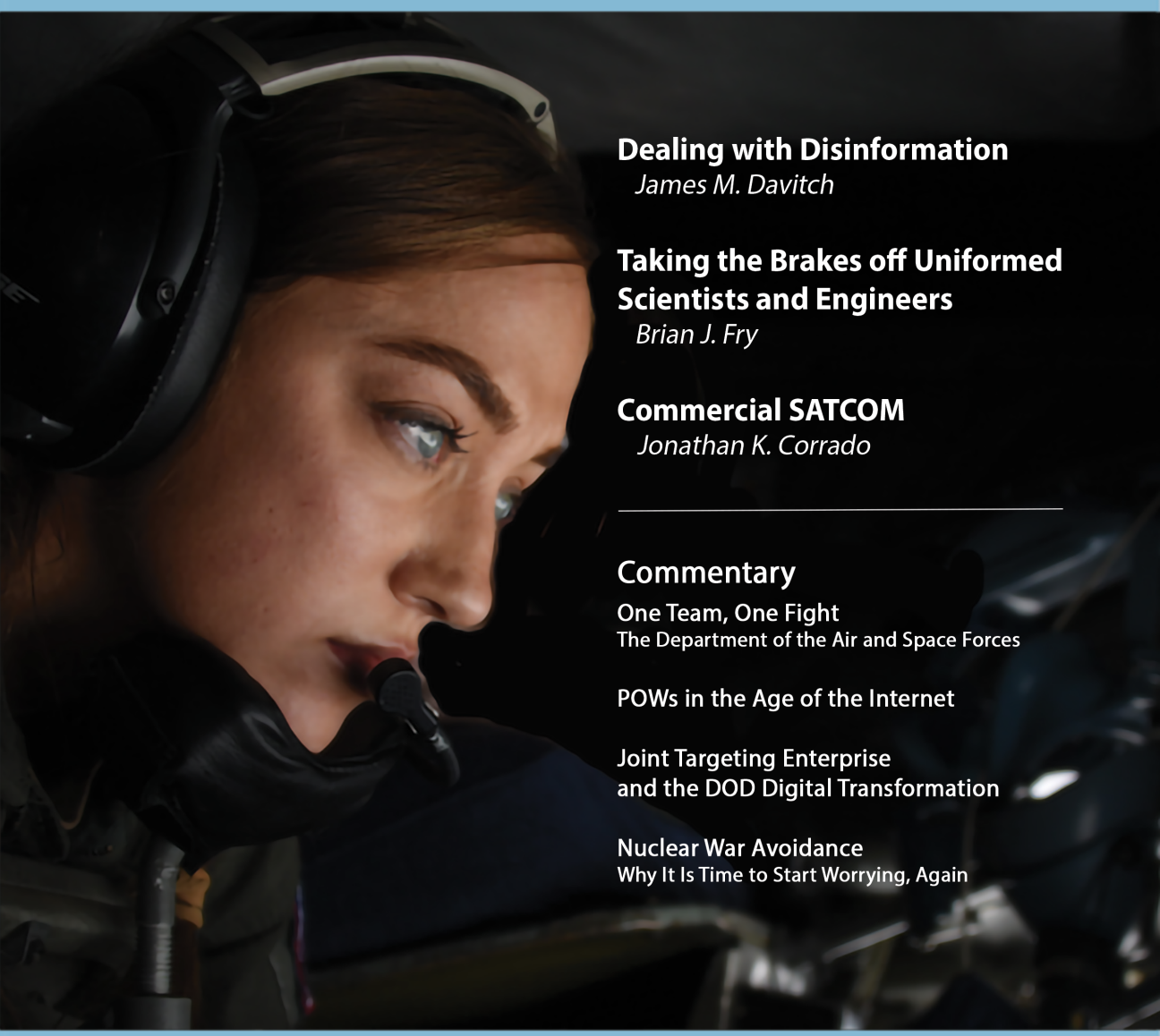
DEPARTMENT OF THE AIR FORCE

# ASOR

## AIR & SPACE OPERATIONS REVIEW





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## Air & Space Operations Review



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# Air & Space Operations Review

SPRING 2022 VOL. 1 NO. 1

## LETTER FROM THE EDITOR

Dear Reader,

Thank you for taking time to become acquainted with *Air & Space Operations Review* (*ASOR*). As you may know, *ASOR* is the new name of the flagship peer-reviewed, operations-focused journal of the Department of the Air Force, most recently published under the name *Air & Space Power Journal*. From solid beginnings in 1947 as *Air University Quarterly Review*—just over six months prior, in fact, to the establishment of the US Air Force as a separate service—*ASOR* marks three quarters of a century of Air Force, other service, and civilian scholarship on the subjects of airpower and spacepower operations, strategy, doctrine, leadership, technological innovation, force structure, and national security concerns.

The journal could not have foreseen the events unfolding in Ukraine this spring and the unprovoked death and destruction committed against a free Ukrainian nation at the direction of Russian president Vladimir Putin. Contributions to our spring issue, however, have direct relevance to the war, covering topics such as information warfare, Joint targeting, and prospects of nuclear war.

James Davitch leads our articles with a proposal to form special information fires teams composed of military members skilled in global geopolitics, predictive analyses, metacognitive tools and theory, open-source information collection, and internal and external communication and messaging. Brian Fry argues uniformed scientists and engineers are uniquely suited to link technical possibilities to operational realities. Developing these capabilities will help uniformed scientists and engineers maximize their contributions to the acquisition community and to the combat power of the Air Force. Concluding our articles, Jonathan Corrado presents a strategy to mitigate the myriad risks posed by the US military's dependence upon commercial satellite communications architecture. These risks include protection, control, reliability, interoperability, and access.

Our commentaries begin with Raj Agrawal and Aaron Brooks, who make the case that the Department of the Air Force should be renamed to the Department of the Air and Space Forces. This would explicitly signal a coequal status between the leads for the air and space military domains. Jan Kallberg, Todd Arnold, Stephen Hamilton, and Mark Visger explain that the emergence of deepfakes has challenged long-standing protocols concerning prisoners of war in the Geneva Conventions. The United States, its Allies, and partners must educate service members about the potential exploitation of any recorded media obtained if they become prisoners of war.

Hugh Curry argues that when the Joint Warfighting Concept and digital initiatives are viewed through the lens of the Joint targeting enterprise, it is clear Joint targeting is the best way to achieve the Department of Defense's digital transformation. Louis René Beres concludes our issue with a passionate call to attend to the complex existential issues of nuclear war avoidance—a call indeed pertinent as the United States and its European Allies and partners face a security dilemma, and escalation and deterrence theories are being put to the test.

The journal's commitment to academic freedom remains stalwart: in the Spring 1947 issue, the first editor and editorial board observed, "if the appearance here of articles which may not agree with accepted policy, or even majority opinion, will stimulate discussion and provoke controversy, an important part of the journal's mission will have been accomplished: to induce Airmen to have original thoughts on these matters and to give these thoughts expression" (*Air University Quarterly Review*, Spring 1947, 94). As long as submissions are relevant, intellectually rigorous, accurate, and do not divulge classified information, the journal is committed to promoting views across the spectrum of conviction.

We are grateful for the readers of the professional journals of the Department of the Air Force: the *Journal of the Americas*, the *Journal of Indo-Pacific Affairs*, *Æther: A Journal of Strategic Airpower & Spacepower*, and *ASOR*, as well as the books and papers published by Air University Press. Air University Press will continue to provide rigorous, scholarly publications that critically engage Air Force, US military, and national security strategy, policies, plans, and operations. ~ The Editor

ARTICLE

# Dealing with Disinformation:

## The Barriers to Success and a Path Forward

James M. Davitch

In order to win in the information domain, the Department of Defense requires a new capability—an information fires team, engaged to combat disinformation. Working at the operational level, such a team will include military members skilled in global geopolitics, predictive analyses, metacognitive tools and theory, open-source information collection, and internal and external communication and messaging.

The US military's approach to information warfare relies on personnel, organizations, techniques, and procedures grounded in conventional doctrine.[1] When it comes to tactical information operations, instead of doing what the Joint force needs them to do, US military members do what they know how to do. This reality leaves combatant commanders at a comparative disadvantage relative to foes who use the information space to exploit a vulnerability of the United States while avoiding its historic conventional military strengths. Winning in the information domain today and tomorrow will require the Department of Defense to acquire a new capability. In conflicts with peer competitors, clear, concise, and correct communication is a major weapon of warfare.

This article advocates for a new kind of fires team to assist with this problem. The proposed "anti-disinformation" cell would compete in the cognitive rather than physical domain. The Department should begin to think about force packaging that includes not only traditional military hardware like ships, aircraft, and munitions, but also people who can help understand the geopolitical situation and communicate in a way advantageous for US national interests. Recommendations in this article are also pertinent to civilian national security leaders as they consider ways to respond to adversary moves and inform public opinion to help achieve political ends.

In a prescient 1997 essay, Richard Szafranski lays bare the consequences of falling behind adversaries who attempt to gain information advantages. When a citizenry's will, their country's technological edge, and that nation's claim to the moral high ground are in alignment, the pursuit of the profession of arms is useful and important. "If, however, the moral high ground is lost, a domino effect occurs: public support is lost, the technological high ground is lost, and the armed forces are lost."[2]

1. I would like to thank Lieutenant General B. Chance Saltzman and Colonel Donald R. Brunk who helped clarify my thoughts through many valuable conversations. Additionally, I would like to thank the editorial team at Air University Press and two anonymous reviewers for their constructive comments on earlier versions of this article. All errors found herein are my own.

2. Richard Szafranski, "A Theory of Information Warfare; Preparing for 2020," *Airpower Journal* 9, no. 1 (Spring 1995).

In the years since this warning, there has been no shortage of scholarship discussing the importance of information operations. Christopher Paul made an important argument in favor of information operations' outsized benefits relative to their cost.[3] Many articles have been published describing the need to think differently about the so-called information domain.[4] This article articulates the problems the military faces in the information domain, highlighting five barriers to success; presents a new force packaging concept focused an information fires team; and concludes by suggesting an implementation plan for senior leaders.

