and returned to Rabaul, from where they had come. The rest were killed. On the other hand, the Allies lost only a handful of aircraft. The Battle of the Bismarck Sea was Japan's last air offensive in the SWPA, and it set the stage for the Allied offensive in that theater from June 1943 onward.

One scholar opines that the battle was the turning point of the protracted New Guinea campaign, calling it the campaign's "Midway."[11] In the same vein, the authoritative postwar *U.S. Strategic Bombing Survey* notes that regarding the SWPA, "From 1 March 1943 to the end of the war, the enemy remained on the defensive, strategically and tactically, except for desperate counterattacks by separate and isolated units."[12]

Lesson One: Land-Based Aircraft Can Play a Key Role in Maritime Interdiction

This lesson is especially relevant today given the debate over how the United States could best fight for sea control

during a conflict with a Great Power. One student of the Bismarck Sea engagement contends that it "still stands as a striking example of the deadly effectiveness of land-based air power against naval targets."[13] As the Allies did not have any aircraft carriers or major surface combatants in the area of operations at that time, aircraft flying from New Guinea bases undertook the task almost entirely of interdicting Japanese convoy Operation 81. Prior to the battle, the in-theater Allied air forces that comprised the U.S. Fifth Air Force and Royal Australian Air Force Command had a mixed record in attacking ships.[14] The Battle of the Bismarck Sea changed that, and using

tactics employed during the engagement, the Allies prevented subsequent Japanese attempts at reinforcing their positions in New Guinea.

While the Battle of the Bismarck Sea arguably marked the apogee of land-based aviation in the antisurface warfare (ASuW) role during World War II, there were also several other cases of terrestrial airpower successfully attacking ships during that conflict. Witness the deadliness of the Luftwaffe's Focke-Wulf Fw 200 Condor during the initial stages of the Battle of the North Atlantic. This medium bomber posed such a threat to Allied convoys that British Premier Winston Churchill called it the "scourge of the Atlantic." Indeed, two retired senior U.S. Navy officers, Wayne P. Hughes and Robert P. Girrier, assert that Luftwaffe head Hermann Goering's focus on land operations meant that "the service did not take as seriously the ship-attack remit."[15] Consequently, "the possibility that Germany might wake up to the opportunity haunted the harried Royal Navy throughout much of the war."[16] In the Pacific theater, Japanese navy medium bombers flying from Indochinese bases decimated British Force Z with the sinking of the *Prince of Wales* and *Repulse*, marking the first occasion where capital ships were sunk by aircraft while they were under way at sea. Allied land-based bombers proved equally devastating during the campaign to retake the Philippines from the Japanese. At the November 1944 Battle of Ormoc Bay, U.S. Army Air Force (USAAF) medium bombers inflicted substantial losses on a Japanese troop convoy.

Moreover, the significance of Allied land-based airpower in the ASuW role during the Pacific War is often understated as it is commonly believed that sea-based aviation was the key player in this respect. To be sure, carrier planes were behind the destruction of much of the imperial fleet. The *U.S. Strategic Bombing Survey* reveals, however, that land-based aircraft accounted for 14.5 percent of Japanese merchantmen losses, which is only slightly lower than the corresponding figure of 16.3 percent for carrier aviation.[17] The toll on Japanese

commercial shipping exacted by shore-based airpower is higher when accounting for the fact that sea mines, laid mainly by USAAF B-29 bombers, accounted for another 9.3 percent.[18]

Land-based airpower proved its worth in ASuW during World War II, and Pentagon thinkers would do well to bear this in mind and let it complement U.S. naval power in the quest to attain maritime dominance in this age of Great Power rivalry. Terrestrial airpower could help in efforts to nullify the surface warship component of an adversary's A2/AD system. After all, land-based aircraft possess a number of advantages over their sea-based counterparts, especially in terms of range and payload. To illustrate, the mainstay U.S. naval strike fighter, the F/A-18E/F Super Hornet, can deploy with a few antiship missiles out to several hundred kilometers away. In stark contrast, the Air Force's intercontinental-ranged B-1B Lancer can carry up to 24 of the newly inducted long-range antiship missiles (LRASMs). With the Lancer set to remain in service into the early 2030s, the United States will retain a potent long-range ASuW capability for over a decade with the B-1B/LRASM combination. Indeed, given the increasing significance of the maritime domain, joint force chiefs should also seriously consider the possibility of arming the upcoming B-21 Raider strategic bomber with antiship weapons such as the LRASM.

Another shortfall that sea-based air has is that U.S. carrier strike groups (CSGs) may not be located near a crisis spot and may require a few days' steaming to reach their destination. With midair refueling, Air Force long-range bombers based even in the continental United States can, however, provide presence, albeit temporary, in most parts of the world within half a day. To be certain, critics can argue that heavy bombers like the B-1B by themselves are highly vulnerable to enemy fighters, but the long striking reach of their weapons (such as the LRASM) would enable them to stay farther out within any A2/AD envelope. Moreover, the socioeconomic well-being of America's key strategic rival, China, is highly dependent on keeping its sea

lines of communication open. Indeed, the vast expanses of the Pacific Ocean and the limited number of friendly bases in that theater—for instance, Guam is over 2,000 kilometers away from the East and South China seas—would mean that there will be a premium placed on the extended striking reach of Air Force "heavies."

As much of the *Joint Concept for Access and Maneuver in the Global Commons* (JAM-GC) is classified, one may never know the true extent to which the Air Force is involved in the maritime interdiction portfolio. What is known, however, is that the Air Force has not been practicing maritime strike frequently since the end of the Cold War.[19] This state of affairs should be addressed. Hughes and Girrier maintain that the neglect of dedicated training to this mission during World War II had contributed to the limitations of land-based air against shipping during that conflict.[20] This situation could well replicate itself during a conflict involving the United States and a Great Power adversary. Given its long-range bomber capabilities, the Air Force should therefore seek to entrench itself more firmly in the ASuW business. The introduction of a standoff shallow-water mine capability to its B-52 complement that was shown during Exercise Valiant Shield 2018 is a step in the right direction, as was the integration of the LRASM with the Air Force's B-1B bombers.[21]

What should follow naturally from this is perhaps new iterations of the Resultant Fury exercise that was held in 2004 and demonstrated the capability of Air Force heavy bombers to attack moving targets at sea with laser-guided bombs.[22] Future Resultant Fury–like drills would do well to incorporate the LRASM and more challenging conditions so as to simulate a major war contingency. Such are the options provided by a long-range bomber force. In fact, the noted defense analyst Robert Haddick has argued rather heretically for the U.S. Navy to possess such a capability to better counter China's burgeoning A2/AD edifice.[23] In the same vein, other commentators, echoing former Deputy

Defense Secretary Robert Work, have called for the B-1B being transferred to the Navy as a "sea control bomber" that focuses on maritime strike rather than being retired in the 2030s.[24]

Lesson Two: Innovate and Improvise to Deal with Current and Urgent Problems

The next takeaway from the Battle of the Bismarck Sea is that innovation and improvisation could be key in allowing one side to gain an edge in military competition. The battle is noted for the perfection of emerging tactics that Allied fliers adopted against Japanese vessels. One innovative tactic used was skip-bombing, whereby an airplane dropped its bombs from a low altitude so that their forward trajectory would make them skip along the sea surface like a stone and impact on the side of the enemy ship. To be sure, skip-bombing was not entirely new, as the British had used it in the European theater with some success; however, the first decisive use of this tactic had to be credited to the Allies who perfected it during the Battle of the Bismarck Sea.[25] Allied airmen also modified the B-25 Mitchell medium bomber to help it suppress enemy antiaircraft fire as it made its low-level attacking run. This involved installing eight forward-firing 0.50-caliber machine guns on the plane that enabled it to carry out a combination strafing/bombing attack. The A-20 Havoc light bomber was similarly modified to have six 0.50-caliber weapons firing ahead. Prior to this, heavy bombers such as the B-17 Flying Fortress were used in the low-level antishipping role in the SWPA, but they were vulnerable to antiaircraft fire given their lack of forward-firing guns to suppress enemy gunners.[26]

The results of these innovations were devastating for Operation 81, as the strafing runs of these up-gunned bombers caused significant topside casualties and damage among Japanese ships, leaving them more vulnerable to bombing runs. Writing about the U.S. contribution to the Battle of the Bismarck Sea, Matthew Rodman fittingly notes that "the battle

was a testament to adaptability," adding that "the weapons and tactics perfected in the first months of 1943 were a tremendous success because Fifth Air Force's airmen quickly and willingly adapted themselves and their aircraft to the battle at hand."[27]

The lesson from this aspect of the Bismarck Sea engagement vis-à-vis the counter-A2/AD discourse is that innovating and making do with what one has on hand could make much operational sense because they could mitigate—at least in the short term—some of the shortfalls that the U.S. Navy is currently facing. There are currently doubts over the survivability of U.S. CSGs in the face of modern A2/AD capabilities. For instance, there is much talk about U.S. carrier strike aircraft lacking the range to strike at an adversary without exposing their motherships to threats.[28] The Navy has taken steps to address this capability gap with the upcoming MQ-25 Stingray unmanned aerial tanker, but it will take many years before it comes into active service. Reinstating the mothballed S-3 Viking to serve as an aerial tanker is another sensible measure being put forth to mitigate the A2/AD conundrum,[29] as is the proposal to retrofit the SM-6 surface-to-air missile to the F/A-18 Hornet to enhance its counter-air capabilities.[30] In the same vein, introducing the airborne early warning and control variant of the V-22 Osprey is one way to enhance the survivability of U.S. amphibious forces against access-denial threats.[31] Seemingly heretical ideas, such as that of converting merchant ships into cruise missile shooters, should also be assessed.[32] After all, in an operationally challenging and uncertain milieu like today's, all options should be considered.

What is viable about such proposals is that they are not about the introduction of entirely new capabilities—a process that is invariably drawn out and expensive—but about making do with what one has at hand. In a nod to this line of reasoning, the National Security Strategy contends that "Where possible, we must improve existing systems to maximize returns on prior investments."[33] Similarly, Admiral Richardson stresses in *A Design*

for Maintaining Maritime Superiority that due to budgetary pressures in the foreseeable future, "[we] will not be able to 'buy' our way out of the challenges we face," adding that "the budget environment will force tough choices but must also inspire new thinking."[34] And new thinking was exactly what the Allies in the SWPA did in March 1943, much to the detriment of Japanese convoy Operation 81. Modern U.S. Armed Forces have gone down this path of innovation and improvisation before, with one good example being the transformation of four *Ohio*-class strategic submarines into cruise missile platforms. Modifying the SM-6 surface-to-air missile to have a ship-attack capability is another.[35] At the end of the day, while it is well and good to have new platforms and systems, there is a need to, in the words of former Chairman of the Joint Chiefs of Staff Joseph Dunford, "get the right balance between today's capabilities and tomorrow's capabilities so we can maintain that competitive advantage."[36]

All in all, the Battle of the Bismarck Sea shows how having bold thinkers who can improvise and overcome the challenges presented by the enemy on the battlefield is a force multiplier. However, in today's dynamic and rapidly advancing world, technologies that are new today could be outdated and replaced in a year or two, so there is a definite need for thinkers who can keep pace with these changes or even think one step ahead in the quest to attain and maintain the edge. In this light, the following observation cannot be truer: "Innovative teams and individuals able to integrate current resources in new ways or to creatively make the most of technological advances are critical for corporate and government success in solving wicked problems. . . . If we cannot find those solutions, others will do so and lead the way into a disruptive future."[37]

Lesson Three: Overwhelm the Enemy with Massed and Multidimensional/Vectored Threats

Robert Kaplan once stated, "Never provide your adversary with only a few

Air Force B-1B Lancer, assigned to 37th Expeditionary Bomb Squadron and deployed from Ellsworth Air Force Base, South Dakota, lands at Andersen Air Force Base, Guam, as part of continuous bomber presence mission, December 4, 2017 (U.S. Air Force/Richard P. Ebensberger)

problems to solve . . . because if you do, he'll solve them."[38] Several decades before the noted strategic affairs commentator made this point, U.S. and Australian fliers coupled this maxim of overwhelming the enemy together with the innovations just described to devastate Japanese forces during the Battle of the Bismarck Sea. Therein lies the third and final lesson from the battle vis-à-vis maintaining U.S. maritime dominance: joint force leaders should draw up operational concepts that leverage mass and different dimensions to defeat the enemy in a sea-control fight. In other words, they should harness cross-domain synergy, which, in the words of Sam J. Tangredi, is "the ability to strike the enemy simultaneously or sequentially from dominant positions in all combat mediums or domains in such a way that operations in each domain provide mutual support for each other."[39] This synergy (or lack of it) will determine the outcome of any scenario

involving antiaccess and counter-antiaccess forces, he stresses.[40]

While the Bismarck Sea encounter does not evince a *cross-domain* approach in the true sense of the term given its predominant airplane-versus-ship nature, it does show the benefits of a multidirectional modus operandi. During the battle, Allied aircraft executed their coordinated attacks from various heights to befuddle as well as diffuse enemy defenses. To illustrate, there were aircraft dropping ordnance from medium altitude. While these bombs were less likely to hit Japanese vessels, the convoy was forced to break defensive formation and take evasive action.[41] This essentially "kicked the door open" for the devastating skip-bombing and strafing runs at low altitudes. According to the official Royal Australian Air Force (RAAF) release on the battle, "Enemy crews were slain beside their guns, deck cargo burst into flame, superstructures toppled and burned" as a result of strafing runs by

RAAF Beaufighters.[42] The effectiveness of the multipronged Allied attacks was such that one pilot described Japanese defensive fire at his plane during the encounter as "practically nil."[43] Hence, according to Rodman, the Bismarck Sea operation was "a triumph of coordinated bomber assault against a determined and well-defended enemy convoy. With the incorporation of modified medium and light bombers designed specifically for low-altitude attack, other platforms could move back to higher altitudes. As a result, the Japanese convoy found it almost impossible to mount a proper defense, simply overwhelmed by the multiaxis, multialtitude bomber attacks."[44]

The amassing of airpower against Japanese convoy Operation 81 also contributed significantly to Allied victory. Prior to the engagement, few Allied air attacks involved coordinated multisquadron action.[45] The Battle of the Bismarck Sea, however, involved 16 squadrons, and the various waves of attackers were

F/A-18E Super Hornet assigned to "Eagles" of strike fighter squadron 115 transits Bismarck Sea en route to Royal Australian Air Force Base Townsville, Queensland, Australia, during exercise Black Dagger, March 24, 2016 (U.S. Navy/Chris Pagenkopf)

coordinated to strike just moments apart, delivering a large pulse of firepower to the enemy.[46] In fact, much of the devastation the Japanese suffered took place on the morning of March 3—just 1 day of the entire battle.

Today, many believe that the U.S. military has lost the ability to overwhelm enemies. Part of that mindset is likely the lack of resistance encountered during operations carried out after 2001. Another reason is the collective U.S. obsession with fewer numbers of large, highly expensive—read much less expendable—platforms. How can you present massed, multidimensional/vectored threats to the enemy when you simply do not have enough numbers?

With the return of Great Power competition and the concomitant quest to reestablish maritime dominance,

joint force planners must dare to think differently. In this respect, the National Defense Strategy is right on the mark when it argues for "chang[ing] . . . the way we organize and employ forces" and "developing operational concepts to sharpen our competitive advantages and enhance our lethality."[47] That being said, U.S. naval forces must plan for challenging the integrated, layered defenses of near-peer rivals, and this is far removed from handling the relatively weak systems of extremist groups and Third World nations. To this end, Washington should reconsider the U.S. way of war that emphasizes qualities such as agility and precision over overwhelming force à la the application of Allied airpower during the Battle of the Bismarck Sea.

The likes of China and Russia are emphasizing the latter attribute in their

quest to negate U.S. military superiority in wartime. For instance, the People's Liberation Army (PLA) is believed to have drawn up plans involving forces attacking from multiple dimensions—land, surface, sub-surface, and air—and vectors to overwhelm U.S. maritime forces. This involves pitting high-density, cheaper, and more expendable assets against the U.S. Navy battle force, which largely has the opposite of these characteristics and the magazine capacities of which could be depleted rapidly during a high-intensity missile exchange. James Holmes and Toshi Yoshihara note that "PLA saturation attacks will involve the concerted use of cruise, ballistic, and hypersonic missiles; aerial attack from manned and unmanned warplanes, mines; torpedo attack; electronic warfare and cyber warfare."[48] As an example, they postulate that

an aerial missile attack "would compel U.S. tacticians to look skyward while *Kilo*-class diesel boats loosed salvoes of wake-homing torpedoes . . . against U.S. surface combatants from below."[49] In fact, this scenario somehow mirrors what happened during the opening stages of the Battle of the Bismarck Sea, when medium-altitude bombing runs paved the way for the low-level devastating attacks discussed earlier in this article. Therefore, Washington would do well to take a cue from Beijing in its endeavor to obtain maritime superiority in the face of A2/AD and adopt even more actively a cross-domain approach to maritime operations. After all, such an approach would greatly facilitate breaking the "walls" of an A2/AD-centric peer competitor, such as its integrated air defense systems.

Fortunately, the United States has taken a few tentative steps in the right direction. For a start, U.S. ground forces, which have hitherto been left out of the counter-A2/AD calculus, are finally being factored in. This can be seen in the promulgation of concepts such as the Marines Corps expeditionary advanced base operations, where they would help the Navy establish sea control.[50] It also bears notice that the U.S. Army is forging into doctrine the multidomain operations (MDO) concept that will see the Service operating against near-peer enemies in nonpermissive environments across all domains—land, sea, air, space, and cyber.[51] In a nod to this new concept, the Army fired an antiship missile at a sea target during the 2018 Rim of the Pacific exercise. Facing the possibility of attack from different dimensions, the adversary's operational and tactical picture would undoubtedly become more complicated. The key then is for the U.S. military (and allies) to be able to integrate their actions to deliver the kind of effects airpower delivered in the Bismarck Sea engagement. The force integration shown during the battle exemplifies the cross-domain synergy called for by the Pentagon that is key in the modern contested operating environment, and this is a point that cannot be overemphasized.

Indeed, there was a glimpse of this in the April 2018 military action against

Syria, where U.S., British, and French air and naval forces attacked the Bashar al-Asad regime from the Mediterranean, Red Sea, and Persian Gulf. After the operation, Admiral Richardson stated that the U.S. Navy was studying the lessons learned to better prep itself for higher intensity conflict.[52] One hopes the Service has noted that the three-pronged, three-dimensional (there was also a submarine involved) nature of the attack had contributed to the overwhelming of Syrian air defenses, much like Allied aircraft did during the Battle of the Bismarck Sea 76 years ago. All that being said, the Army and the Air Force have publicly committed to MDO, but the Navy has not.[53] This situation does not bode well for the U.S. military's goal of achieving cross-domain synergy, as MDO cannot become an official joint concept of all the Services and it will not be encapsulated in the joint force's budgeting, procurement, and doctrine.[54]

Conclusion

Military entities can be prone to inertia, and the Armed Forces are no exception. In the face of extant and emerging A2/AD systems that could seriously undermine U.S. control of the seas, Pentagon leaders should step up their game in addressing this issue. To be sure, the U.S. sea services have taken some action in this respect, but perhaps more could be done. To this end, while it is always good to think of novel ideas, it is often instructive to look to history, especially some of its less famous episodes, for takeaways. Indeed, such lessons are of immense value and free for learning, provided they are considered.

Winston Churchill once stated, "The longer you can look back, the farther you can look forward." The sage British statesman was spot on here as historical events that seem far removed from the contemporary era can still provide lessons pointing to the way ahead. To be sure, the relatively lesser known Battle of the Bismarck Sea took place 76 years ago, and much in the operational environment has changed since then. We should also bear in mind the limitations of drawing lessons from a single historical episode.

Nevertheless, the fundamental challenges presented by a Great Power competitor remain the same, and the battle offers ample food for thought for Pentagon leaders in terms of coming up with a viable operational concept (think JAM-GC and related concepts), not only as a warfighting implement but also to act as a deterrent during peacetime against A2/AD-centric near-peer rivals.

All in all, the three key takeaways of the Battle of the Bismarck Sea may seem trite at first glance, but a deeper look will arguably show their worth in the discourse to preserve the exalted U.S. status of *primus inter pares* in the maritime domain. Going forward, Admiral Richardson in *Version 2.0* has alluded to a large-scale exercise in 2020 that will seek to test the Distributed Maritime Operations concept, as well as deliver an "initial cross-domain solution."[55] While not much is currently known about the exercise, the joint force would do well to incorporate, if possible, land-based bombers as well as the capabilities of all Services into this particular drill as per the first and third lessons, respectively. The U.S. sea services have arguably lost their high-end warfighting edge in the long calm lee of the end of the Cold War. With the military edge of the United States fast eroding in relation to its strategic competitors, the Nation must adapt to this new reality by taking more appropriate measures or risk coming to grief. **JFQ**

Notes

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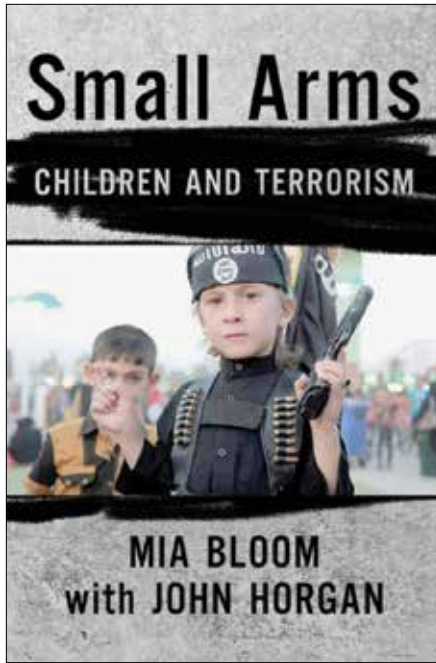
Small Arms: Children and Terrorism

By Mia Bloom with John Horgan
Cornell University Press, 2019
248 pp. $27.95
ISBN: 978-0801453885

Reviewed by Kira I. McFadden

Each year, tens of thousands of youths under the age of 18 take part in armed conflicts. Yet the use of children in war, particularly in acts of terrorism, remains woefully understudied and not well understood. In *Small Arms: Children and Terrorism*, political scientist Mia Bloom with psychologist John Horgan compare children in terrorist organizations and child soldiers, examining how children are recruited, trained, and exploited, as well as how their experiences shape reintegration and rehabilitation efforts.

Drawing on in-depth field research, as well as new primary and secondary sources, the authors offer detailed case studies to illustrate the phenomenon of children in terrorist groups. Organized around chapters depicting various dimensions to the life cycle of the child terrorist, *Small Arms*' thematic focus is on the so-called Islamic State, although comparisons are drawn with contemporary and historical terrorist groups, too. While the strength of the book lies in its interdisciplinary approach, the analysis sometimes muddies the distinction between children as terrorists and children as soldiers.

Children play a wide variety of roles as informants, spies, peer recruiters, executioners, jihadi brides, frontline fighters, and suicide bombers. The main difference between child soldiers and terrorists, however, is the recruitment process, which Bloom and Horgan examine in detail. While both are drawn into conflict for similar reasons, children in terrorist groups are more likely to be supported by the community, religious leaders, peers, and family. The authors do well in recognizing that while these children are victims, some have also perpetrated heinous crimes, and they do not assume a one-size-fits-all process for addressing their actions.

Contemporary scholarship regarding children's involvement in terrorist groups tends to revolve around children's victimhood. While *Small Arms* does play to an emotional dimension, the scholarship is sound and should evoke concern about the future of terrorism and efforts to combat it. First, terrorist groups will continue to recruit children because they provide operational advantages. Children, especially girls, are able to move more freely and attract less suspicion than adult males, making them useful as spies and suicide bombers. Child martyrs and preachers are powerful recruitment tools to shame those with wavering allegiances. Physically, children are also well suited for bomb making and hard labor.

Perhaps more concerning is the implication of rigorous indoctrination and exploitation for the endurance of extremist ideology. The generational nature of terrorism—strategies, ideologies, resource streams, and alliances learned and strengthened in one conflict tend to appear in the next—is well documented. Bloom and Horgan's most important contribution is detailing the process by which children under the Islamic State "learn terrorism." As with cults and other extreme social groups, months of intense positive reinforcement, rewards, "insider" identity markers, routinization of violence, and military and Sharia training teaches children to be passionate participants in the movement and to shame those who express doubt. As *Small Arms* makes clear, parents in the Islamic State played a disturbing and central role in radicalizing their own children.

This raises a "ticking time bomb" dilemma in that children associated with terrorist groups may present an ongoing security risk in a manner atypical of children associated with other armed groups. While these children usually lack formal education, skills learned under the Islamic State are transferrable to other criminal enterprises. Recidivism for these young people could include not only re-engagement but also other forms of violence and criminality. While the Department of Defense has expressed interest in deradicalization activities in Iraqi and Syrian refugee camps where foreign women and children may become more radicalized over time, it is not currently a priority. Countering violent extremism requires that planners examine the process of radicalization and institute measures for deradicalization, reintegration, and repatriation. At the same time, security concerns should not influence the question of accountability for past acts of terrorism.