## The Problem

The *Summary of the 2018 National Defense Strategy* highlights the need to address information warfare challenges because they test "our ability to deter aggression."[5] For the United States to effectively deter an adversary, it must first recognize what is happening and second, credibly warn the adversary of the negative consequences of its actions. Information warfare complicates deterrence because it injects confusion into perception and decision making.

The fog of war has always been a challenge. But the volume, variety, and velocity of information sources are growing at such a rate that the creation of new terms for the measurement of data (for example, exabytes, zettabytes, yottabytes) is increasing as rapidly as the data.[6] The confusion generated by the influx of data, much of it deceptively injected into the information domain, can slow US response times. This degrades the military's ability to credibly deter adversaries amid persistent, low-grade conflict. To compete, the military must reexamine how information warfare forces are organized and trained.

Information operations are not new, but they are nonetheless complex. The Joint Staff has enshrined information in doctrine, labeling it as the seventh Joint function.[7] As doctrine is the result of past experiences, this suggests the Defense Department has learned enough to be agile in its application. Yet across all levels of information operations, tensions persist between various interrelated elements—cognitive biases and

3. Christopher Paul, "Enhancing US Efforts to Inform, Influence, and Persuade," *Parameters* 46, no. 3 (2016): 10.

4. Will Atkins, Donghyung Cho, and Sean Yarroll, "More Cowbell: A Case Study in System Dynamics for Information Operations," *Air & Space Power Journal* 34, no. 2 (Summer 2020), https://www.airuniversity.af.edu/; US Joint Forces Command, *Commander's Handbook for Strategic Communication and Communication Strategy* (Suffolk, VA: Joint Warfighting Center, June 24, 2010), xiii; and, Justin Lynch, "Yet Another Article about Information Technology and the Character of War," War on the Rocks, September 2, 2020. https://warontherocks.com/.

5. James N. Mattis, *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, January 2018), 3.

6. Giuseppe Arbia, *Statistics, New Empiricism and Society in the Era of Big Data* (Cham, Switzerland: Springer, 2021).

7. Chairman of the Joint Chiefs of Staff (CJCS), *Joint Concept for Integrated Campaigning* (Washington, DC: CJCS, March 16, 2018).

heuristics, training deficiencies, digital literacy limitations, security challenges, and epistemological hurdles. All five deserve scrutiny.

## Information Warfare

### *Cognitive Challenges*

In the information space, the advantage goes to the first mover, partially due to the cognitive biases psychologists call anchoring effects and framing effects. Both biases prey on the mind's tendency to be heavily influenced by the first piece of information heard and the proclivity to assume that information is true. In a combat environment, the rush to keep up with operations can result in a search for quick answers, and that tendency can cause more problems than it solves.

Confirmation bias, anchoring effects, and framing devices are especially hazardous for intelligence personnel who often encounter classified material as the first piece of information they examine and then endow it with outsized significance.[8] Worse still, the fixation on classified information can form barriers to creative thinking if it precludes the pursuit of additional, possibly contrary, forms of information. Searching for so-called disconfirming evidence is one of the techniques seasoned intelligence professionals employ as a counter to confirmation bias.[9] Unfortunately, classified information from exquisite sources often overshadows equally relevant but less exotic publicly available information that may contain disconfirming evidence.[10]

### *Training Challenges*

Another reason why contending with information warfare is so difficult is due to the way military personnel are trained and educated for their jobs. Understanding how foes can manipulate social media has not historically been a prerequisite for military operations. This may be especially true in the Air Force, which prioritizes traditional science and technology undergraduate degrees. One consequence of this is that current Air Force personnel may be playing catch-up in a game that has already started. Analysis of nongovernmental Russian "digital mercenaries" found that successfully carrying out a disinformation campaign on social media platforms requires an understanding of platform affordances, audience segmentation and targeting strategies, and marketing best prac-

8. Josh Kerbel, "The US Intelligence Community Wants Disruptive Change as Long as It's Not Disruptive," War on the Rocks, January 20, 2016, https://warontherocks.com/.

9. *A Tradecraft Primer: Structured Analytic Techniques for Improving Intelligence Analysis* (Washington, DC: Center for the Study of Intelligence, 2009); and Richards J. Heuer, *Psychology of Intelligence Analysis* (Washington, DC: Center for the Study of Intelligence, 1999).

10. Anthony Olcott, *Open Source Intelligence in a Networked World* (New York: Continuum, 2012).

tices—skill sets not traditionally found within the state military and intelligence organizations most often responsible for information operations.[11]

## *Digital Literacy Challenges*

Some argue the military needs to begin a crash program aimed at improving digital literacy.[12] But emerging scholarship shows there are differences between the ways military and civilian college students use social media that may put young officers at a disadvantage. Empirical research of student habits has shown a measurable gap between military academy, Reserve Officer Training Corps, and civilian student social media use.[13]

This data does not support a conclusion that military students are less capable at employing social media, but it does suggest cadets tend to use it less than civilians. This may result in a population of active-duty military personnel that are, at least initially, slightly less prepared to engage in tactics, techniques, and procedures for the application of "social media intelligence."[14]

## *Security Challenges*

Another limitation the military faces is that personnel involved tend to operate without a shared understanding of what to discuss, if anything. In responding to adversary moves in the war for public opinion, sometimes personnel from as varied service backgrounds as intelligence, public affairs, legal, and foreign disclosure offices find themselves hastily assembled as information-warfare first responders. Through no fault of their own, individuals from these offices possess divergent viewpoints regarding releasing information to the public.

For some, such as intelligence personnel, information protection is a core job requirement. For public affairs professionals, information sharing is part of the daily routine. But all exist within a defense culture that tends to reward keeping rather than disclosing information. There is a good reason for this discretion: otherwise innocuous information can reveal, in sum, a larger picture of what the US government may be trying to hide.

Many military professionals today complete extensive information-protection training that encourages one to, when in doubt, protect data from being released. Clearly operational security is important, and the military still requires a degree of discretion when

11. Renée DiResta, Shelby Grossman, and Alexandra Siegel, "In-House vs. Outsourced Trolls: How Digital Mercenaries Shape State Influence Strategies," *Political Communication* (published online December 2021), 3.

12. Peter Singer and Eric Johnson, "The Need to Inoculate Military Servicemembers against Information Threats: The Case for Digital Literacy Training for the Force," War on the Rocks, February 1, 2021, https://warontherocks.com/.

13. Karin K. De Angelis et al., "Ubiquity with a Dark Side: Civil-Military Gaps in Social Media Usage," in *Social Media and the Armed Forces*, ed. Eva Moehlecke de Baseggio, Olivia Schneider, and Tibor Szvircsev Tresch (Cham, Switzerland: Springer, 2020).

14. David Omand, Jamie Bartlett, and Carl Miller, "Introducing Social Media Intelligence (SOCMINT)," *Intelligence and National Security* 27, no. 6 (2012).

releasing some evidentiary material. But the demands of current operations require a military force with a different mindset. For example, current events unfolding between Russia and Ukraine are changing approaches to traditional information and security shibboleths. The Biden White House is demonstrating innovative ways of releasing selective pieces of information in an apparent attempt to combat disinformation while controlling the narrative during the crisis.[15]

## *Epistemological Challenges*

The final complicating factor in information warfare relates to the pursuit of knowledge and divergent conceptions of truth, where truth is uncertain and elusive. This is not a new phenomenon. Thomas Rid traces a distinct upswing in information operations to the early Cold War years where two common understandings of truth emerged and hardened in opposition to each other.[16]

The first, analytical and apolitical truth, was based on shared norms and beliefs. Accordingly, the traditional intelligence process focused on the pursuit and acquisition of data in the hope that if enough data were acquired, truth will be found. To operate in this world, military personnel prepared for conventional force-on-force warfare in a sterile, positivist environment based on ostensibly objective facts and neat dichotomies of red forces opposite blue forces.[17]

This warfighting paradigm rewards deductive inferences and the acquisition of data. For instance, if one believes adversary forces are congregated at a certain location, aerial reconnaissance may be sent to observe it. Then a military commander may draw the conclusion that the adversary is or is not present. Imagery analysis can prove the fact that the adversary is there through physical, three-dimensional pictures. Of course, adversarial denial and deception techniques can obscure truth and cognitive factors such as the bias of the imagery analyst are still prevalent.

Still, a pervasive belief exists in military operations that the truth is objective and is supported by facts, data, and observation. In certain contexts, that is accurate. Yet in other contexts where truth is contested, that way of thinking is insufficient because there is also another truth.

Rid describes the second form of truth as ideological, emotional, and aligned with beliefs and values.[18] "The goal of disinformation is to engineer division by putting emotion over analysis."[19] The problem with expecting the military to compete in information warfare is

15. Julian E. Barnes and Helene Cooper, "U.S. Battles Putin by Disclosing His Next Possible Move," *New York Times*, February 12, 2022, https://www.nytimes.com.

16. Thomas Rid, *Active Measures: The Secret History of Disinformation and Political Warfare* (New York: Farrar, Straus and Giroux, 2020).

17. Micah Zenko, "Millennium Challenge: The Real Story of a Corrupted Military Exercise and Its Legacy," War on the Rocks, November 5, 2015, https://warontherocks.com/.