Small Arms is a must-read for policymakers and planners working on counterterrorism strategy, particularly those grappling with how to work with regional partners to mitigate the fallout from the Islamic State. With so little existing political science scholarship in this arena, Bloom and Horgan earn the dubious distinction of providing the most comprehensive overview of children and terrorism. Their "white paper" recommendations for effectively countering violent extremism among children, all of which require integrating interagency, nongovernmental, and foreign partners, should generate considerable discussion.

The role of family, including children, in terrorism must be understood if we are to combat cyclical violence and the

resurgence of the Islamic State. *Small Arms* is one of only a few pieces of scholarship to examine the long-term challenge of children in terrorist organizations. While the authors admit much remains unknown, this book is an excellent dive into an underexamined issue and a must read for those working to end generational cycles of violent extremism. **JFQ**

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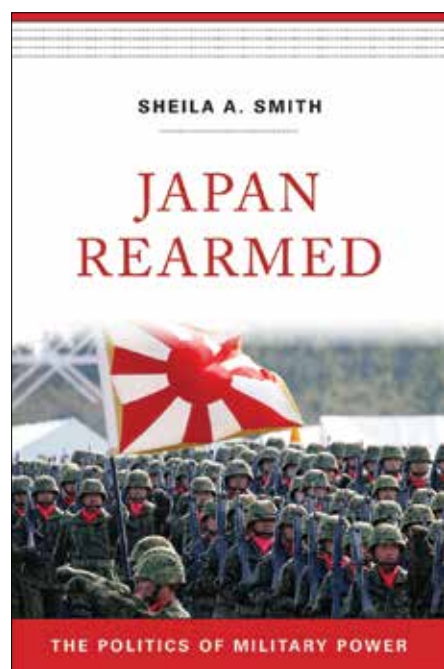
Japan Rearmed: The Politics of Military Power

By Sheila A. Smith
Harvard University Press, 2019
352 pp. $29.95
ISBN: 978-0674987647

Reviewed by Nathaniel L. Moir

According to the June 2019 Indo-Pacific Strategy, the U.S.-Japan alliance is the cornerstone of peace and prosperity in the Indo-Pacific. The strategy also explains why it is imperative that the U.S.-Japan alliance adapt to meet the challenges that threaten our security and shared values. *Japan Rearmed: The Politics of Military Power* examines how Japan is responding to the challenges of Chinese military modernization, a rogue regime in North Korea, and environmental crisis by improving the Japanese Self Defense Force's (SDF) joint structure and, politically, by adapting the Japanese constitution to support the SDF's engagement in the Indo-Pacific and beyond. As the book makes clear, the security interests of the United States and Japan are closely intertwined.

Sheila A. Smith, a Senior Fellow for Japan Studies at the Council of Foreign Relations, analyzes Japan's position as a cornerstone of the Indo-Pacific alliance. Smith is objective in her assessment of the alliance, and the book is unique in its focus on the relationship between the SDF, Japanese politics, and Japan's alliance commitments. It is an exemplary work, drawing on an array of primary sources, government documents, and a deep understanding of Japanese history to produce a comprehensive and engaging analysis. The only substantive criticism one might levy is the sparse assessment of changes in the U.S.-Japan alliance as a result of the Vietnam War and rapprochement with China after 1972. Readers unfamiliar with those events will benefit from her suggested reading list.

Established in 1954, Japan's SDF faced restrictions against collective security participation and offensive operations because of Japan's actions during World War II. While Smith provides enough history to contextualize contemporary advancements, her focus centers on explaining how Japan is adapting to new threats, primarily through constitutional interpretations that permit increased collective security cooperation. These changes are evolving quickly as Chinese and North Korean threats to Japan metastasize. As a result, Smith emphasizes the evolution of the SDF and regional alliances after 1989.

The end of the Cold War complicated the U.S.-Japan alliance. For decades after World War II, the United States provided Japan with security guarantees in exchange for basing rights and economic assistance. Smith's diagnosis suggests that historic cooperation is now called into question because of the changing threat environment and current alliance structure. The U.S.-Japan alliance differs from the Nortah Atlantic Treaty Organization and the U.S.–Republic of Korea alliance because the U.S.-Japan alliance has no combined command structure or contingency plans. Moreover, the SDF's ability to adapt remains constrained by lack of command structure and planning, let alone by restrictions against using military force. Politicians, especially Prime Minister Abe Shinzo, seek to alter this through revisions to the 1947 constitution. However, modifications, even new interpretations, are strenuously disputed in the National Diet of Japan.

The Japanese constitution's Article 9 is the central legislative guidance for civil-military relations and the regulation of military force. It states that the "Japanese people forever renounce war as a sovereign right." During the Cold War, Japan could rely on U.S. nuclear deterrence to provide national security, so revising Article 9 and deploying the SDF was largely unnecessary. Today, however, changes in the threat environment have forced debate in the National Diet concerning not only reinterpreting Article 9 but also creating the laws required to permit the SDF to deploy beyond the Japanese archipelago. The SDF's support for Iraqi reconstruction demonstrates how Japanese law adapted in the past and may adapt again for future deployments. This issue of deployment, along with greater responsibilities and self-reliance for the SDF, are central debates in Japan today.

While Smith devotes ample attention to the Chinese and North Korean threats, she also provides a unique look at the role of the SDF in environmental crisis management. This aspect is central for arguments underpinning efforts to revise Article 9. The Great Hanshin earthquake of 1995, the Fukushima nuclear disaster, and the recent devastation

of Chiba by a typhoon in October 2019 have necessitated broader interpretations of national security that require the capabilities of the SDF in ways the architects of Article 9 did not envision. Smith argues convincingly that Japan's ability to increase its crisis management capability will entail SDF expansion and greater freedom of action. These changes are not uncontested politically but are emerging out of necessity and come with broad implications for the U.S.-Japan alliance.

Japan Rearmed is not prescriptive, but Smith does an extraordinary job offering a diagnosis of the many challenges ahead for the SDF and U.S.-Japan alliance. For national security professionals and those in the joint force focused on the region, *Japan Rearmed* is the most authoritative account available on the SDF, its political, organizational, and legal challenges, as well as a reminder of the importance of U.S.-Japan cooperation in the Indo-Pacific. **JFQ**

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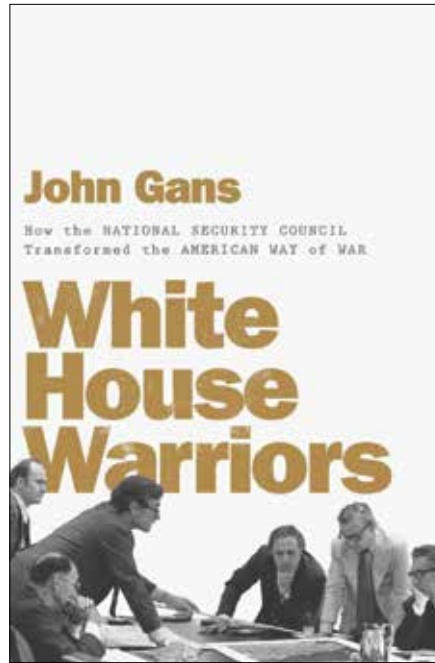
White House Warriors: How the National Security Council Transformed the American Way of War
By John Gans
Liveright Publishing Corporation, 2019
299 pp. $28.95
ISBN: 978-1631494567

Reviewed by Edward G. Salo

Over the past several years, the position of the National Security Advisor has been subject to sensational media attention. From war hawks to war heroes, recent national security advisors routinely command the headlines. While media attention centers on their singular power to shape foreign policy, we have ignored the members of the National Security Council (NSC) staff who work tirelessly behind the scenes to craft that policy. In *White House Warriors: How the National Security Council Transformed the American Way of War*, John Gans explores how the NSC staff evolved from a group of clerks tasked with recording meetings and passing proposals to a cadre of national security professionals, sometimes wielding

extraordinary influence on American foreign and national security policy.

Gans, a former chief speechwriter for Secretary of Defense Ash Carter, draws on interviews, oral histories, and declassified archives to provide a meticulously researched insider view of the NSC. Gans explores its evolution and growing influence from the trials of the Truman administration to the tribulations of the Trump administration. He spotlights the NSC staff during critical moments in history, using case studies to examine the influence of regular staff on the development of national security policy and raising perennial questions about the efficiency and structure of the organization, as well as the centralization of power and the need for greater transparency.

The case studies aptly demonstrate the strengths and weaknesses of different staff compositions and organizational types. Gans argues that effectiveness depended on a manageable size and diverse mixture of officials (staff on temporary duty from the military, intelligence, academic, and diplomatic communities, etc.) with an effective National Security Advisor. Gans highlights General Brent Scowcroft, the only man to be National Security Advisor under two different Presidents, as running the most effective NSC. Scowcroft had served on the Tower Commission investigating the Iran Contra scandal, which resulted from the NSC overstepping its role, a concern that has persistently dogged the NSC. Gans also points to the NSC in the second term of George W. Bush's administration as successful, highlighting its instrumental role in guiding the Surge in Iraq. While other administrations had some success, many were crippled by either micromanagement, an ineffective National Security Advisor, or distrust among the Cabinet-level departments that inhibited effective coordination.

In addition to his comprehensive organizational analysis, Gans succeeds in putting human faces on an otherwise obscure piece of the national security enterprise. For example, he highlights the work of Richard Haass, a regular

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staffer, who became an architect of much of the policy during the first Persian Gulf War. Likewise, Gans starts the book by introducing the reader to Meghan O'Sullivan, a staffer who helped redevelop the strategy during the 2003 war in Iraq after the initial failures of the conflict. This focus on individuals strengthens the argument that the NSC works best when staffers are empowered as "honest brokers" and that "nameless staff" can have a significant influence on national policy and the way the Nation engages in conflict.

While the selective use of case studies effectively demonstrates the strengths and weaknesses of the NSC as a policy coordinating body, it lacks attention to the role of the NSC in crisis management. A close look at NSC influence during the Iranian hostage crisis or the Soviet invasion of Afghanistan, for example, would have provided a more balanced perspective.

White House Warriors is an important read for the joint force at all levels. The lessons learned can serve as a guide to future officers serving on the NSC or at regional commands. Gans offers up colorful anecdotes of how the NSC worked most efficiently when it was empowered to find solutions. Of course, each Presidential administration is different, and there is no roadmap of what to expect. Many administrations intended to reform or reduce the size of the NSC, yet its size and influence continued to expand. When paired with autobiographies of national security advisors, the full scope and influence of the NSC is illuminated. *Nerve Center: Inside the White House Situation Room* (University of Nebraska Press, 2004) by Michael Bohn would complement *White House Warriors* by exploring the role of the NSC as a conduit and gatekeeper of information to the President and his aides.

Today, the need for an efficient and effective NSC supported by dedicated staff is paramount. Gans demonstrates the importance of experts with bureaucratic, functional, and area expertise to maintain a strong national security policy. Rather than the threat to democracy many see in these officials, Gans successfully conveys the NSC's dedication to keeping the Nation safe from threats we do not yet know exist. *White House Warriors* is an important read for national security professionals looking to peer behind the curtain of the foreign policy and national security decision-making process. **JFQ**

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U.S. military relief efforts in Haiti 4 days after January 12, 2010, earthquake (DOD/Fred W. Baker III)

Failed Megacities and the Joint Force

By Matthew N. Metzel, Todd J. McCubbin, Heidi B. Fouty, Ken G. Morris, John J. Gutierrez, and John Lorenzen

I n what might become one of the greatest international challenges of the 21st century, sociologists have documented a dramatic shift in population centers termed *megacities*.[1] These densely populated urban areas are of such size and scale that they create new challenges requiring careful consideration by both civilian and military planners. The problems the joint force could face when operating in a megacity would stretch the limits of U.S. military support to humanitarian assistance and disaster response (HA/DR) operations. Although joint doctrine addresses the subject of traditional urban terrain, it neglects to address the highly complex challenges associated with megacities. Given the potential crisis of a failed megacity, the probability for military support, and the risk associated with inadequate doctrine, the Department of Defense (DOD) must develop joint doctrine that adequately addresses the challenges posed by operations in a failed megacity.

There are several key points that underscore the need to develop joint force doctrine to address failed megacities. First, megacities should be categorized differently than other urban terrain due to the size and scale of those affected by either natural or man-made disasters.[2] Second, existing joint doctrine does not adequately

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Marine Corps Warfighting Laboratory executed Dense Urban Operations limited operational experiment 2019 called Project Metropolis II, with Marines assigned to 3rd Battalion, 8th Marine Regiment; squad-size element from 1st Battalion, 6th Marine Regiment; and British Royal Marines assigned to 8 Troop Charlie Company, at Muscatatuck Urban Training Center, Indiana, August 20, 2019 (U.S. Marine Corps/Matt Lyman)

address the problem of conducting operations within an urban environment with a population of 10 million or more people.[3] Third, megacities will become more commonplace in developing nations and, due to the weight of economic and humanitarian needs, cause an increase in social destabilization.[4] Fourth, unstable nation-states will exploit potential migration crises from failed megacities in an effort to receive political favors and financial aid from the international community.[5] Fifth, violent extremist and criminal organizations will persist in and leverage ungoverned spaces in megacities to achieve their political and economic objectives.[6] Sixth, these organizations will leverage migration activity from megacities by embedding themselves within and recruiting from displaced civilian populations in order to breach established security measures.[7]

Finally, given these key points, U.S. leaders will likely need to quickly employ joint force capabilities to support humanitarian assistance operations for failed megacities to protect U.S. interests abroad.

Megacities: Definition and Problem

General Mark Milley stated that the joint force is insufficiently prepared for operational activity in megacities.[8] His words of caution signal the need for military leaders to develop joint doctrine that adequately addresses operations within this highly complex terrain. *Megacities* are defined as areas of continuous urban development that contain over 10 million people.[9] These large and densely populated areas create new challenges that require careful consideration

for best practices by both civilian and military planners.

For the first time in recorded history, more than half of the world's population lives in an urban environment, with over 8 percent of mankind now living in one of the world's 37 megacities.[10] The 10 largest megacities are:

- Tokyo-Yokohama (38 million)
- Jakarta (32 million)
- Delhi (27 million)
- Manila (25 million)
- Seoul-Incheon (24 million)
- Shanghai (24 million)
- Mumbai (23 million)
- New York City (22 million)
- Beijing (21 million)
- Sao Paulo (21 million).[11]

In 1990, New York ranked as the second largest city in the world, with Los

Angeles ranking eighth. By 2018, New York dropped to the eighth largest, while Los Angeles slipped to seventeenth.[12] These statistics show that the developing world is outpacing Western population growth in dramatic fashion. For example, China now holds the largest number of megacities (four), with an additional eight cities on the cusp of megacity status.[13]

The reason megacities matter to the joint force is tied to the scope and scale of these large and potentially ungoverned spaces. The enormous challenges that military leaders faced during humanitarian assistance efforts following the 2010 earthquake that struck Port-au-Prince, Haiti, would pale by comparison if a similar earthquake struck a megacity. Port-au-Prince ranks as a relatively small urban population of just over 2.8 million (globally, Port-au-Prince ranks 176th in population).[14] A natural disaster disrupting a megacity, such as Lagos, Nigeria, with a population of 13.9 million people, or Seoul-Incheon, with 24 million inhabitants, would lead to exponentially more damage.[15] Military capabilities would be consumed relatively quickly under the sheer size and scale of any such response operation.

Given the gaps in current joint doctrine in addressing the significant challenges of a potential failed megacity such as Lagos, leaders should prioritize the development of relevant doctrine to the threat of failed megacities. The urbanization of populations across the globe and the resulting concentration of threats to millions of people in relatively confined areas pose a problem that military leaders have traditionally tried to avoid because of the associated risks. A natural or man-made disaster in a megacity such as Lagos would prove to be a complex disaster in an unknown or, more likely, hostile operational environment.

Joint Urban Operations Doctrine and Megacities

In 2013, former Army Chief of Staff General Ray Odierno directed the Army's Training and Doctrine Command (TRADOC) to study the problem of megacities as part of a comprehensive review of urban operations.[16] Since then, General Milley and, before his retirement in July 2019, Marine Corps Commandant General Robert Neller openly stated their shared goal to improve urban operations doctrine in order to address the challenges of military operations in megacities.[17]

Joint urban operations (JUO) doctrine is largely silent on the subject of megacities and provides only a general overview of items to consider when conducting military operations, primarily combat operations, in an urban setting. Joint doctrine does discuss the challenges of what it describes as the "urban triad," which consists of three significant challenges for military operations in an urban environment. The triad includes man-made physical terrain—the buildings and layout of the urban area; population size and density—the magnitude of the population size, and the density/layout of the population; and infrastructure that the area/city depends on for basic operations—utilities that include sewer, power, and communications.[18] The triad is not only significant for planning urban operations, but it is also exponentially more critical in a megacity environment. Joint Publication (JP) 3-06, *Joint Urban Operations*, uses the term megacities to warn that criminal groups operating within this type of urban terrain have the potential to gain significantly more power over the population in a short amount of time than those who operate within rural settings.[19] The triad would serve as fundamental to criminal groups gaining control, but be difficult for joint forces to wrest from them.

In addition, JP 3-06 highlights a few critical points that could apply to both urban and megacity operations. For example, it discusses the critical nature of understanding the operational environment and the joint intelligence preparation of this environment.[20] It also emphasizes that urban operations should be a coordinated effort with all political, military, economic, social, infrastructure, and information elements and across all instruments of national power.[21] Understanding the operational environment and the collaboration of

intelligence are critical components, but doctrine should better address the significant differences between operating in megacities and operating in traditional urban centers.

In 2017, a RAND report addressed the concern of military operations in megacities by looking at five recent conflicts in urban environments.[22] The report stated, the "Army is not ready to fight in urban combat. Its doctrine, tactics, and training have not absorbed the lessons these case studies [the five recent conflicts] teach. In part, this is because urban combat is messy and destructive and seen as something to be avoided."[23] However, two common mitigation themes emerged from RAND's research into urban operational requirements that can aid in preparing for future urban conflict, and both may apply to urban HA/DR operations. First, maintaining a mobile protected firepower capability when conducting urban operations is a necessity for combat operations and force protection.[24] Second, forces need to be creative and adaptive and exploit intelligence to gain the desired operational effect.[25] This recent research suggests that current JUO doctrine and the Army's Field Manual 3-06, *Urban Operations*, are largely inadequate to address complex military operations involved in response to a failed megacity.[26]

In a 2015 article from *Parameters*, the authors point out that a megacity "can be best described as systems of systems, comparable to a living organism. They are dynamic environments that change not only block by block, but day to day."[27] The authors discuss five complex challenges presented by megacities that are either not adequately addressed or not addressed at all in current JUO doctrine. These five challenges include:

- regional and international interconnectedness and centers of gravity (not addressed)
- extended urban infrastructures supporting dense, diverse populations (partially addressed in joint doctrine)
- formal and informal sources of power (not addressed)

Octávio Frias de Oliveira bridge, commonly known as "Ponte Estaiada," spans Pinheiros River, February 3, 2015, São Paulo, Brazil (Courtesy Emilio García)

- congested and constraining terrain (partially addressed in joint doctrine)
- interconnected, embedded threats across super-surface, surface, sub-surface, and cyber/space (not addressed).[28]

These five areas highlight the fact that each megacity is unique and that the challenges faced will be multilayered issues for joint military and civilian leadership to address. A review of JP 3-06, recent research findings, and assessments from General Milley and General Neller all indicate that the joint force is not prepared, nor does current joint doctrine adequately address military combat or humanitarian operations in a megacity environment.

Joint publications do not address the challenges of a humanitarian and disaster relief response to the megacity environment. JP 3-29, *Foreign Humanitarian Assistance*, covers foreign HA/DR

and lists eight short references to the complexity of operating within urban terrain.[29] While JP 3-29 does cover the framework for DOD support to an HA/DR effort, and reviews the possible HA/DR missions, such as Federal disaster relief, dislocated civilians, security, and technical assistance, it does not directly address the complexities of providing these services in a megacity or urban environment. JP 3-29 also discusses "related operations," such as humanitarian and civil assistance and security assistance (military training), foreign internal defense (JP 3-22), peace operations (JP 3-07), noncombatant evacuation operations (JP 3-68), civil-military operations (JP 3-57), and foreign consequence management (JP 3-41). A comprehensive review of these related operational areas and the corresponding joint publications reveal little guidance applicable to urban operations and none for megacity operations, which is a substantial gap in joint

doctrine for a highly probable future requirement.

Joint doctrine guidance for megacity operations is currently limited to the single joint publication that directly addresses JUO. While this might suffice for current smaller urban military combat operations, it does not provide sufficient guidance for megacity combat operations or megacity HA/DR (or its related HA/DR operations). While Army and Marine Corps leaders have identified a gap in the doctrine addressing combat operations in a megacity, the requirement equally exists for HA/DR and related operations for a megacity. The gap in doctrine should be addressed as soon as feasible across the spectrum of military response requirements.

To address the complexities of megacity humanitarian relief-type operations, JP 3-29 should be updated to include discussions on megacity operations. Currently, JP 3-29 chapter 3 discusses the major areas that military operations

in a HA/DR event will need to address, such as deployment, sustainment, command and control, intelligence, protection of the force, engineer operations, rules of engagement, legal considerations, liaison, communications synchronization, and public affairs.[30] Lessons learned from recent urban operations should be incorporated into 3-29.[31] Joint doctrine needs to expound on these topics to more adequately address the complexities of megacity operations. For example, the intelligence collection and fusion will be significantly different in a megacity environment based on scale and scope. Collection by space, air, and signal intelligence assets will be hampered in a large metropolitan area that contains large areas of ungoverned spaces. Leveraging social media, news media, and nongovernmental organization intelligence will be required in any megacity disaster relief operation, as well as sharing/synchronizing the intelligence with other civilian organizations and law enforcement agencies. In addition, HA/DR-related doctrine will need to incorporate megacity operational factors into HA/DR "related operations" mentioned above to better prepare the joint force for the complexities associated with megacity operations.

Joint Force Response to Haiti Earthquake

The humanitarian assistance provided to Haiti after the 7.0 magnitude earthquake on January 12, 2010, provides a recent example of the employment of joint force capabilities, using current doctrine, to support a large urban population. The immediate and decisive response to the disaster directly saved lives and set the stage for follow-on operations. Several key aspects of this response can be cited as examples for the use of the joint force for these nontraditional missions, despite the issues encountered.

First, the military's planning capability provided the framework for the integration and cooperation of the rest of the international community.[32] While the international community—both military and nongovernmental

organizations—stood ready to provide assistance in the aftermath of the earthquake, these agencies and partners depended on the planning capabilities of a joint task force (JTF) headquarters for international coordination structure. Second, the joint force employed effective methods for liaison activities among the numerous international organizations.[33] Recognizing that most assistance would not be provided by the joint force, the Operations Order 01-10 was published as an unclassified order so that partners would be able to share information.[34] In addition, the JTF used numerous liaisons to ensure that there was unity of effort throughout the operation. Finally, the integration of the JTF with the functionally degraded Haitian government showed the U.S. resolve to provide the gateway for humanitarian assistance without usurping Haitian independence.

Despite these positive aspects of the operation, several issues point to the lack of a comprehensive joint doctrine that addresses all of the challenges that may be encountered. According to JP 3-29, disasters could be slow onset, rapid onset, or complex.[35] In addition, the assistance may be required to be provided in one of three types of environments: permissive, uncertain, and hostile.[36] Although the damage and loss of life in Haiti was a massively tragic event, the disaster could arguably be classified as neither complex nor in a hostile environment. Yet the joint force still faced several obstacles in executing the operation. First, although the U.S. Agency for International Development was established as the lead agency, the command structure on the ground was unclear.[37] The agency was neither prepared nor equipped to manage the myriad U.S. and international organizations. Another problem encountered was the lack of clarity of priorities. The call for any and all types of assistance available, without the ability to accurately assess the ground situation, caused logistical and communication friction at airports, seaports, and along the limited land routes. Finally, the organization of the JTF headquarters into a functionally

aligned staff postured for theater security cooperation rather than crisis response made it difficult for the staff to plan continuous operations as other partners, organizations, and supplies were flooding into Haiti.[38]

Urban City Relief Operations Compared to a Megacity

While the Haiti earthquake took an enormous toll in human lives and destruction of property and infrastructure, the failure of a megacity such as Lagos would pose infinitely more challenges to the joint force. Lagos would characterize all three challenges noted previously. First, the physical terrain would limit and impede freedom of movement for the joint force. The city of Lagos is filled with extensive infrastructure and is Africa's major financial center. The buildings and layouts of this operational environment would further complicate any of the command and control issues that were faced in Haiti. In addition to the terrain obstacles, the population size and density of Lagos would make the operation environment extremely complex. While Haiti's total population exceeded 10 million, this population was dispersed over more than 10,000 square miles. Lagos has a concentrated population of nearly 15 million confined to 452 square miles. Any threat posed by natural disaster, and the resulting chaos due to illness, criminal activity, and the collapse of any form of government, would be concentrated in an extremely densely populated area. Finally, the infrastructure of Lagos would further complicate any assistance operation. As seen in Haiti, the control of incoming organizations and supplies lacked any sort of prioritization or control. This problem was on an island with limited airport or seaport capability. In contrast, Lagos boasts some of Africa's busiest airports, seaports, and highways. In addition, Lagos serves as a communication hub for Africa. Given the difficulty of controlling the limited infrastructure in Haiti, a disaster in Lagos would pose an infrastructure control and rebuilding issue of massive proportions.