18. Rid, *Active Measures.*

19. Rid, *Active Measures*, 426.

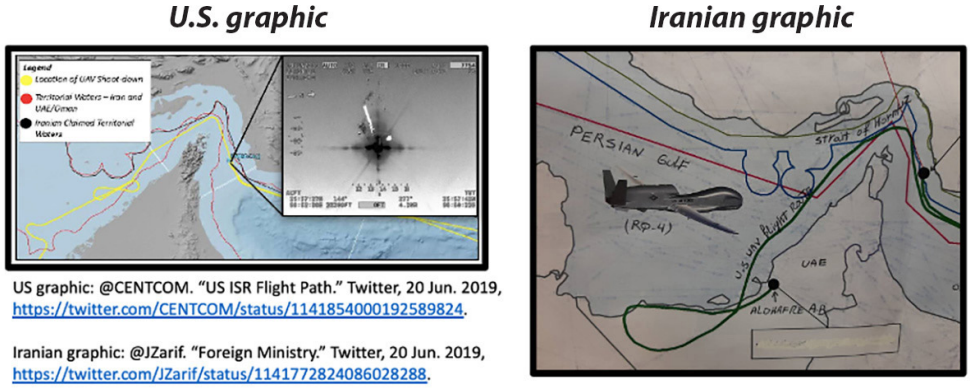
that conventional militaries train for and want to operate in an environment that puts analysis and facts over emotions and beliefs. In information operations, truth is constructed, context dependent, and relative based on an audience's preexisting belief structures.

Information operations must be more than accurate, they must be persuasive. This is because two understandings of truth exist, and while military personnel must be conversant in both to win militarily, maintain legitimacy, and retain public trust, most military members tend to be better at thinking in only one realm of truth.

Therefore, cognitive biases and challenges with training, digital literacy, security, and epistemology combine to create barriers to success in information warfare. The Department of Defense requires a new force-packaging concept that can overcome these obstacles. Combatant commanders need individuals who, in the information space, revel in the ambiguity of operations and can maneuver inside of the opponent's decision-making timeline. A team of individuals who can rapidly understand and contextualize the environment and communicate effectively to decision makers may form part of the solution.

## Force Packaging

In June 2019, after Iran shot down a coalition unmanned aircraft in international waters, US Air Forces Central (AFCENT) responded to a conventional adversary with conventional weapons, including the F-22A Raptor's first deployment to Qatar. Iran followed the shootdown with a state-sponsored propaganda campaign designed to generate confusion and distrust of American intentions. A review of Iranian state-sponsored social media operations shows the goal of their information activities is to influence regional players' perceptions of the United States. Both Iran and America provided competing visual evidence for their arguments (fig. 1).[20]




US graphic: @CENTCOM. "US ISR Flight Path." Twitter, 20 Jun. 2019, https://twitter.com/CENTCOM/status/1141854000192589824.

Iranian graphic: @JZarif. "Foreign Ministry." Twitter, 20 Jun. 2019, https://twitter.com/JZarif/status/1141772824086028288.

**Figure 1. US and Iranian graphics related to Iranian shootdown of unmanned aircraft in June 2019**

20. Seth G. Jones and Danika Newlee, *The United States' Soft War with Iran* (Washington DC: Center for Strategic and International Studies, 2019), https://www.csis.org/.

The speed with which US fighter jets, aircrew, and support personnel arrived to support US Central Command's F-22 request was impressive and demonstrated a key strength of the US Air Force to deploy conventional forces globally on short notice. But one lesson became clear in the weeks following the shootdown. United States information efforts did not adequately convince observers of Iranian intransigence.

Sensing this information failure, US Secretary of State Mike Pompeo accused the Iranian government of "sowing pure and blatant disinformation." He called the Iranian drawing "childlike" and concluded, "we need to make sure that every news outlet, everyone who is observing this, understands what's true and what the Iranian regime wants you to believe."[21] The United States was engaged in a fight for truth, something much less tangible than achieving airspace presence.

Recall that one of the primary objectives of disinformation is to privilege emotion over objective analysis. It is a weapon of the weak, especially for those adversaries that lack liberal democratic institutions. "For liberal democracies in particular, disinformation represents a double threat: being at the receiving end of active measures will undermine democratic institutions—and giving in to the temptation to design and deploy them will have the same result. It is impossible to excel at disinformation and democracy at the same time."[22] Therefore, it is time to think about the means of warfare as more than military equipment. Additionally, the Defense Department must consider how to employ counterdisinformation capabilities in accordance with core principles of liberal democratic governance.

The US Air Force excels at delivering supplies to coalition forces with mobility assets, finding adversaries with ISR sensors, and employing precision weapons. Yet warfighting requirements are changing with respect to new domains of competition. Military commanders should expand their inquiry beyond what traditional forces can be applied to an adversary. They must also ask what cognitive forces are needed to gain and maintain information advantages. The answers to such questions will allow leaders to manage the volatility of the Information Age, anticipate change, and predict upcoming challenges to military operations.[23]

On one hand, the loss of an unmanned aircraft due to a surface-to-air missile is a tactical issue best addressed in the way conventional forces have typically prepared for combat. At the same time, the strategic problem of the shootdown is how deliberate disinformation from an adversary can feed regional preexisting belief structures of US imperial overstretch. That narrative can play into the affective emotional response of regional Allies and partners. Further, it may have follow-on theater-wide ramifications beyond the initial aircraft loss that influence partners' decisions to allow access, basing, and overflight requests.

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21. Amanda Erickson, "Pompeo Accuses Iran of Spreading 'Blatant Misinformation' on Downing of Drone," *Washington Post*, June 23, 2019, https://www.washingtonpost.com/.

22. Rid, *Active Measures*, 426.

23. Gregory F. Treverton, *Reshaping National Intelligence for an Age of Information* (New York: Cambridge University Press, 2003); and Stephen Gerras et al., *Strategic Leadership Primer* (Carlisle Barracks, PA: US Army War College, 2010), 11.

## Information Fires Team

The following paragraphs outline what combatant commanders require of personnel and a concept of operations to compete in the information domain. The skills described immediately below resemble that of good journalists and, in some cases, it may be possible for all these traits to exist in one person. More likely though, an organization engaged in information warfare will need a group comprised of individuals with these skills—an "information fires" team that acts as an anti-disinformation unit.

Such a team should be a part of the military and diplomatic instruments of power. But in the reality of ongoing military operations, military decision makers tend to feel most comfortable with and have confidence in the military members involved in a mission. This is especially true considering the Joint Force's advocacy of mission command principles that aim to "build teams through mutual trust."[24]

Military personnel would not necessarily perform the tasks outlined below better than a civilian diplomatic unit, but military personnel in combat operations are often thrust into positions where they must counter disinformation in the course of their military responsibilities. Additionally, the established martial mindset focused on targeting and kinetic fires aligns more closely with the military than with the diplomatic skillset. If senior military officers, therefore, find themselves in a position to rebut adversarial disinformation, having the right composition of individuals versed in current and historical geopolitics, metacognition, sense making, and communication should assist them in doing it more effectively.

### *Geopolitics*

First, individuals in an information fires team should have a working understanding of regional history and the present geopolitical context, as the former so often informs the latter. Foreign area officers typically possess such skills and education. These individuals should also be able to think predictively. Too often, military members conducting combat operations focus on tactical events, or as some have termed it, "descriptive intelligence," which attempts to explain what just happened.[25] Fewer can describe why it happened. Fewer still offer a judgment regarding what will happen next. Those that do prognosticate do so without consequence—rarely can they point to empirical evidence of past predictive forecasting success.[26]

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24. Department of the Air Force, Air Force Doctrine Publication 1: *The Air Force* (Maxwell AFB, AL: Curtis E. LeMay Center for Doctrine Development and Education, March 10, 2021), 2, https://www.doctrine.af.mil/.

25. Ronald D. Garst, "Fundamentals of Intelligence Analysis," in *Intelligence Analysis*, ANA630, vol. 1 (Washington, DC: Joint Military Intelligence College, 2000), 18–28.

26. James M. Davitch and Robert D. Folker Jr., "Operationalizing Air Force Critical Thinking," *Air & Space Power Journal* 31, no. 4 (Winter 2017).

Therefore, a robust knowledge of the geopolitical situation is critical for thinking about the future. Proving one's predictive bona fides through rigorous testing and evaluation is ideal. The Intelligence Advanced Research Projects Activity's "Good Judgment Project" showed how this type of program can produce impressive results.[27] A significant body of scholarship backs up the utility of using forecasting competitions, and more investment in this area across the Department is crucial.[28]

## *Metacognition*

Second, individuals should be versed in metacognitive tools and theory. History has shown some of the most consequential military events hinged on how much our unconscious biases have influenced our decisions.[29] The military therefore requires those who understand not only what common cognitive biases to which they are personally most prone, but also the biases that may affect decision makers in their chain of command.

And because the enemy gets a vote, team members should also offer prescriptions informed by historical and geopolitical understanding to explain an adversary's potential thinking and possible reactions. This is especially critical with respect to coercion theory and deterrence operations. The dominant variable in structuring adversary incentives is the enemy's perception.[30] Too often, US deterrence operations forget this point despite Robert Jervis' warning that "what matters in sending a message is not how you would understand it, but how others will understand it."[31]

## *Open Source Information*

Third, the individuals must be able to use information technology to sense-make by harnessing publicly available information. The expensive airborne or space-based sensors the United States used during the Cold War to gather information were and are important for certain needs. But today information flows freely through social media and other digital platforms.

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27. Philip E. Tetlock and Dan Gardner, *Superforecasting: The Art and Science of Prediction* (New York: Random House, 2016).

28. See Barbara Mellers et al., "Psychological Strategies for Winning a Geopolitical Forecasting Tournament," *Psychological Science* 25, no. 5 (2014); Philip Tetlock et al., "Forecasting Tournaments: Tools for Increasing Transparency and Improving the Quality of Debate," *Current Directions in Psychological Science* 23, no. 4 (2014); Tetlock, Mellers, and J. Peter Scoblic, "Bringing Probability Judgments into Policy Debates via Forecasting Tournaments" *Science* 355, no. 6324 (2017); and Welton Chang et al., "Developing Expert Political Judgment: The Impact of Training and Practice on Judgmental Accuracy in Geopolitical Forecasting Tournaments," *Judgment & Decision Making* 11, no. 5 (2016).