Given the gaps in current joint doctrine in addressing the significant challenges of a potential failed megacity such as Lagos, leaders should prioritize the development of doctrine relevant to the threat of failed megacities. The urbanization of populations across the globe and the resulting concentration of threats to millions of people in relatively confined areas poses a problem that military leaders have traditionally tried to avoid because of the associated risks. A natural or man-made disaster in a megacity such as Lagos would prove to be a complex disaster in an unknown or, more likely, hostile operational environment.

Military leaders must seize the initiative to develop joint doctrine that adequately addresses the problem of military operations in a failed megacity environment. While some U.S. military leaders have held that humanitarian operations are a distraction from the true mission of the joint force, it is highly probable that political leaders within the United States would quickly turn to the military for an immediate HA/DR force for megacity challenges.[39] Although it is a reasonable position to want to avoid the complexities of humanitarian missions, historical events highlight the value of employing joint force assets to counter crisis events, such as the destabilizing effects of forced mass migration. As the RAND study and other works have pointed out, military operations will be required in a failed megacity and the failure of a megacity is highly likely in the not-too-distant future. DOD has learned valuable lessons from recent urban operations in Haiti, Mogadishu, and Fallujah.[40] Now is the time to develop DOD megacity doctrine *before* a disaster occurs. Updating DOD HA/DR-related doctrine will enable the future development of combatant command contingency plans to address likely security threats and challenges that will become the responsibility of future joint military leaders. **JFQ**

Notes

[1] Kees Koonings and Dirk Kruijt, *Mega Cities: The Politics of Urban Exclusion and Violence in the Global South* (New York: Zed Books, 2009), 1, 8, 10.

[2] Kevin Felix and Frederick Wong, "The Case for Megacities," *Parameters* 45, no. 1 (Spring 2015), 20.

[3] Ibid., 27.

[4] Joel Kotkin and Wendell Cox, "The World's Fastest-Growing Megacities," *Forbes*, April 8, 2013, available at <www.forbes.com/sites/joelkotkin/2013/04/08/the-worlds-fastest-growing-megacities/#3af2c7057519>; *Demographia World Urban Areas*, 15th ed. (Beltsville, IL: Demographia, April 2019), available at <http://demographia.com/db-worldua.pdf>. China has four cities with over 8 million people and four others with over 7 million.

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[7] Brian Ross and Dragana Jovanovic, "Paris Bomber Sneaked in with Refugees, Officials Say," ABC News, with video, 2:08, November 15, 2015, available at <http://abcnews.go.com/ International/isis-refugee-journey-terror-paris/story?id=35220868>.

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[9] Kotkin and Cox, "The World's Fastest-Growing Megacities."

[10] See *Demographia World Urban Areas*. As of March 2018, 55.4 percent of the world's population lives in an urban environment, and 86 cities contain a population of over 5 million.

[11] Ibid., 22.

[12] Kotkin and Cox, "The World's Fastest-Growing Megacities."

[13] Ibid. See also *Demographia World Urban Areas*.

[14] Ibid., 25.

[15] Ibid., 22.

[16] South, "The Future Battlefield."

[17] Ibid.

[18] Ibid.

[19] Joint Publication (JP) 3-6, *Joint Urban Operations* (Washington, DC: The Joint Staff, 2014), II-7.

[20] Ibid.

[21] Ibid.

[22] Gian Gentile et al., *Reimagining the Character of Urban Operations for the U.S. Army: How the Past Can Inform the Present and Future*, RR1602 (Santa Monica, CA: RAND, 2017), xiii, available at <www.rand.org/pubs/research_reports/RR1602.html>.

[23] Ibid., xiii.

[24] Ibid., 174.

[25] Ibid., xi.

[26] Ibid., 160, 174–175.

[27] Felix and Wong, "The Case for Megacities," 45.

[28] Ibid.

[29] JP 3-29, *Foreign Humanitarian Assistance* (Washington, DC: The Joint Staff, 2013).

[30] Ibid., chapter 5.

[31] Gentile et al., *Reimagining the Character of Urban Operations for the U.S. Army*, chapters 3, 4.

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[35] JP 3-29, III-3–III-4.

[36] Ibid., III-4.

[37] DiOrio, *Operation Unified Response—Haiti Earthquake 2010*, 5.

[38] Ibid., 6.

[39] JP 3-29.

[40] Gentile et al., *Reimagining the Character of Urban Operations for the U.S. Army*, chapters 3 and 4.

Infantryman with 3rd Battalion, 8th Cavalry Regiment, 3rd Armored Brigade Combat Team, 1st Cavalry Division, clears bunker September 25, 2019, during platoon live-fire training, Rodriguez Live Fire Complex, Republic of Korea (U.S. Army/Scott Kuhn)

Harnessing Artificial Intelligence and Autonomous Systems Across the Seven Joint Functions

By Brian David Ray, Jeanne F. Forgey, and Benjamin N. Mathias

A lthough the 2018 National Defense Strategy emphasizes technological innovation as well as the way it will change the overall character of war, the joint force is not adequately positioned to share best practices and lessons learned among key players in the artificial intelligence/autonomous systems (AI/AS) space.[1] To address this shortcoming, joint manning documents across the force should add an AI/AS cell made up of officers, warrant officers, and senior noncommissioned officers in order to effectively incorporate technological best practices across the seven joint functions. This increase of specialized staffing is similar to the approach that the Army took in 2003 at the brigade level with the creation of knowledge management as a distinct discipline

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and staff function.[2] With knowledge management, the Army sought to "help commanders drive the operations process through enhanced understanding and visualization . . . thereby enabling them to envision a set of desired future conditions that represent the operation's end state."[3]

Embracing similar new approaches and techniques in the AI/AS space is in keeping with advice offered by Rear Admiral Andrew Loiselle, the deputy director for Future Joint Force Development on the Joint Staff J7, who stated, the joint force "cannot expect success fighting tomorrow's conflicts with yesterday's weapons and equipment. Neither is modernization defined solely by hardware. It requires changes in the way we organize and employ forces."[4]

This article explores the most likely impacts of AI/AS on each of seven joint functions: command and control (C2), intelligence, fires, movement and maneuver, protection, sustainment, and information. These functions represent groups of related activities that provide commanders and staff with the ability to synchronize and execute military operations.[5] Each of the functions, which is aligned with the Joint Capability Areas and Functional Capability Boards, allows for effective assessment and investment decisions by policymakers.[6]

The Use of AI/AS in the Joint Force

The joint force is accustomed to fighting by effectively synchronizing the unique set of land, sea, and air capabilities inherent in each of the Services. In the protracted engagements of the past two decades, the joint force has fought via a set of "interconnected human-inhabited platforms that pass surveillance and targeting data across great distances."[7] However, over the next 20 years, the pace of technological change will significantly impact how the joint force plans and executes the full spectrum of its missions.[8] Rapid technological developments in five key areas (info, neuro, quantum, nano, and bio) will be primary drivers in various areas of AI and AS.[9] As the Brookings

Institution's John Allen and Darrell West note, "AI will significantly impact the world's economy and workforce, the finance and health-care systems, national security, criminal justice, transportation, and how cities operate. All of this change is likely to redistribute and concentrate wealth, challenge political systems, and generate new cyber threats and defenses."[10]

Future kinetic conflicts, especially those that include near peers such as China or Russia, will likely be replete with AI/AS architectures and methods that will include engagements best characterized as a "swarm" of lethality with unprecedented "coordination, intelligence, and speed."[11] In a March 2016 budget hearing before Congress, General Joseph Dunford, then Chairman of the Joint Chiefs of Staff, stated future conflicts will likely have "an increasingly transregional, multi-domain, and multi-functional nature. . . . [F]uture conflicts will spread quickly across multiple Combatant Command geographic boundaries, functions, and domains."[12] U.S. near peers clearly understand the importance that AI/AS will have in future conflicts.

By way of example, in 2017 the Chinese government released a document titled "New Generation Artificial Intelligence Development Plan" with the stated ambition of leading the world in AI by 2030. This plan calls for a "civil-military" fusion of AI to leverage dual-use advances for applications in national defense, including support of command decisionmaking, military deduction, and defense equipment.[13] The Chinese also have an approach in this domain that is best described as "systems confrontation and system destruction warfare."[14] Seeing the strategic importance of AI, Vladimir Putin stated, "Whoever becomes the leader in AI will be the ruler of the world."[15] The United Kingdom also clearly demonstrated the importance of AI/AS with its May 2018 publication of a joint doctrine document titled *Human-Machine Teaming*. The document describes the stakes that are involved in exploring and integrating AI/AS:

Robots and artificial intelligence offer the potential for an inflection point in delivering military transformation and advantage. Developing the right blend of human-machine teams (i.e., the effective integration of humans and machines into our warfighting systems) is the key . . . and we should not forget that we are in a race with our adversaries to unlock this advantage. The clock is ticking as new technology capabilities accelerate. This joint concept document should be read by everyone who needs to understand how AI, robotics, and data can change the future character of conflict for us and our adversaries.[16]

The military application of autonomous systems has an array of protection and lethality possibilities (for example, unmanned vehicles and swarming weapons systems) as well as the potential to provide commanders with the ability to make decisions much more quickly and efficiently than a team of humans in a headquarters ever could. Even though AI/AS is at the forefront of thought leadership in a variety of disciplines, the Department of Defense (DOD) has neither taken a proactive approach in developing policies to govern such technology, nor has it effectively infused it into the formal acquisition process. This lack of policy guidance and adequate funding has had a limiting effect on the full military potential of AI/AS.[17] This lack of joint/synchronized exploration of AI/AS possibilities should be a significant concern. As of summer 2018, each Service still seemed to be going it alone, with the Air Force, for example, having more than 600 projects incorporating various facets of AI across multiple mission sets.[18]

The application of AI/AS in a military context has significant potential. Some researchers envision future AI/AS fights with "autonomous and uninhabited systems" that will be networked and have the ability to coordinate actions in response to events on the ground.[19] For example, swarming/coordinated action will enable synchronized attacks or defense, more efficient allocation of assets over an area, self-healing networks that respond to enemy actions, and

Airman participates in Security Forces Sustainment training at Baumholder, Germany, October 10, 2019 (U.S. Air Force/Deven Schultz)

widely distributed assets that cooperate for sensing, deception, and attack. As then–Secretary of the Army Mark Esper stated, "This technology [AI/AS] could very well change the character of warfare as we know it."[20]

In the U.S. Army War College publication *Key Strategic Issues List 2018–2020*, AI and AS are mentioned multiple times as keys areas for future research and investment.[21] Our allies in the United Kingdom also see the benefits of AI/AS for each of the joint warfighting functions with the following stated goals: "increase situational awareness, lighter physical and cognitive loads, sustainment with increased anticipation and efficiency, increased force protection, and ultimately superior maneuver options in and across all domains."[22] However, one difficulty that the United States and others will have in adopting AI/AS across any of the seven joint functions primarily concerns the challenges associated with testing and validation. In short, how can leaders be confident that a system will do what it is intended to do and nothing else beyond that, which might be detrimental to the mission? As then–Vice Chairman of the Joint Chiefs of Staff General Paul Selva stated, "In the DOD, we test things until they break. You can't do that with artificial intelligence. We're going to have to figure out how to get the software to tell us what it has learned."[23] Beyond this necessary step of analyzing what the software has learned, the more critical aspects of assessment also include deciding how to employ AI/AS within all of the generally accepted ethical, legal, and moral frameworks.[24]

Regarding the use of AI/AS in the joint force, there are currently four Joint Capability Areas envisioned for unmanned systems: battlespace awareness, force application, protection, and logistics.[25] For example, the use of robots would mean that fewer troops would be needed to defend a certain piece of terrain. This is an advantage given increasing DOD personnel costs.[26] Robots also have the capability to operate for longer periods of time without the human need for rest.[27] Moreover, unmanned systems can operate in harsh and deadly environments (for example, chemical, biological, radiological, or nuclear) with less degradation in capabilities. These and other examples provide an economy-of-force advantage that would allow joint force commanders the flexibility to allocate personnel to particular aspects of a battle plan (for example, interpretive or conceptual work) that are not conducive to or appropriate for unmanned systems.[28] An economy-of-force advantage from AI/AS would help
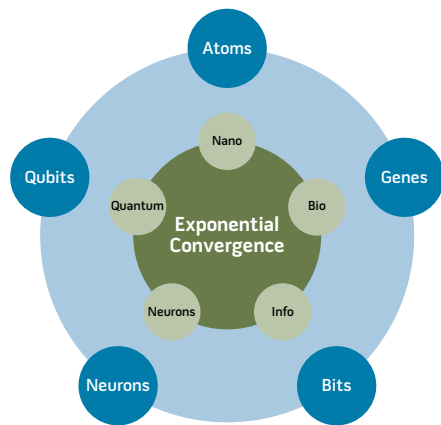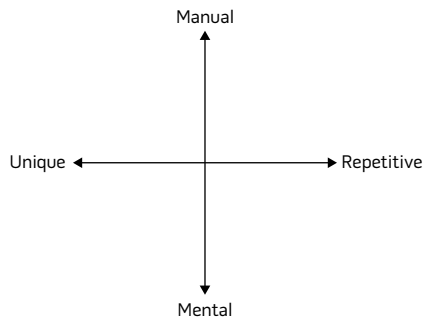
Figure 1. Exponential Convergence

Figure 2. Tasks and Trust

The development of a useful understanding of the spectrum of tasks and their associated levels of trust requires a framework to distinguish between the nature of differing military tasks and the intendant effects upon the need for human supervision.