29. Daniel Kahneman and Jonathan Renshon, "Why Hawks Win," *Foreign Policy* (2007).

30. Tami Davis Biddle "Coercion Theory: A Basic Introduction for Practitioners," *Texas National Security Review* 3, no. 2 (Spring 2020).

31. Robert Jervis, *Perception and Misperception in International Politics*, new ed. (Princeton, NJ: Princeton University Press, 2017) 187.

Ralph Clem has plead repeatedly for the intelligence agencies to begin to give greater credence to information available in the public domain. He cites not only the ubiquity of valuable information but the technical sophistication of the exploitation tools available to citizens or public corporation.[32] In today's information environment, America risks losing the fleeting opportunities to seize the narrative if its military fails to use this readily available data source to characterize the environment.[33]

## *Communication*

Fourth, the individual must be able to communicate clearly a picture that is truthful, accurate, and understandable to multiple audiences. Many military members are proficient at explaining a combat situation to other military personnel. Few have the skill to illustrate it in such a way that it, at once, provides deterrent value to an adversary and explanatory value for the public.

This skill set gets to the crux of the dilemma of military operations below the threshold of open conventional conflict. The right individuals possess the written and verbal faculties to reassure friends and family at home that America and her coalition allies' actions are justified while at the same time warn enemies their belligerence will not go unnoticed or unanswered.

Communication skills in the information environment will benefit from personnel that have a wide breadth of experiences, reflecting the reality of geopolitical challenges the military faces. For instance, the White House's *Interim National Security Strategy* clearly articulates how the characteristics of US Indo-Pacific Command's peer competitor challenges in East Asia vary considerably from the instability US European Command faces along Russia's near abroad. Versatility will be key and breadth will be more valuable than depth.

Yale historian John Lewis Gaddis, employing the Greek poet Archilochus's fox and hedgehog analogy, shows that individuals who possess a broad knowledge base (foxes) may be superior at operating across multiple problem sets. Gaddis argues nimble foxes are more comfortable in complex environments. (While Gaddis's assessment of the meaning of the analogy is not necessarily universally embraced, the proposal that breadth is more valuable than depth, especially in this context where communication is important, has merit.)[34]

This view of foxes contrasts with hedgehogs who possess only one area of narrow expertise. From the perspective of active duty members in defense intelligence, a broad rather than narrow knowledge base is much more beneficial, because it results in a more cogni-

32. Ralph S. Clem, "MH17 Three Years Later: What Have We Learned?," War on the Rocks, July 18, 2017), https://warontherocks.com/.

33. James M. Davitch, "Open Sources for the Information Age: Or How I Learned to Stop Worrying and Love Unclassified Data," *Joint Force Quarterly* 87 (2017).

34. John Lewis Gaddis, *On Grand Strategy* (New York: Penguin Books, 2019); and James M. Davitch et al., "Lead, Think, and Communicate: Embracing Air Force Intelligence Officer Agility and Versatility," Over the Horizon, June 6, 2018, https://othjournal.com/.

tively versatile and agile military professional.[35] In the information fight, it is likely versatile foxes will be more useful when communicating information to multiple audiences.

## *Risk Management*

Lastly, the individuals involved in this information fires team must accomplish these tasks balancing urgency, operational security, and accuracy. In this fight for public opinion, the strictures of operational security are and will be in tension with the need to rapidly control the narrative. While combatant commands may desire to move swiftly and gain the first-mover advantage, individuals indoctrinated in a culture of secrecy will be hesitant because their muscle memory will act contrary to the need for speed.

There is no simple answer to this problem other than both sides of the dilemma accepting risk. Commanders who want to "go fast" must reassure those under them that the risk falls on the commander when information is released. And those producing the information must find the most advantageous way possible to provide information, primarily from publicly available sources.

In his book *Active Measures*, Thomas Rid considers the history of Cold War information campaigns on both sides of the East/West divide and concludes it took a special kind of operator to excel in a disinformation environment.[36] That individual is something of a nonconformist, someone with a mind that works unconventionally. He or she enjoys exploring contradictions. They do not become frustrated by the lack of measurable success, as information warfare does not lend itself to typical metrics the military uses to assess effectiveness.

Finding individuals with these traits via current Department of Defense personnel systems would be difficult. Finding one person with all the traits would be harder still. Nevertheless, emerging software tools like the Air Force's "MyVector" are promising and provide more talent management utility than ever before. Military personnel agencies could assist the talent management search by studying, and possibly rewriting, the entries in their accessions guidance.

Current career field management teams should relook at their accessions guidance and determine if they may too strongly favor undergraduate science, technology, engineering, and math (STEM) degrees. The trade-off—that the career field might forfeit officers who are more technically minded—is acceptable because nontechnical degrees may be able to contribute more than commonly thought to building leaders with critical thinking skills.[37]

For example, the Air Force Officer Classification Directive uses a matrix to designate various tiers that outline which academic degrees the career fields value. Currently

35. Davitch, "Agility and Versatility."
36. Rid, *Active Measures*.
37. Davitch and Folker, "Critical Thinking."

only 1 of 37 Air Force officer career fields listed denote those with cultural studies degrees as a tier-1 accessions target. Most of the desired degrees are STEM related.

As an aviation-centric military service, this is entirely appropriate. But one result from this relative deemphasis on cultural literacy is that for certain assignments, the Air Force must rely on individuals who attend midcareer foreign area training and may not have an academic grounding in social sciences. If the US military decides that cultural fluency is worth having as a small part of its information-operations approach, then slight modifications to its accessions targets could result in important changes to the types of personnel available for information fires teams.

## A Concept of Operations

Once individuals with the correct skill sets have been identified and the in-garrison and deployed billets have been coded correctly, the information fires team needs a concept of operations. Fortunately, the kinetic targeting process that exists today provides just such a concept and only requires slight adjustments for information warfare. In short, we have done this before.

The goal of deliberate targeting is to ensure that the destruction of a target meets the commander's intent while adhering to the laws of war and rules of engagement. Targets nominated for kinetic and nonkinetic effects move through a validation process.

Deliberate targeting efforts follow a general pattern called the Joint targeting cycle, which is a framework consisting of six steps: (1) end state and commander's objectives; (2) target development and prioritization; (3) capabilities analysis; (4) commander's decision and force assignment; (5) mission planning and force execution; and (6) target assessment.[38] It is important to stress here that the Joint targeting cycle is a framework upon which information fires teams can build. Indeed, there are instances where the targeting cycle does not align with information warfare requirements.

First, due to the fluid nature of the information environment, a checklist-style method for employing information effects would be detrimental. Second, and this is true for many traditional targeting operations as well, targeting cycle steps can and often do happen concurrently. Ultimately, information fires teams should use it as a guide to synchronize their efforts in line with the commander's larger scheme of operations. Information fires must act in concert with, rather than independent of, combatant commander strategic guidance. Effective information fires modeled on the Joint targeting cycle will lead to the effective employment in the information warfare fight.

An information fires team will have the greatest ability to contribute within the competition-below-armed-conflict environment, whereby "two or more actors in the international system have incompatible interests but neither seeks to escalate to armed conflict."[39] It is here that the possibility for misperception and inadvertent escalation is

38. Currently access is limited to *Joint Targeting*, JP 3-60, the document containing the Joint targeting cycle.
39. CJCS, *Joint Operations*, JP 3-0 (Washington, DC: CJCS, October 22, 2018), https://www.jcs.mil.

the highest. Accordingly, using information fires in the grey zone will allow commanders to gain an advantage in the informational domain, put an adversary at an informational disadvantage, and help prevent conflict escalation while returning the geopolitical situation to a status quo condition.

## Situating an Information Fires Team

An information fires team must be placed at the right level of warfare to contribute timely and effectively in support of a Joint Force commander. An argument can be made that it should reside at the strategic level because the team would receive combatant commander-level guidance in support of combatant command priorities. Yet if the team's purpose is to support the goals of the Joint Force commander, a combatant command-level organization could be in a position of serving two masters—the combatant commander and the Joint Force commander, if they are separate individuals.

At the other end of the spectrum, a tactical-level information fires team could adopt a small-unit-style operations tempo, like a fighter squadron, and respond at the pace of unit-level operations. But an information fires team at the tactical level could become too divorced from theater commanders' operational-level schemes of maneuver.

The most effective level of implementation, then, is operations, and the right unit for an information fires team is the Air & Space Operations Center (AOC). These centers already execute the Joint targeting process—the information fires team could operate easily within current targeting procedures. Additionally, Joint forces are already present in AOCs, notably US Army battlefield coordination detachments. Certain AOCs have already implemented "nonkinetic" targeting teams that could be modified for the purposes outlined in this article.[40] This model could be replicated at AOCs throughout the world.

Information fires teams should work within the AOC construct in support of theater component commanders. The US Air Force Air Combat Command should implement this concept, because information fires teams can assist in shaping the Air Force contributions in support of theater commander priorities. Such narrative building is, and will continue to be, vital to sustaining friendly coalitions. Additionally, these narratives will assist in weakening adversary narratives in competitions short of war.

## Conclusion

The Air Force can lead the US defense enterprise as it uses truth to shed light on falsehood and proclaim the righteousness of the principles it fights for. Presenting the truth with forthright conviction and in a timely manner can help gain the first-mover advantage in the information space and deny it to adversaries. Doing so will allow those

40. Jeffrey C. Crivellaro, *Combined Arms in the Electro-Magnetic Spectrum: Integrating Non-Kinetic Operations* (Fort Leavenworth, KS: Army School of Advanced Military Studies, May 23, 2013).

engaged in the profession of arms to maintain public support, foundational to preserving technological advantages. Military professionals will remain vital to the defense of the United States by gaining and maintaining the moral high ground. Force packaging teams of individuals with the cognitive skills identified above will allow the United States and its coalition partners to win in the information contests of the future and gain an edge over their adversaries.