Source: Andrew Massie, "Autonomy and the Future Force," *Strategic Studies Quarterly* (Summer 2016), 139.

address one of General Dunford's stated concerns, namely that the joint force currently lacks sufficient capacity to meet all the combatant commands' requirements for forces.[29]

The Definition of *Autonomous* in Military Settings

When incorporating any form of autonomy in a military context, it is important to acknowledge that such a move also increases unpredictability.[30] Autonomy in the context of the human/machine interaction dynamic has three dimensions: the human-machine C2 relationship, the complexity of the decisions made by the machine, and the functions of the system that are made

autonomous. DOD frequently defines *autonomy* in terms of human involvement in the execution of a machine's tasks. Systems that are marked by full human control over all the machine's core tasks are considered "human-in-the-loop" systems. Systems that have the ability to operate independently but still require humans to review decisions and intervene in the case of a malfunction are often called "on-the-loop" or "human-supervised" systems. A system that can carry out its tasks with total independence, leaving no opportunity for a human to intervene, is referred to as a "human-out-of-the-loop" system.[31] However, there are many different points of view regarding the terms used throughout the military (for example, *automation* vs. *autonomy*, *semi-autonomy*, *supervised autonomy*, *on-the-loop* vs. *in-the-loop*, and *mixed initiative*). This diversity of AI/AS phrases led to such confusion that a recent report suggested that "DOD should abandon the debate over definitions of levels of autonomy" and instead focus on developing a "method of analysis of trade-offs over multiple stakeholders and objectives."[32]

Currently, DOD has an established "spectrum of activity" for describing autonomy. Variables within the spectrum include differentiating between machines that think and machines that think and act. Figure 1 offers a visualization regarding the important distinctions between what can best be described as manual or "physical tasks" (firing a weapon, for example) vis-à-vis mental or "cognitive tasks" (for example, deciding if the target is friendly, neutral, or hostile). As one can imagine, the spectrum between the two is quite wide. Therein lies the difficulty for DOD, and by association the joint force, in deciding which scenarios and environments are conducive to the advantages of autonomous systems and which require human discernment and interaction with machines in order to accomplish the mission.[33]

Command and Control

As Joint Publication (JP) 3-0, *Joint Operations*, states, joint functions should reinforce and complement

one another.[34] Integration across the other six joint functions is imperative if joint task forces are to effectively and efficiently accomplish their mission. Of the seven joint functions, C2 is the most complex and most important. For example, JP 3-0 lists 12 tasks that are part of the joint C2 warfighting function. Examples include managing risk, communicating and maintaining the status of information among and across subordinate units, assessing progress toward accomplishing mission-related tasks, and coordinating/controlling the employment of joint lethal and nonlethal capabilities. Given these important tasks, it is clear that AI/AS could play a significant role in creating efficiencies in a variety of C2 decisionmaking processes.[35] As noted by Samuel White, "Winning in the decision space is winning in the battle space."[36] Similarly, a more robust capability for commanders to effectively "understand the operating environment" was one of the 11 strategic themes of the *Decade of War* study that looked at key lessons learned in Afghanistan and Iraq.[37]

An example of how AI/AS could prove beneficial in this area includes more timely, accurate, and relevant intelligence that results in a more robust common operating picture across the joint force, something that would provide a staff with the opportunity to keep commanders better apprised of developments in the battlespace.[38] Another example of improved C2 via AI/AS is the automated analysis of more than 90,000 daily Facebook posts by the so-called Islamic State and its sympathizers, looking for actionable intelligence that even the most robust team of humans could not possibly generate in a similarly efficient manner.[39] General Dunford has described these types of scenarios as the ability of commanders to "make decisions at the speed of relevance."[40]

Andrew Massie suggests why AI/AS, and its implications for C2, are not easily reconciled:

The challenge of C2 Mission Command involves communicating intent as well as appreciation for why a task has been

Paratrooper assigned to 37th Brigade Engineer Battalion, 82nd Airborne Division, navigates wire obstacle during Blood on the Water competition at Fort Bragg, North Carolina, September 7, 2018 (U.S. Army/Ryan Mercado)

set but does not determine how it must be conducted; competent subordinates will exercise their best judgment dependent upon the circumstances. However, when delegating authority, we set bounds on the activity our subordinates undertake. Approaching one of these boundaries invokes the need to report up the chain for clarification or further guidance. Therefore, supervision is inherent in any command relationship, and will vary with circumstance and task complexity.[41]

The difficult balance is determining how to harness the speed of AI/AS in the C2 protocol *without* losing the ability to incorporate new or revised command guidance as circumstances dictate or as new opportunities present themselves on the battlefield.

AI can also assist commanders in making decisions about distinction (that is, proper identification of friend, enemy, or noncombatant) as well as decisions that deal with the appropriate proportionality of a retaliatory strike.[42] The Air Force is currently developing the fastest jet computer processor in avionics, the Advanced Display Core Processor, that will have the ability to process 87 billion instructions per second. The result will be faster and more reliable mission data processing.[43] Another area where AI/AS could prove advantageous is military operations in complex environments such as mega-cities and subterranean operations.[44] IBM, with its Watson AI initiative, foresees AI/AS technology soon being adapted to develop tactical military plans as well as design a set of courses of action (COAs) for commanders to consider.[45]

C2 enhancements that utilize AI/AS have the following advantages: endless and faultless memory, lack of emotional investment, and potentially unbiased analyses.[46] However, autonomous systems are not capable of reasoning in the human sense.[47] Systems of this nature develop COAs (that is, reason) using a probabilities approach.[48] Accordingly, DOD Directive 3000.09, *Autonomy in Weapons Systems*, from May 2017 provides clear guidance on the C2 function with regard to the use of autonomous and semi-autonomous systems: "Autonomous and semi-autonomous weapon systems shall be designed to allow commanders and operators to exercise appropriate levels of human judgment over the use of force."[49] In a military engagement where lethal force is directed or applied, there is a clear chain of accountability from the trigger puller to the commander who directs that the target be engaged. For autonomous weapons systems, the locus of responsibility is not so clear-cut. How to determine who "ordered" the attack and who or which entities should be held accountable

Combat medic assigned to Landstuhl Regional Medical Center, Regional Health Command–Europe secures simulated casualty during simulated attack as part of 21st Theater Sustainment Command Best Medic Competition, Baumholder, Germany, August 22, 2019 (U.S. Army/Jesse Pilgrim)

beyond the traditional chain of command present significant challenges.[50]

With these types of concerns in mind, the key position that the United States has taken in many international settings (for example, the United Nations Convention on Certain Conventional Weapons) is that lethal force can only be committed to a target when "appropriate levels of human judgment" by an individual have been taken into account. In other words, a person, not a machine, has the ultimate decisionmaking authority. Interestingly, it was clarified at the same meeting that the U.S. position was not that a human had to make every firing decision. Instead, the U.S. position is that a weapons system has to act in a manner consistent with "reasoned human decisionmaking." Specifically, the U.S. position paper argues that international humanitarian law "does not require that a weapon determine whether the target is a military objective, but rather that the weapon be capable of being employed consistent with the principle of distinction by a human operator."[51]

Intelligence

The joint intelligence process encompasses six categories of intelligence operations: planning and direction, collection, processing and exploitation, analysis and production, dissemination and integration, and evaluation and feedback.[52] If correctly established and thoroughly vetted by subject matter experts from all Services and intelligence disciplines, AI/AS tools offer a variety of opportunities and provide the potential for mitigating cognitive analyst biases (for example, availability heuristic or bandwagon effect).

Planning and direction will likely continue to be a human-driven operation, although AI/AS can provide recommendations using historical data, cultural knowledge, previous operational design, and results. As with many applications of AI/AS, the likelihood of success with the employment of these technologies is largely dependent on the quality and volume of the data available for analysis. Critical to the success of AI/AS efforts in joint intelligence will be the normalization of legacy stovepipe data segregation.

While joint collection activities could be enabled or supplemented by cognitive AI/AS systems, it is likely to take time for commanders to become comfortable with the idea of having a machine prioritize their intelligence requirements for collection and develop a supportive collection strategy. In reality, AI/AS tools have the potential to be well suited to perform as a collection manager in accordance with the four key tenets of this particular role: early identification of requirements,

prioritization of requirements, taking a multidisciplinary approach, and the tasking of available collection assets.[53] The Navy has invested heavily in AI-enabled sensors in both sea (for example, OPNAV N96 initiatives) and air (for example, sixth-generation fighter) platforms.[54]

Processing and exploitation present perhaps the most promising use of AI/AS systems in the intelligence domain. For example, during the past 10 years within the geospatial intelligence discipline, academicians and technology professionals have participated in an annual contest known as ImageNet to detect and identify certain objects within images.[55] Teams from around the world collaborate and compete to build the best exploitation programs by leveraging traditional programmatic coding, detailed algorithms, and AI/AS tools. The resulting open-source repository now contains over 14 million URLs that can be used to train image recognition AI tools, many of which have achieved a 97.3 percent accuracy rate, far surpassing average human capabilities.[56] Signals intelligence—including communications intelligence, electronic intelligence, and foreign instrumentation signal intelligence—is another discipline that presents a significant opportunity for AI/AS usage in the analysis of collected electronic signals. The use of AI/AS tools in conjunction with other disciplines, such as human intelligence, will be slower to implement.

Analysis and production are also good candidates for the integration of AI/AS tools. Currently, the "Chinese People's Liberation Army is developing algorithms that enable data fusion, enhance intelligence analysis, and support command decisionmaking."[57] Today's intelligence teams are faced with an increasing flow of information and data through a variety of sensors and sources. Technological advances have continued to accelerate that flow, but human analysts have not been able to keep pace with these increases. There is undeniable risk associated with the integration of AI/AS tools into analytical processes. As with any cognitive or machine-learning solution, it will take time as well as a variety of learning situations to hone analytical capabilities and

build a sufficient level of confidence with AI/AS-developed products. Processes must be put in place to vet analytical data, especially those created prior to achieving an acceptable level of confidence with joint products. In the end, though, if the joint force does not find a way to streamline and automate a portion of the intelligence analysis function, commanders will continue to be deprived of volumes of potentially actionable intelligence.

Within the dissemination and integration function, AI/AS will enable the former, but the latter is required to enable AI/AS usage. Standard dissemination is one of the most straightforward intelligence functions to automate, while ad hoc disseminations will likely continue to involve human effort. As previously cited, integration with large, consistent, normalized datasets will require successful AI/AS intelligence integration. That said, there are also security implications associated with collapsing a variety of data sources or networking a greater number of intelligence, surveillance, and reconnaissance assets. Since every sensor within an automated system has the potential to be exploited in a variety of ways (for example, jamming, intercepting, hacking, or spoofing), integrating these tools into a more comprehensive network has the potential of increasing vulnerability.[58]

While AI/AS tools have the ability to objectively evaluate and provide feedback regarding the quality and effectiveness of intelligence reports and products, the more critical and impactful evaluation of the quality and effectiveness of intelligence is likely to come from the human engaged in conflict. If commanders do not trust and act on intelligence products produced with the assistance of AI/AS tools, it will not matter how efficient the processes have become.

Fires

JP 3-0 lists eight key considerations when employing fires: targeting, joint fire support, countering air and missile threats, interdiction, strategic attack, global strike, limiting collateral damage, and nonlethal capabilities.[59] As AI/AS are developed, it is important for

the programmers to work closely with commanders to ensure this breadth of employment options is taken into account. In 2005, as the AI/AS sector was gaining traction, a senior leader at U.S. Joint Forces Command commented on the significant benefits of automated weapons systems: "They don't get hungry. They're not afraid. They don't forget orders. They don't care if the guy next to them has just been shot. Will they do a better job than humans? Yes."[60] In 2019 and beyond, the implications of AI/AS in the fires domain are even higher, with Bruce Jette, Assistant Secretary of the Army for Acquisitions, Logistics, and Technology, offering the following observations:

There are a number of public organizations that have gotten together and said, "We don't want to have AI tied to weapons." But time is a weapon. If I can't get AI involved with being able to properly manage weapons systems and firing sequences then, in the long run, I lose (in the time domain). Let's say you fire a bunch of artillery at me, and I can shoot those rounds down, and you require a man in the loop for every one of the shots. There are not enough men to put in the loop to get them done fast enough.[61]

While those statements are true in most respects, they are observations that only look at AI/AS technology as an asset. The liabilities of technology must also be considered. Commanders and the U.S. Government must still be held accountable for actions taken by AI/AS. DOD Instruction 3000.09 directs that autonomous weapons must be able to "complete an engagement in a timeframe consistent with commander and operator intentions and, if unable to do so, terminate engagements or seek additional human operator input before continuing the engagement."[62]

Given this directive, the crafting of rules of engagement for multiple scenarios, as well as establishing the appropriate boundaries for how DOD will utilize AI/AS technologies, will be quite challenging. For example, when programming an

Four unmanned remotely operated high-speed maneuvering surface targets move to blocking positions on James River during Office of Naval Research–sponsored demonstration of autonomous swarmboat technology, Newport News, Virginia, August 13, 2014 (U.S. Navy/John Paul Kotara)

autonomous weapons system (AWS) for a multitude of scenarios, at some point the weapon will only be effective and/or safe to employ in a small number of instances, calling into question its benefits vis-à-vis its costs. If an AWS cannot be programmed to meet the "reasonable commander standard" (that is, properly weighing the likely collateral damage vis-à-vis the potential military advantage), it is highly unlikely that a senior military leader will conclude that the potential advantages of an AWS are worth the risk.[63]

Movement and Maneuver

JP 3-0 states that the objective of movement and maneuver is to gain positional advantage to accomplish both operational and strategic goals. This is done primarily through five key tasks: deploying forces within the operational area (OA), maneuvering to achieve the advantage, providing constant ability

to mobilize over terrain or obstacles without delay, delaying or stopping the enemy, and controlling significant areas in the OA.[64]

In the area of movement and maneuver, an autonomous system such as a robot has certain advantages over a human. For example, a robot has no instinctual need for self-protection that could slow an advance. A robot does not have the emotions that could otherwise distract/impair a warfighter's judgment (for example, frustration, fear, revenge, or rage). Conversely, robots have no innate appreciation for the sanctity of human life or feelings such as compassion or mercy.[65] One example of new AI/AS technology in the movement and maneuver domain is the Navy's new unmanned underwater vehicle, which is capable of operating for 5 months at a time without maintenance or refueling.[66] The space domain has also seen similar use of unmanned vehicles

with the Phantom Express and X-37B platforms, both of which provide enhanced and efficient maneuver capability.[67]

Even with these promising examples, there is still an open question on the best way that AI/AS can be utilized within the joint function of movement and maneuver. Unmanned aircraft and ground platforms are already utilized in the Middle East for resupply missions. The Army recently accelerated its Automated Ground Resupply program and plans to have 70 self-driving supply trucks operational by 2020.[68] The future challenge is finding ways to enable these systems to "autonomously predict, plan, track, and optimize resupply demands from military users."[69] This idea of interconnected autonomy will allow troops to focus more on the mission instead of using precious time planning how they will maneuver from one place to another across the battlespace.

Protection

JP 3-0 describes protection as a function that encompasses traditional force protection and protection of health and other activities that preserve/conserve the force. Of the seven joint functions, protection is one of the more complex. For example, JP 3-0 lists 15 tasks/components that are part of the protection warfighting function. Examples include providing air/space/missile defense; protecting U.S. civilians and contractors authorized to accompany the force; conducting operations security, cyber defense, and cyber security; providing chemical, biological, radiological, and nuclear defense; establishing capabilities and measures to prevent friendly fire incidents; and securing and protecting combat and logistics forces, bases, joint security areas, and lines of communication. And while those components of force protection seem on the surface straightforward and appropriate, JP 3-0 also includes additional aspects of force protection that are broader in nature and not easily or narrowly defined, such as health protection.[70] To ensure overmatch against near peers, force protection is one of five key lines of effort envisioned by the Army Training and Doctrine Command for integrating new technologies into future organizations, the other four being increasing situational awareness, lightening Soldiers' workloads, sustaining the force, and facilitating movement and maneuver.[71]

JP 3-0 provides a taxonomy of four broad areas that provide a useful approach for analyzing the methods by which the joint force could effectively utilize AI/AS to enhance force protection: active defensive measures, passive defense measures, the application of technology to reduce fratricide, and a more robust and rapid response to various types of emergencies (for example, accidents or natural disasters).[72] In the area of active defensive measures, the key focus is on protecting information, military installations/assets, and lines of communication from enemy destruction and/or disruption. There has been significant progress in the use of unmanned automated systems to execute resupply missions. The benefits of letting machines do the "dull, dirty, and dangerous" work of resupply so troops can focus on more complex aspects of the mission have been pointed out.[73] Commenting on a Marine amphibious exercise, Colonel Daniel Sullivan stated, "Going forward, the first one in the room should never be an air breather. It should be a robot with a lethal capability."[74] In congressional hearings, Senator Gary Peters (D-MI) offered the following telling observation: "In the Iraq War we lost more Soldiers in logistics operations than we did in combat." To mitigate loss of life, especially in resupply and logistics, one promising AI/AS concept is "leader/follower." This solution envisions personnel in a lead vehicle with multiple unmanned trail vehicles moving along the same general route based on the electronic signal from the lead vehicle.[75]

In the area of passive defensive measures, JP 3-0 stresses the importance of taking proactive/precautionary steps to make it more difficult for a hostile force to locate and engage personnel, assets/facilities, and various systems (such as communications). One could imagine the use of deep learning systems (machines that are programmed to discern when certain types of attacks are likely/imminent) conducting analysis quicker than could be expected by human monitoring and/or reaction.[76] Other examples where deep learning systems could prove beneficial include cyber defense and electronic warfare attacks. Autonomous systems also provide an advantage in defensive postures to "select and engage incoming enemy" indirect fires (for example, mortars, artillery shells, and rockets). An autonomous system designed to provide a rapid and robust "counter-battery" response against the origin of an attack provides commanders with additional time to focus on second- and third-order decisions given that the initial response to the attack was "automatically initiated" with speed and accuracy. Israel uses this type of force protection approach with its Iron Dome defenses.[77]

In the area of applying technology to reduce fratricide, AI/AS technologies have tremendous potential for the joint force as well as potential hazards. It is possible to envision scenarios in which AI/AS can provide much more effective early identification in protecting civilians as well as combatants from friendly fire incidents (for example, more precise targeting or minimizing collateral damage).[78] In the area of developing a more robust and rapid response to emergency scenarios, the key for the joint force will be adopting AI/AS technology and applying it to respond with COAs that enhance survivability as well as isolating the negative impacts that result from accidents, biological hazards, and natural disasters.[79]

Sustainment

JP 4-0, *Joint Logistics*, defines *sustainment* as "the provision of logistics and personnel services necessary to maintain and prolong operations." The logistics portion of sustainment includes the core functions of deployment and distribution, supply, maintenance, logistical services, operational contract support, engineering, and health services.[80] Among the seven joint functions, sustainment operations present some of the most likely quick wins for employment of AI/AS technologies.

The integration of AI/AS analytical tools provides a significant advantage for dealing with large datasets and complicated algorithms. The Air Force already uses the Automatic Logistics Information System, which has automated the transmission of logistics data (for example, fuel consumption and engine diagnostics) to free up pilot attention for a greater focus on combat.[81] Since planning for deployment and distribution relies heavily on large volumes of data and algorithms, AI/AS implementation could provide a tangible improvement for the joint force. By leveraging automated solutions to track information such as unit basic load status, supply orders, warehousing stock, distribution channels, and transportation schedules, a joint logistics command would be well positioned to service both peacetime and wartime requirements.

Highly automated vehicles (HAVs) are currently in use, with many experts suggesting that the adoption of autonomous vehicles will soon become commonplace in military as well as civilian settings. One of the

Marines with Headquarters Battalion, 3rd Marine Division, provide security for convoy during Samurai 2-20 on Camp Hansen, Okinawa, Japan, December 10, 2019 (U.S. Marine Corps/Kallahan Morris)

primary challenges associated with the widespread adoption of HAVs in sustainment and logistics operations is the ethical issues associated with "training" vehicles—how to teach the AI/AS technology to effectively evaluate potential accidents. The Army recently invested nearly $50 million in the Autonomous Ground Resupply Program to leverage AI/AS with the goal of saving lives as well as economy of force.[82] The joint force may want to build on this initial implementation of HAV technology in relatively self-contained environments (for example, moving materials on and off ships and aircraft) before implementing a more robust program. In this rollout, the joint force could partner with civilian freight agencies that are already moving forward with test programs. The legalities of leveraging HAVs in an international environment, and the related liabilities, would have to be fully researched by the Judge Advocate Corps before this option is rolled out in various countries.

The network-based nature of private sector logistics provides a natural framework for implementing and scaling AI for complex military supply chains.[83] In June 2018, the Army awarded a predictive maintenance contract to Uptake, a company that analyzes millions of hours of data from diesel engines and other major components to predict imminent equipment failures. The goal of this trial program is to identify ways to streamline logistics and help untether the warfighter from traditional supply lines.[84]

While the most common AI/AS-enabled personnel services and processes relate to recruitment, hiring, onboarding, and financial management, there are a multitude of rules-based, repetitive human resources tasks that can be automated to provide more time for value-added functions.[85] For example, AI/AS tools have the potential of assisting joint force leaders with talent and succession planning programs in an unbiased manner. Automation techniques could also be used to offer a preliminary evaluation of promotion packets and offer suggestions on personnel management, such as setting the optimal rate for retention bonuses.

The Services have each undertaken efforts to more effectively attract, manage, and retain talent. "Cultivating workforce talent" is highlighted in the 2018 National Defense Strategy, along with the clarification that it will require the inclusion of new capabilities and an openness to updating practices, not just the addition of new technology.[86] Following the Air Force's September 2017 Workforce Summit, Michael Parker stated, "Talent management information technology must transform to function in today's digitally connected world."[87] Simultaneously, the Navy's Sailor 2025 initiative as well as the Army's Talent Management Task Force seek to "improve and modernize personnel management."[88]

In another sustainment initiative, the Army is poised to implement the Integrated Personnel and Pay System–Army, which will allow the tracking of individual Soldier and civilian skillsets across all three components: Active, Army Reserve, and Army National Guard.[89] Personnel management has the unique ability to be both an enabler

F/A-18E Super Hornet assigned to Stingers of Strike Fighter Attack Squadron 113 launches from flight deck of aircraft carrier USS *Theodore Roosevelt*, Arabian Gulf, February 5, 2018 (U.S. Navy/Spencer Roberts)

of the future of AI/AS within the joint force—through focused recruitment and talent management programs—and a consumer of AI/AS capabilities. While each of the Services is becoming more analytical and objective regarding evaluations and promotions, having positioned themselves to use AI/AS functions in a Service-specific manner, if DOD would merge these sources of talent data, the joint force would have a robust source of the information from which to staff future teams.

The healthcare component of sustainment has already seen success with AI/AS and stands poised for even more. Recovery Engagement and Coordination for Health, a Veterans Administration (VA) program that uses AI to analyze veteran health record data, had proactively identified nearly 7,000 veterans at risk of suicide as of March 2018, thereby allowing for quick and effective intervention.[90] IBM is partnering with the VA—and with myriad civilian medical research entities—in the area of cancer treatment.[91] With the number of new cancer diagnoses between one million and two

million annually, medical assessments are a tremendous area of opportunity for expanded AI/AS usage, particularly in remote and/or deployed environments where it is not always possible for a full range of specialists to be on location.

Whether the focus is logistics, personnel management, or healthcare services, the sustainment function is primed for incremental AI/AS enhancements. Additionally, this is a key integration area where the joint force could and should partner with civilian and interagency organizations for the more robust and effective systems.