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ARTICLE

# Taking the Brakes off Uniformed Scientists and Engineers

Brian J. Fry

Policies intended to develop and utilize uniformed scientists and engineers are often misapplied and impede effective employment. Uniformed scientists and engineers are uniquely suited to link technical possibilities to operational realities; developing these capabilities will help uniformed scientists and engineers maximize their contributions to the acquisition community and to the combat power of the Air Force.

Acquisition management is vital to the future Air Force, but restricting uniformed scientists and engineers (S&Es) to that singular function blunts their potential contributions. This approach is not the consequence of some unexpected demand but an institutionalized misinterpretation of S&Es' roles and abilities. This article examines how S&Es are being developed and utilized today, identifies the bureaucratic restrictions placed upon them, and describes how to posture S&Es to maximize their contributions and the combat power of the Air Force. (Of note: "S&Es" refers only to active duty military officer S&Es.)

The Air Force has untapped science and engineering capabilities within its S&Es.[1] Their advanced education opportunities depreciate and their hard-won technical skills atrophy in duties that do not utilize these skills. Today's S&Es see minimal opportunity for future use of their skills within the Air Force but a plethora outside the service. They exercise more leadership and responsibility as captains in career-broadening assignments than they do in assignments at the ranks of major and lieutenant colonel.

## Motivation

The optimal function of S&Es is to exploit "technology by linking technical possibilities to operational realities faster than an adversary."[2] This is a distinct role for which

1. George M. Williams, "An Analysis of the Problems Encountered by the United States Air Force in the Motivation and Retention of Military Scientists and Engineers" (master's thesis, George Washington University, February 1965), 63–71; James M. Thomas, *Retention of Scientists and Engineers in the Air Force: A Modified Model for Interpreting Correlates of Career Intent*, AFHRL-TR-70-27 (Lackland AFB, TX: Air Force Human Resources Laboratory, Air Force Systems Command, June 1970), 11–13, https://apps.dtic.mil/; Robert H. Cohn, *Scientist and Engineer Career Patterns for Air Force Civilians and Officers*, AU/ACSC/029/1999-04 (Maxwell AFB, AL: Air Command and Staff College [ACSC], April 1999), 34, https://apps.dtic.mil/; and Montgomery C. Hughson, "The Future Role of the USAF Technical Officer" (Maxwell AFB, AL: ACSC, April 2000), 5–6, 28, 32, https://apps.dtic.mil/.

2. Brian J. Fry, "Mobilizing Uniformed Scientists and Engineers," *Air & Space Power Journal* 35, no. 2 (Fall 2021): 70, https://www.airuniversity.af.edu/.

S&Es are ideally suited and one that has proven indispensable in the Air Force's past peer conflict (World War II) and competition (Cold War). To fulfill this role, an S&E must possess three attributes: 1) be technically proficient, 2) be operationally relevant, and 3) be able to lead others in identifying, maturing, and fielding new technologies.[3] By developing S&Es with these attributes, the Air Force will adapt to technological changes faster than a peer adversary.

Outwardly, the Air Force seems to develop its S&Es accordingly: The service sponsors graduate degrees in science and engineering; it offers operational broadening tours to S&Es; and the established career path for S&Es includes command positions up to colonel. Yet despite many initiatives available to develop S&Es in line with their optimal role, those initiatives are often misapplied, if at all, or exist in opposition to other initiatives. The result is a narrow or unclear S&E career identity.

While S&Es' overarching role of exploiting technology may be accepted already, its implementation has been interpreted as S&Es are expected to be "smart buyers."[4] In other words, they use their technical knowledge to ensure the Air Force buys appropriate technology. This expectation is enshrined in a career and assignment structure designed to use S&Es (and acquisition managers) in service of purchasing technology solutions.

This article envisions a role that infuses S&Es throughout operations rather than being limited to acquisitions environments. Given this broader role, S&Es will not only be smarter buyers, but they will also be able to satisfy technology needs and exploit opportunities sooner, better align technology development to operational needs, and develop future technical leaders more deliberately.

## Historical Context

From the 1970s to the early 1990s, S&Es frequently utilized their technical skills as their primary function and were valued for those skills. A cursory survey of the S&E senior leaders commissioned and cultivated during this era show a large portion earned graduate degrees early in their career. Many had a string of technical assignments, and many held technical leadership positions early in their careers.[5]

Following the Cold War, the Department of Defense and the Air Force began a series of acquisition reforms from the mid-1990s through the early 2000s. One approach in particular, Total System Performance Responsibility, asserted that much of the government involvement in system development was nonvalue-added, and efficiencies could be

3. Fry, "Scientists and Engineers," 72.

4. William F. Ballhaus et al., "Science and Technology and the Air Force Vision: Achieving a More Effective S&T Program" (Washington, DC: US Air Force Scientific Advisory Board, May 2001), 8, https://apps.dtic.mil/.

5. "Major General Paul D. Nielsen," US Air Force (USAF) (website), August 2004, https://www.af.mil/; "Lieutenant General Ted F. Bowlds," USAF (website), August 2011, https://www.af.mil/; "General Ellen M. Pawlikowski," USAF (website), June 2015, https://www.af.mil/; and "Major General William N. McCasland," USAF (website), April 2013, https://www.af.mil/.

gained by transferring some government functions to the contractor (especially engineering functions).[6] Rather than provide program oversight, the assumption was the government could write sufficient requirements, establish metrics, reward or punish as needed, and simply maintain "insight" through program execution.[7]

Discussing the merits of this approach is beyond the scope of this article, but its impact is important: organic technical experience was gutted from Air Force acquisitions. Under Total System Performance Responsibility, this expertise was only necessary for writing requirements and metrics, and the initiative was used to justify downsizing the acquisition workforce with scientific and engineering expertise absorbing the brunt of the reductions.[8] Within Air Force Materiel Command from 1994 to 2005, the number of S&E authorizations dropped 48 percent; for comparison, the total Air Force officer authorizations decreased only 10 percent.[9]

In response, S&Es began a shift from technical functions to acquisition management or left the service. A retention bonus was briefly offered to S&Es from 2003 to 2005; however, the bonus has been authorized but unfunded since that time.[10] In addition, during the 2006–2008 reduction-in-force/force-shaping initiative, acquisition managers were retained at rates above the nonrated officer average, while S&Es' retention rates were at or below the average.[11]

From 1994 to 2020, Air Force active-duty-officer end strength decreased 21 percent.[12] In comparison during that period, scientists decreased 26 percent, engineers decreased 22 percent, while acquisition managers increased 42 percent.[13] These factors reinforce the notion that acquisition management and not technical skills are preferred by the Air Force. Moreover, this preference for acquisition management influences the development and employment of S&Es and instills an uncertainty in the role and value of S&Es.

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6. National Research Council (NRC), *Owning the Technical Baseline for Acquisition Programs in the U.S. Air Force: A Workshop Report* (Washington, DC: The National Academies Press, 2015), 6, https://doi.org/.

7. Henry P. Pandes, "A Quest for Efficiencies: Total System Performance Responsibility," AU/ACSC/094/2001-04 (Maxwell AFB, AL: ACSC, April 2001), 5–10, https://apps.dtic.mil/.

8. NRC, *Technical Baseline*, 6–7.

9. NRC, *Examination of the U.S. Air Force's Science, Technology, Engineering, and Mathematics (STEM) Workforce Needs in the Future and Its Strategy to Meet Those Needs* (Washington, DC: The National Academies Press, 2010), 159–160, https://doi.org/.

10. *Department of Defense Appropriations for 2003: Hearings before the Subcommittee of the Committee on Appropriations*, 107th Cong., 2nd sess. (2002), 731, https://www.govinfo.gov/; and A. J. Bosker, "Scientists, Engineers Vital to Air Force Mission," *Air Force Print News*, April 1, 2003.

11. Courtney Knoth, "Air Force STEM Health" (Washington, DC: Air Force Studies and Analyses, Assessments and Lessons Learned, May 16, 2012), 33–37.

12. Defense Manpower Data Center, "DoD Personnel, Workforce Reports & Publications," accessed January 4, 2022, FY1994 Data, https://dwp.dmdc.osd.mil/; and FY2020 Data, https://dwp.dmdc.osd.mil/.

13. Christopher A. Wyckoff, "The Slippery Slope of Air Force Downsizing: A Strategy Connection" (Maxwell AFB, AL: Air War College, February 14, 2013), 31, https://apps.dtic.mil/; and Air Force Interactive Demographic Analysis System, FY 2005–20 datasets.

## Building Technical Proficiency

### *Current Practices*

The development of S&Es is determined by their inclusion within the acquisition career group, which includes six utilization fields: scientists, engineers, acquisition managers, contracting officers, and finance officers, with senior materiel leader-upper echelon for certain colonel positions.[14] This article focuses on the first three fields. Although the senior materiel leader-upper echelon field uses aspects of the other five fields, its qualifications and scope of responsibilities most closely match that of acquisition managers, so this article treats them as the same field.[15] Acquisition managers are responsible for managing acquisition programs and may possess any undergraduate degree. Only about 20 percent of new acquisition manager accessions possess a science/engineering degree.[16]

In contrast, all S&Es possess at least a technical baccalaureate degree, yet they face several obstacles to further developing and practicing their technical skills. The nature of military service—different assignments, duties, locations, and so forth—inhibits most S&Es from achieving the technical specialization and longevity on subjects like government civilians and contractors. This makes S&Es less desirable to participate in (or lead) technical projects, pushing S&Es into administrative and acquisition management duties. This push is further reinforced by reduced representation of S&Es but increased representation of acquisition manager authorizations at higher ranks (fig. 1).