Information

With the 2017 release of JP 1, *Doctrine for the Armed Forces of the United States*, information was added as the seventh joint function, the first addition of a joint warfighting function in 20 years.[92] JP 1 defines the *information joint function* as follows:

The information function encompasses the management and application of information and its deliberate integration with

other joint functions to influence relevant actor perceptions, behavior, action or inaction, and support human and automated decision making. The information function helps commanders and staffs understand and leverage the pervasive nature of information, its military uses, and its application during all military operations. This function provides [joint force commanders] the ability to integrate the generation and preservation of friendly information while leveraging the inherent informational aspects of all military activities to achieve the commander's objectives and attain the end state.[93]

Brigadier General Alexus Grynkewich, who served on the Joint Staff as the J39 Director of Global Operations, stated, regarding the addition of this seventh joint function, "The elevation of information in joint doctrine . . . underscores the [DOD] focus on how to adapt in order to more effectively use the military instrument of national power in a changing strategic environment."[94] Building on this idea, the DOD publication *Strategy for Operations in the Information Environment* states

that information could possibly be the decisive factor in successful future military operations.[95] Secretary Mattis likewise understood the importance of this newly designated joint function when, as a commanding general, he stating, "Capturing perception is the new high ground in today's conflicts."[96] General John Hyten, then commander of U.S. Strategic Command, stated, "The military that figures out how to control information will be the most powerful military on the planet."[97] The importance of information as a joint function was also highlighted in *Joint Operating Environment 2035: The Joint Force in a Contested and Disordered World*. This document includes the following prediction: "Advanced information technologies will lead to new and faster ways to form, build, and maintain cohesion and common purpose among members of a group. Consequently, it will become easier to mobilize and expand groups and ideas, irrespective of geographic proximity."[98] In support of this prediction, the most recent National Security Strategy, as well as the 2018 National Defense Strategy, frequently cite myriad threats to national security that are likely to stem from the use of information as a weapon by U.S. adversaries.[99]

Artificial intelligence and automated systems hold tremendous promise for improvements across each of the seven joint functions. As Andrew Massie noted, "At its core, our ability to harness autonomy is a test of our ability to trust machines, and therefore delegate authority for decision making and action."[100] DOD took action with the June 2018 directive establishing the Joint Artificial Intelligence Center.[101] The joint community would be wise to build on this new initiative and timely directive by adding AI/AS planning and integration cells on joint manning documents to ensure that the benefits of lessons learned, both within and outside the military, are fully leveraged across the joint force. But this is just a part of what should be a much bolder approach to AI/AS investment across DOD and the joint force. Time is of the essence. In recent congressional testimony, DOD officials reported that China

spent $12 billion in 2017 on AI and plans to spend at least $70 billion by 2020.[102] By comparison, current U.S. expenditures are one-tenth of those planned by the Chinese. By taking a bold and integrative approach in the AI/AS space, DOD and the joint community will put themselves in position to take advantage of the advice offered by Paul Schare, author of *Robotics on the Battlefield*: "The winner of this revolution will not be who develops these technologies first, or even who has the best technologies, but who figures out how to best use them."[103] **JFQ**

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Army CH-47F Chinook helicopter assigned to B Company, 1st Battalion, 126th Aviation Regiment, California Army National Guard, assisted by Inyo County Search and Rescue, hovers while hoisting injured hiker at 13,800 feet on Mount Whitney, Inyo County, California, August 25, 2019 (Courtesy Inyo County Search and Rescue)

The Future of Interagency Doctrine

By George E. Katsos

Agencies and Departments must deliberately and jointly invest in civil-military strategy, doctrine, training, and operations to meet the tests of this era.[1]

—**General Joseph F. Dunford, Jr.**

Colonel George Katsos, USAR (Ret.), is a Program Manager on the Joint Staff.

nteragency capability synchronization continues to challenge whole-of-government approaches to national security. In 2011, Chairman of the Joint Chiefs of Staff (CJCS) General Martin Dempsey addressed

Special mission aviator assigned to 33rd Rescue Squadron looks out gunner's window aboard HH-60G Pave Hawk, capable of performing peacetime operations such as civil search and rescue, emergency aeromedical evacuation, disaster relief, international aid, and counter-drug activities, July 31, 2019, Kadena Air Base, Japan (U.S. Air Force/Matthew Seefeldt)

the issue in the context of reform by directing the U.S. Armed Forces to expand the envelope of interagency cooperation.[2] This strategic direction inspired an abundance of literature cataloging horizontal and vertical unity challenges among and between military and civilian workforces. Subsequently, the Joint Staff convened Department of Defense (DOD) and non-DOD (interagency and other civilian stakeholders) personnel to brainstorm on how to improve workforce interoperability within the context of joint doctrine—the purpose being to identify and work with those who get things done. The following

accomplishments bring to light the potential of future interagency doctrine development.

U.S. military workforces plan and train with guidance material called doctrine. Joint doctrine, which is managed by the CJCS, is a body of institutional knowledge that provides fundamental principles and offers official advice to guide the employment of joint military forces in support of achieving national policy objectives. While recent national security system reform pursuits often describe U.S. Government civil-military cooperation emphasis as diminishing over time, joint doctrine was identified as one of two military efforts that still

maintains a focus on promoting whole-of-government issues.[3]

Joint doctrine's influence is vast. In a broader context for interagency personnel, joint doctrine and its standardization of terminology reduce organizational uncertainty, focus on strategic and operational perspectives, and provide transparency of best practices for organizational leaders, individual members, and society at large.[4] In the realm of national interests, while national policies provide direction, joint doctrine in comparison offers official advice on how to enhance joint force effectiveness. While strategy describes national power synchronization, joint

doctrine offers official advice on how to make strategy more effective on what to attain and with which military capabilities. Furthermore, as plans enumerate steps in the pursuit of mission objectives, joint doctrine offers official advice on how those objectives can be achieved. Under joint force development, lessons captured in operations and exercises enhance joint doctrine as well as expose unproven conceptual ideas that identify doctrinal gaps. Training, exercises, and education are also developed and implemented in accordance with joint doctrine.

Workforce doctrine and standardized terminology outside of DOD are scarce. Most organizations can be categorized as policy- or rules-based rather than doctrine-based workforces that capture and revalidate frameworks, common language, and best practices. Other than DOD, the Department of Homeland Security is the only U.S. Government entity with formal doctrine and terminology development processes. With present-day socialization of existing doctrine and terminology frameworks with interagency personnel, these participants continue to develop a basic understanding and appreciation for joint doctrine as well as a sincere desire to participate in joint doctrine development and to foster a dialogue that is leaning toward something similar for their own organizations.

Non-DOD joint publication participation continues to grow over time. Evidence includes non-DOD requests increasing twofold since General Dempsey's departure. General Dunford added to his direction for non-DOD organizations to invest in military doctrine.[5] The Joint Staff subsequently broadened opportunities for non-DOD entities via the Annual Call Memorandum to Executive Secretariats, creating a pathway for working group participation and other revision opportunities. One significant opportunity for change occurred in 2016 when the United Nations, International Committee of the Red Cross, and other governmental and nongovernmental organization personnel became involved during the revision of Joint Publication 3-08, *Interorganizational Cooperation*.[6]

Their input influenced military perceptions that steered current practices away from calling non-DOD organizations "force multipliers and partners" to being known as "stakeholders" within an operational environment. Initially, the "so what" for non-DOD involvement was whether joint doctrine content was important enough to monitor and the development process worth the time and effort to inject organizational perspectives. After results of the aforementioned and other interactions, the question changed from *whether* to be involved to how these organizations could become *more* involved in joint doctrine development. Subject matter of continued interest focused on interorganizational cooperation, protection of civilians, defense support to civil authorities, joint planning and intelligence activities, special operations, counterdrug operations, countering weapons of mass destruction, and combating terrorism.[7]

Non-DOD involvement in joint doctrine development positively affects the enterprise. Recently, the Joint Staff assembled more than 30 authors from 18 organizations to develop a series of 3 articles on interorganizational cooperation.[8] This series addressed the importance of a shared purpose, shared process, and working thoughtfully with people who follow through. Authors also examined organizational interpretation of higher-level guidance, area of responsibility distribution, time horizons, decisionmaking, and work methods. Furthermore, the group examined attitude and mutual respect as well as touchpoints on understanding principles, mandates, and organizational interests. This interaction and process led the way to understanding the importance of and need for a common set of terms and definitions to close the knowledge gap among U.S. Government workforces.[9] Based on the fact that successful doctrine is normally built on a well socialized, understood, and agreed language, multiple interagency personnel banded together in 2017 and created the U.S. Government *Compendium of Interagency and Associated Terms*. This first edition included domestic- and

foreign-themed sections to assist stakeholders in understanding counterpart language usage during steady state cooperation and force employment. Members of specific communities that found utility in this product included DOD special operations forces and academia.[10]

The remaining question is whether the time is ripe to formally develop interagency doctrine. In current joint doctrine, non-DOD contributions continue to improve content to include what joint force commanders should know about other potential workforces to be encountered during force employment.[11] This U.S. Government interoperability information can be productive for use by National Security Council and Executive Branch department and agency personnel. The vehicle for this momentum is the new *Joint Guide for Interagency Doctrine*. Released in October 2019 and available at the Joint Electronic Library, this inaugural document contains U.S. Government structures, frameworks, relevant coordination mechanisms, force employment observations, organizational areas of responsibility regions, and notional framework and terminology mapping constructs. Moreover, the guide expands on current knowledge and can assist in the strategic art of navigating the U.S. Government bureaucracy to make workforces work more efficiently together in achieving national policy objectives. CJCS General Mark Milley has touched upon this issue, indicating that listening to entities such as those that make up the interagency is important to building an adaptive and agile force.[12] In the end, the Joint Staff–driven gathering held 5 years ago not only shined a light on improving U.S. Government workforce interoperability but also brought the future of interagency doctrine to fruition. **JFQ**

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Joint Publications (JPs) Under Revision (to be signed within 6 months)

JP 1-0, *Personnel Support*

JP 2-0, *Joint Intelligence*

JP 3-05, *Special Operations*

JP 3-26, *Combating Terrorism*

JP 5-0, *Joint Planning*

JP X-XX, *Joint Electromagnetic Spectrum Operations*

JPs Revised (signed within last 6 months)

JP 1, *Doctrine for the Armed Forces of the United States, Vol. 1*

JP 3-09.3, *Close Air Support*

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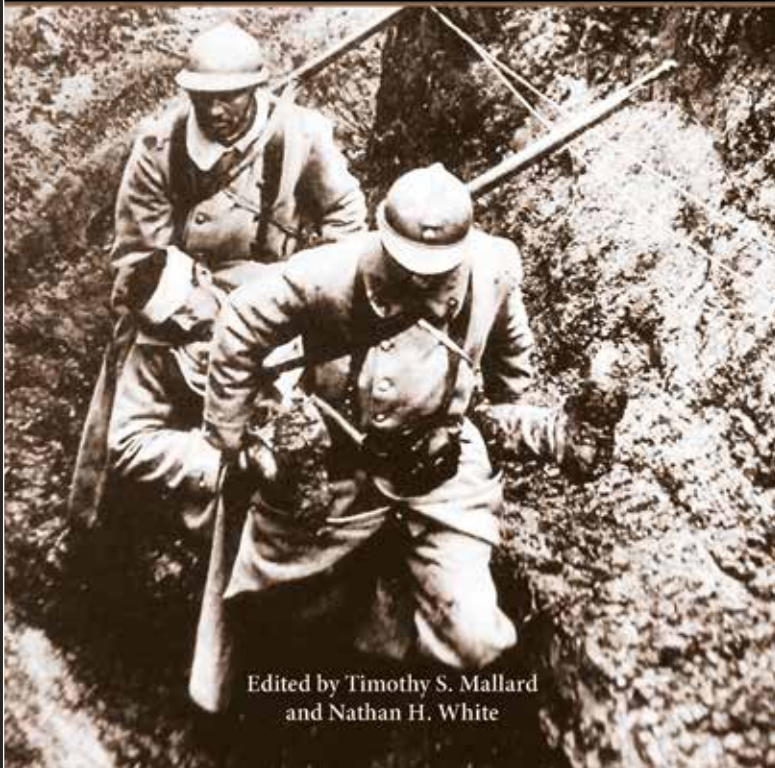
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A Persistent Fire: The Strategic Ethical Impact of World War I on the Global Profession of Arms

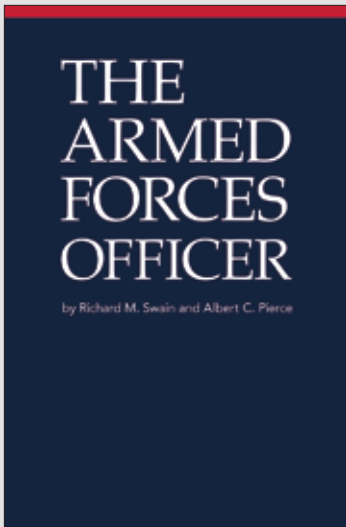Edited by Timothy S. Mallard and Nathan H. White

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Since "the war to end all wars" witnessed the rise of global war among competing nation-states conducted in often tenuous alliances with nascent professional militaries—characteristics that continue to mark contemporary warfare a century later—then studying that conflict's impact seems a relevant method to decide ways in which the profession of arms will develop in the next 25 to 50 years. Indeed, like a smoldering, persistent fire that threatens to re-erupt into a fresh conflagration, World War I continues to deeply shape and guide the profession of arms today.

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