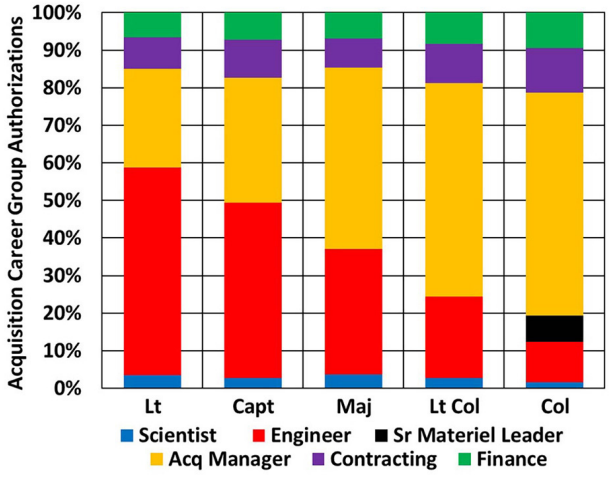


**Figure 1. Composition of the acquisition career group by rank (adapted from Air Force Personnel Center, Data Reports and Retrieval Branch, September 2020 manpower file)**

14. Headquarters Air Force Personnel Center (HQ AFPC), "Air Force Officer Classification Directory (AFOCD)," April 30, 2020, 207–26.

15. HQ AFPC, AFOCD, 208–26.

16. HQ AFPC, AFOCD, 267–69.

An S&E with a career goal of promotion to colonel will likely deduce their opportunities are greater in an acquisition manager position, with its ancillary technical prerequisite. Collectively, these conditions produce an organizational disincentive for S&Es to invest in deeper technical skills.

Scientists, engineers, and acquisition managers all attend the same initial skills training—a 14-day course focused almost entirely on the acquisition infrastructure and administering contracts.[17] Some coursework includes test and evaluation, but the focus of the course is on test planning and administration not execution. Using science and engineering to support operations and intelligence activities is left entirely to on-the-job training despite the officer classification guide specifically including these activities as a part of S&E duties.[18]

Throughout their careers, S&Es are required to obtain acquisition certifications, such as program management, science and technology management, and engineering management.[19] But as with initial skills training, the certification requirements are primarily focused on program management and contract administration with little supplementary technical training; the educational requirements for certifications, including the highest certifications (Level III), are a technical baccalaureate degree.[20] By receiving identical training to acquisition managers focused almost completely on contract management with minimal supplementary technical or operational connection, S&Es are trained to buy things in peacetime not exploit technology in wartime.

Like acquisition manager careers, assignments for S&Es sample the system life cycle (laboratory, center, depot) to allow them to observe the cradle-to-grave system progression. While a life-cycle pathway may be useful for acquisition managers to experience the various contract arrangements at each stage, this arrangement contains little to no technical connective tissue. Even if S&Es are placed in technical positions, any technical knowledge they gain in one assignment may be, and often is, superfluous in their next assignment.

The intent may be to develop technology generalists, but because of frequent moves, the current pathway makes S&Es technical spectators instead of participants. Yet the latter element is essential to developing the deep knowledge necessary to rapidly link technical options to operational applications. This lack of subject-matter depth diminishes the appeal of assigning S&Es to lead technical efforts. They are instead steered toward worker-bee tasks, acquisition management, and administrative duties where technical skills are less essential.

The assignment process for S&Es further limits their technical contributions. These officers are usually assigned to positions based first on what is open, then career field (just

17. Air Force Institute of Technology School of Systems and Logistics, "FAM 104: Air Force Fundamentals of Acquisition Management," n.d., accessed January 13, 2021, https://www.afit.edu/.

18. HQ AFPC, AFOCD, 209–12.

19. Defense Acquisition University (DAU), "DAWIA Certification & Core Plus Development Guides," accessed January 13, 2021, https://icatalog.dau.edu/.

20. DAU, "DAWIA Certification."

the broad category, for example, "physicist"), followed by rank, the position's fill priority, and lastly specialization (for example "laser and optics") and desires.

Although an S&E's specialty is considered somewhere in that process, a best-fit position may mean little after passing through all the other filters. One officer, upon graduating with a PhD in astrophysics, could have applied for 11 available physicist positions, but only one position included any mention of "space" and that was only a part of the position's scope. The Air Force has many applications for an astrophysics PhD, but unless those positions are open when an officer is available for a new assignment, the fact is irrelevant.[21]

By limiting assignments to open slots only and placing technical specialty at the bottom of precedence, double-billeting is treated as a greater sin than squandering technical expertise. S&E expertise and positions are generally treated as homogenous; this Industrial-Age practice regards people as interchangeable parts and variations from the standard as superfluous.[22]

While earning a master's degree is considered a criterion for promotion to the field-grade ranks (approximately 22,000 officers), the Air Force regards additional graduate education as an extravagance: only 402 field-grade authorizations require a doctoral degree and only 285 require a PhD in a science, technology, engineering, and math (STEM) field.[23]

Additionally, a substantial portion of these doctoral authorizations are faculty positions; just 74 of those field-grade STEM PhDs reside within Air Force Materiel Command. A STEM PhD signifies the recipient has expanded the frontiers of science or engineering. But only 3 percent of acquisition colonel positions require STEM PhD degrees, decidedly insufficient in Information-Age warfare where a networked variety of experts is essential to swiftly adapting to change.[24]

In recent years an Air Force PhD management office was created, but its efforts have been directed toward better identifying and utilizing existing PhD expertise, and it has not shifted the Air Force's view on the value of an expanded PhD cadre. For the last five years, yearly PhD quotas available to scientists and engineers were about 9 (3 percent of the total career field) and 21 (less than 1 percent of the total career field), respectively.[25]

While not every S&E needs a PhD, the requirement is likely underresourced and underrated, especially considering almost half of those quotas were for faculty positions, not operations-, intelligence-, or acquisitions-sponsored slots. Furthermore, graduate

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21. Neil deGrasse Tyson and Avis Lang, *Accessory to War: The Unspoken Alliance between Astrophysics and the Military* (New York: W. W. Norton & Company, September 11, 2018).

22. James M. Dubik and Gordon R. Sullivan, *War in the Information Age* (Fort Belvoir, VA: US Army War College Press, 1994), 8, https://press.armywarcollege.edu/.

23. Air Force Personnel Center/Data Reports and Retrieval Branch, "MPW Manpower File" (September 2020).

24. Dubik and Sullivan, *Information Age*, 12.

25. HQ AFPC, "2017 Advanced Academic Degree (AAD) and Special Experience Exchange Duties (SPEED) Selection Process Guide," June 28, 2016, 24–34; HQ AFPC, "2018 AAD and SPEED Selection Process Guide," April 10, 2017, 10–17; HQ AFPC, "2019 AAD and SPEED Selection Process Guide," April 4, 2018, 13–19; and HQ AFPC, "2020 AAD and SPEED Selection Process Guide," April 25, 2019, 13–22.

education is not considered "in-specialty" for S&Es. This means an S&E assigned to a full-time science or engineering graduate program is not regarded as performing S&E duties while an S&E on a headquarters staff is. As a consequence, up to four and a half years (18 months for a master's degree plus three years for a PhD) of Air Force-sponsored graduate education yields no experience credit toward being considered a senior- or master-level S&E in the Air Force.

Additionally, most S&Es have two options for graduate school: principally the Air Force Institute of Technology (AFIT) and sometimes the Naval Postgraduate School (AFIT holds 79 percent of advanced academic degree slots for S&Es).[26] Although an outstanding institution, the Air Force's policy of preferential AFIT attendance is detrimental. The practice of discouraging civilian institution attendance to mandating AFIT attendance is based on a perceived cost savings or yielding a thesis/dissertation topic that is more overtly military in focus.

Neither reason is valid: numerous civilian institutions offer tuition waivers applicable to military students, and AFIT's curriculum is centered around topics with known military applications. By relaxing the Air Force's predilection for AFIT graduate school attendance, its PhD cadre will avoid group-think, gain opportunities for interaction and collaboration with some of the leading experts in emerging technologies, and expand the diversity of experience available to solve the Air Force's problems.

## *Recommendations*

The development of S&Es should begin with an initial skills training that covers the acquisition infrastructure and the operations, logistics, and intelligence infrastructures these officers will be expected to support. If S&Es are to be a technical-operational link, this training will begin to forge that connection. These officers should practice conducting operational and developmental tests not just planning them. They should receive instruction in performing "field" and "hasty" tests they may need to conduct in deployed locations without the benefit of formal test facilities.

Also, new S&Es should receive instruction in wargaming techniques; as S&Es develop new technology, they must understand how best to employ it and wargaming will give them a means to explore that. This training would be the foundation giving S&Es the tools they need to connect the theoretical technical knowledge of their degree programs with the practical technical knowledge they will use in an operational context.

To continue to hone technical skills after initial skills training, S&E assignments should prioritize technical cohesion. These assignments should be made to the genuine best-fit position based on an S&E's expertise and development rather than choosing the best-available position at a set point in time. This can be accomplished by expanding the traditional six-month assignment window to two years and varying tour length more. The service should encourage and capitalize on the variety of specialized S&Es.

26. HQ AFPC, "2021 AAD and SPEED Selection Process Guide," April 1, 2020, iv–ix.

In the long term, more S&E careers should be subject-matter oriented rather than life-cycle oriented. For example, a space-focused scientist would attain a graduate degree(s) in astrophysics and serve in a range of assignments including at a space operations squadron, the Air Force Research Laboratory Space Vehicles Directorate, the Space Systems Command, and the National Reconnaissance Office. Each assignment would allow the S&E to expand and apply their technical specialty in new ways instead of shelving their acquired knowledge in subsequent assignments.

The Air Force cannot overestimate the volume of knowledge that can be brought to bear either for or against it; a master's degree is no longer sufficient. Graduate education is absolutely an example of "S&E duties." Rather than focusing on a discipline's foundational knowledge, a PhD program is a supervised endeavor that extends the bounds of what is currently understood or possible within a discipline. This is a skill essential to the growth and progress of the scientific and engineering disciplines and is an imperative to ensure technological overmatch of an adversary. The intent behind creating uniformed PhDs is to develop the research independence to create this overmatch, integrate (not duplicate) the government civilian and contractor expertise during wartime and enable S&Es to assume a relationship as a collaborator.

## Developing Operational Relevance

### *Current Practices*

Like opportunities for building technical skills, avenues for S&Es to gain operational experience are also limited. Most science and engineering organizations are not colocated with their mission-related operational units (flight test units are a notable exception), requiring S&Es to travel to their technology's eventual customers. This obstructed shared experience between operations and technical development can impair the quality and timeliness of acquired technology.

A career-broadening tour that cross-trains S&Es into operational career fields is one avenue to gain first-hand operational experience and includes two options: operational experience (OPEX, first assignment for new second lieutenants) and special experience exchange duties (SPEED, usually for captains).[27] But OPEX assignments are almost entirely filled by acquisition managers. Few S&Es are in OPEX tours; this was not always the case, but it is the current practice.

Excluding S&Es from the program reflects a priority on infusing the latest science and engineering practices into the acquisition community and the view the Air Force must get its money's worth from new S&Es, since many of them are Air Force Reserve Officer Training Corps scholarship or Air Force Academy graduates. As a result, more than 15

27. HQ AFPC, "2021," 16–23.

percent of new acquisition managers are in some operational assignment, while less than 4 percent of new S&Es participate in such assignments.[28]

While S&Es can apply for SPEED later in their career, positions are limited by the operational career field and competition within the acquisition career group: just under 10 percent of acquisition manager captains serve in operational assignments while less than 4 percent of S&E captains attend.[29] Expecting S&Es to field operationally-relevant technology without the benefit of first-hand operational experiences is a tenuous proposition.

Technical deployments are another source of operational experience for S&Es that has been barely employed. Most deployments available to S&Es are noncareer-field-specific deployments and do not utilize technical skills.[30] The supposition governing S&E deployments is that new technology will be employed like the F-22 (i.e., full operational capability then combat) rather than JSTARS (i.e., combat with prototypes).[31]

## *Recommendations*

With S&Es composing roughly half of new accessions into the acquisition career group, their near-absence from operational assignments is an obvious basis for adjustment. One option would be to make an OPEX/SPEED assignment more accessible to S&Es. In providing an operational context for technical know-how, the program certainly gives the Air Force its money's worth in the long run. But care should be taken in deciding OPEX/SPEED participation as acquisition managers benefit from the experience as much as S&Es. Ideally, the program should be expanded rather than simply reallocated.

Ultimately, the number of OPEX/SPEED positions will be limited because of internal requirements within the operations career fields. Given that constraint, a tighter connection between operations, science, and engineering is needed. This deeper connection can be forged by assigning S&Es directly to operational organizations, either individually or in units. On an individual basis, operationally trained S&Es would have duties that are a mixture of operations and science and engineering, analogous to the existing pilot-physician program, influential in finally solving the F-22 hypoxia problems. The OPEX/SPEED programs could serve as the gateway for an S&E-operations pipeline.[32]

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28. Air Force IDEAS, September 2020 dataset.

29. Air Force IDEAS, September 2020 dataset.

30. Derek W. Beck, "An Analysis of Retention Issues of Scientists, Engineers, and Program Managers in the U.S. Air Force" (master's thesis, Massachusetts Institute of Technology, February 2005), 46, https://dspace.mit.edu/.

31. David Hopper, "F-22s at Langley Receive FOC Status," Air Combat Command Public Affairs, December 12, 2007, https://www.af.mil/; Brian Everstine, "F-22's Role, Impact in Inherent Resolve Increasing," *Air Force Times*, February 12, 2015, https://www.airforcetimes.com/; and Lori Tagg, "JSTARS Plays Critical Role in Operation Desert Storm," US Army Public Affairs, January 16, 2015, https://www.army.mil/.

32. Jay Flottmann, "The USAF Pilot-Physician Program," *Go Flight Medicine*, January 27, 2015, https://goflightmedicine.com/.

In unit-size teams, S&Es would be attached to operational wings or deltas. The existing AFWERX Spark Cells were formed to create pathways between operational units and "experts from industry, academia, and the government" for innovation and new technologies."[33] But these cells are staffed by part-time or additional duty personnel whose expertise is not science, engineering, or acquisitions. Assigning S&Es directly to operational units (e.g., via Spark Cells) would allow them to leverage their technical expertise and proximity to operations to deliver technology directly to the end user.

This arrangement might be perceived as removing S&Es from acquisitions, but quite the opposite is true. These officers would still need to understand requirements, choose the best solution, and monitor the quality of the solution delivered—everything a smart buyer is expected to do but in a manner more comparable to the S&Es' wartime role for rapid adaptation. A peer adversary will introduce technological surprises our systems were not prepared for. In theater, S&E teams would enable adapting equipment and reprogramming systems to work through such surprises.

The advantage of this arrangement is that S&Es would be performing technical actions at the operational level, gaining operational experience in the process and bound to the operational impact of their efforts. Because the Spark Cells' interests tend to be local, the technical specialization and infrastructure needs for most problems will be less intensive, allowing S&Es to solve problems using their own technical expertise or by organizing and leading small teams.

This arrangement frees the laboratories and centers to focus on the large-scale, resource-intensive research and acquisition efforts for which they are better configured, leaving these operational cells to focus on the smaller-scale efforts that alleviate friction within operations. The acquisition community will then be better postured to address the entire spectrum of the Air Force's technology needs. These officers would become technology scouts and sherpas more than simply liaisons. They would communicate new concepts to the laboratories and centers in a technical language, emphasizing what is really needed and communicating to operational organizations—in an operational language—what is possible.

This concept is not new. General James Doolittle, while commanding the 8th Air Force during World War II, created the Operational Engineering Section to "assist [in] the solution of minor problems, and to act generally as the intermediate link between the combat units and the established engineering activities of the Material [*sic*] and Service Commands."[34] This unit identified P-38J engine and fuel issues, modified B-24 bombers to improve survivability, and helped develop tactics utilizing a new ground-mapping radar.[35]

More recently, the 99th Reconnaissance Squadron effectively created its own federal laboratory in order to field technology for the squadron after being frustrated with a lack

33. "Spark," AFWERX (website), accessed November 14, 2021, https://afwerx.com/.

34. Benjamin W. Bishop, "Jimmy Doolittle: Cincinnatus of the Air" (dissertation, School of Advanced Air and Space Studies, July 2016), 103, https://apps.dtic.mil/.

35. Bishop, "Jimmy Doolittle," 103–20.

of progress via the traditional acquisition structure.[36] By spring 2019, the laboratory included 81 full-time civilian personnel across 25 career fields, including a technical director with a PhD in engineering (but no S&Es).[37] Adding full-time S&Es to operational units would dramatically increase the units' organic research, test, and acquisition capabilities supporting innovation. Additionally, S&Es could reach back to the laboratories and centers for more specialized knowledge.

Recent S&E deployments can serve as archetypes for expanding S&Es' contributions: the US Special Operations Command Ghost program, the Air Force Research Laboratory Center for Rapid Innovation program, and battalion electronic warfare officers.[38]

In the early years of the Global War on Terrorism, the Army fielded vehicle-mounted jamming equipment to counter remote-controlled roadside bombs. Since the Army's organic electronic warfare expertise had evaporated after the Cold War, Navy and Air Force electronic warfare officers—rated aircrew officers—were attached to Army units to help rebuild that knowledge. Eventually, Air Force S&Es were added since they were deployable and could quickly absorb the technical aspects of the new equipment.

Attached at the battalion and brigade level, they installed and maintained the jammers, trained soldiers in equipment operation, fielded new equipment, and used on-hand resources to adapt to the adversary. Most importantly from an acquisition standpoint, they provided specific, technical feedback on the equipment. Their technical background allowed them to understand why a technical design choice was made and articulate why that choice was not suitable for a particular operational environment. Furthermore, their proximity to operations allowed them to understand the demands on soldiers and to teach soldiers why the equipment required operating in certain ways. These S&Es' contributions had life-saving impacts against a relatively low-tech adversary; against a more advanced adversary, such contributions would be imperative.

## Growing Technical Leaders

### *Current Practices*

The best S&Es should serve as leaders and commanders. Unfortunately, leadership positions for S&Es are few as are opportunities for junior S&Es to develop their leadership skills before reaching those senior leadership positions. Often the only way an S&E

36. Francesca Gino, Jeff Huizinga, and Nicole Keller, "The United States Air Force: 'Chaos' in the 99th Reconnaissance Squadron," Harvard Business School Case 919-047, May 2019, 9, https://www.hbs.edu/.

37. Gino, Huizinga, and Keller, " 'Chaos' " 9–11.

38. Jason Rathje, "RATPAC: How a Network of Junior Acquirers is Changing the Air Force," Acquisition News & Gazette, December 12, 2014, https://www.transform.af.mil/; Whitney Wetsig, "AFRL, AFSOC Launch Palletized Weapons from Cargo Plane," Air Force Research Laboratory (AFRL) Public Affairs, June 5, 2020, https://www.wpafb.af.mil/; and Jacqueline M. Hames, "Electronic Warfare: A New Way of Fighting," US Army Public Affairs, August 21, 2009, https://www.army.mil/.

can attain leadership experience early in their career is in an operational career-broadening assignment: leading in an entirely different career field.

Frequently, junior S&Es are told they must choose between a technical track and a leadership track. This is a false dilemma—the choice is between one focused on technical competence and one focused on contract and acquisition management. The unfortunate reality is that the acquisition management track has most leadership positions at the end of it. Of 231 acquisition command positions theoretically available to lieutenant colonel S&Es, only 34 are coded for engineering and 3 are coded for science; the rest are acquisition management-type positions. At the colonel rank, of 124 positions, only 2 are designated for engineering, and none are designated for science. Although about 18 percent of acquisition colonels possess PhDs, a distinct variation exists between those in noncommand positions and those in command positions and on a presumptive general officer track (fig 2).[39]

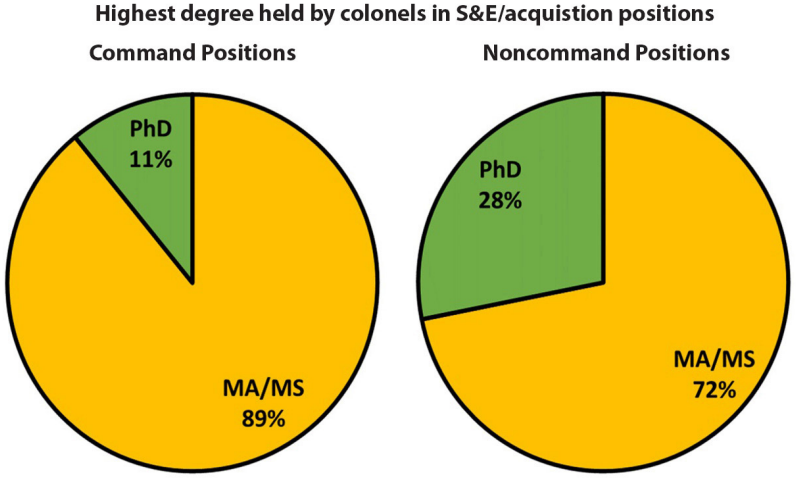


**Figure 2. Comparison of highest educational degree earned by scientist, engineer, and acquisition manager colonels in commander and materiel leader positions and noncommand positions (adapted from Air Force IDEAS October 2020 dataset)**

By forcing this false choice between technical and leadership, those that pursue deeper technical skills (called the subject-matter expert track) have their rank progression capped or leave the service because they see few appealing late-career options. Those that pursue acquisition management—the program management track—to remain competitive for promotions frequently do so by relegating their limited technical skills.

The well-worn remedy for a lack of technical depth in uniformed officers is to pair them with a civilian technical expert. But expecting an officer with limited technical background to fully employ the technical capabilities of their organization is unrealistic. What makes an effective senior technical leader is a robust background in technical

39. Air Force IDEAS, October 2020 dataset.

work—experience built by an S&E choosing, pursuing, and completing their own research and designs and tackling problems of increasing complexity. A properly developed S&E could utilize their civilian counterpart as a decision assistant, collaborator, and peer reviewer rather than as a blind safety net.

This disparity between technical and leadership skills did not exist to this scale in the past. Regardless of how well intentioned or successful Total System Performance Responsibility was, its legacy has steadily driven a wedge between leadership opportunities and those that pursue technical skills. Being a technically-focused officer is entirely compatible with military leadership and command; Generals Doolittle and Lew Allen Jr. are exemplars.[40] The union of a deep technical understanding and its application to operations in a single career specialty is still lacking at the senior military leadership levels.

## *Recommendations*

The term technical track is often mistaken to mean functional track—what is known in the pilot-world as the fly-only track. But that is not what is advocated for here. A true technical track for S&Es engages their technical aptitude and its connection to operations and command decisions, and it empowers senior S&Es to direct and develop junior S&Es toward a technical mission. This bona fide technical track places equal importance on technical acumen, operational savvy, and leading technical efforts to gain advantages over adversaries.

The presence of a technical track need not detract from, nor block access to, an acquisition management track. Acquisition command positions are coded as acquisition management with good reason. Given the number of acquisition authorizations and promotion rates, the acquisition management track has an ample supply of S&Es and acquisition managers. But the existence of a path to senior leadership that prioritizes technical skill, harnessing it in an operational context, and leading others in those efforts would signify the Air Force values those skills and confers a mandate to pursue, advocate for, and employ them. Both the acquisition management and technical tracks need opportunities for S&Es to lead and command.

Creating S&E positions at operational units would be ideal settings for these officers to develop their leadership skills, as would creating units like Kessel Run but applicable to a range of technologies, not just software.[41] Additionally, as S&Es progress through their careers, they will apply their first-hand operational experiences in laboratory and center assignments, infusing an operational perspective from the ground up: a more fruitful alternative to placing operators (likely with limited technical expertise) in command of the

40. Bishop, "Jimmy Doolittle," 297–308; and "General Lew Allen Jr.," US Air Force (website), September 1981, https://www.af.mil/.

41. Lauren C. Williams, "Kessel Run Works through Growing Pains," Defense Systems, September 9, 2020, https://defensesystems.com/; and Mike Benitez, "Bring Back the Air Force Battle Lab," War on the Rocks, May 17, 2021, https://warontherocks.com/.

centers and trying to infuse an operational perspective from the top down. Uniformed scientists and engineers are fully capable of leadership if properly developed and would bring a robust background of technical work and operational insight to their commands.

## Conclusion

Few of the problems and solutions presented in this article are new. For decades, studies and other articles have highlighted S&E issues and advocated remedies, but the Air Force has yet to fully embrace them.[42] With our peer competitors producing STEM PhDs at a rate twice that of the United States, planning to purchase the necessary expertise to maintain a technological lead is not a viable, long-term strategy.[43] With a shrinking technological lead, the Air Force must utilize its S&E personnel more effectively than our adversaries. "Our talent is our competitive advantage," and "people are . . . the reason we [will] prevail."[44]

It would be disingenuous to assert S&Es are not performing technical activities, gaining operational experiences, or leading technical efforts—many are. But the concern is how they are performing those actions and to what end-state. Some S&Es do science or engineering, but only for an assignment or two, frequently without any operational expertise, often without the benefit of an advanced technical degree, and likely in something other than their specialty.

Only a small percentage of S&Es gain operational experiences; the rest need a road trip to an operational unit for a brief spectator education. These officers sometimes lead efforts to field new technologies but only after a career prioritizing contract management skills with the objective of making them into smart buyers. Ironically, this situation provides them less technical experience upon which to base their technical judgments. Rather than creating multiple career paths promoting a range of valuable skills needed to exploit technology in war and all working in concert, the Air Force has promoted a single skill set (i.e., acquisition management) with an amalgamated starting line.

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42. Lincoln R. Thiesmeyer and John E. Burchard, "Combat Scientists" (Boston: Little, Brown, and Co., 1947); J. Douglas Beason, "The Need for Technical Warriors," *Aerospace Power Journal* 14, no. 1 (Spring 2000), https://www.airuniversity.af.edu/; NRC 2012, *Assuring the U.S. Department of Defense a Strong Science, Technology, Engineering, and Mathematics (STEM) Workforce* (Washington, DC: National Academies Press, 2012), 58–59, 96–98, 116–119, https://www.nae.edu/. and Institute for Defense Analyses (IDA) Science and Technology Policy Institute, *Department of Defense Utilization of Military Scientists and Engineers*, IDA Paper P-5082 (Alexandria, VA: IDA, 2014), 27–40, https://www.ida.org/.

43. Katherine Stapleton, "China Now Produces Twice as Many Graduates a Year as the US," *World Economic Forum*, April 13, 2017, https://www.weforum.org/; Zhu Liu and Yong Geng, "Is China Producing Too Many Ph.D.s?" *Nature* 474 (June 22, 2011): 450, https://doi.org/; and *American Institute of Physics China*, "Rapid Rise of China's STEM Workforce Charted by National Science Board Report," January 31, 2018, https://www.aip.org/.

44. AFRL, "Human Capital Strategy 2021–2030," September 24, 2021, 4, https://www.afrl.af.mil/; and US Space Force, "The Guardian Ideal," September 17, 2021, 5, https://media.defense.gov/.

Forcing uniformed S&Es to choose between the extremes of either the functional- or subject-matter expert or program management tracks misses the role for which S&Es are ideally suited: finding and applying technical solutions to operational problems. Driving S&Es into a purely subject-matter-expert track puts them at a handicap in comparison to government civilian or contractor subject-matter experts. These individuals can devote decades to a niche subject, while uniformed S&Es may only get two- to four-year assignments. With limited promotion and effectively no command opportunities, S&Es have little organizational incentive to pursue the subject-matter expert track. In the program management track, S&Es are pulled in opposing directions between their identity as a technical officer and a role where technical skills are subordinate to program management skills.

Above all, S&Es are meant to link technical possibilities to operational realities in wartime faster than an adversary. The following principles and actions are essential to aid S&Es in fulfilling their role:

- S&Es must be trained to exploit technology in wartime against an adversary not simply buy things in peacetime
- the Air Force must foster and capitalize on the variety of S&Es' individual specialties
- the Air Force must offer S&Es a broad range of graduate programs at civilian institutions, in addition to AFIT and Naval Postgraduate School, to supply the service with a variety of expertise, gain opportunities for interaction and collaboration with some of the leading experts in emerging technologies, and expand the diversity of experience available to solve the Air Force's problems
- S&Es need to perform science and engineering—not just watch or manage it
- being a technically-focused officer is entirely compatible with military leadership and command
- both the acquisition management and technical tracks need opportunities for S&Es to lead and command

These recommendations are not a buffet of initiatives but a reset in how the Air Force envisions the role of its S&Es, reorienting a bureaucracy and culture that is failing to deliver technology faster than our adversaries. S&Es can contribute much more to the Air Force's combat power than they currently are, but today's S&E career structure is too restrictive and disaggregated to access their full capabilities.

This article advocates for more than simply relabeling some command positions from acquisition manager to engineer, rewarding STEM graduate degrees at promotion boards, creating a few more S&E generals, or once again funding an S&E bonus. The Air Force must reestablish a capability that proved invaluable in the last peer conflict and subsequent competition but has slowly declined in the decades since.

Extensive science and engineering skills once valued in positions up to the chief of staff of the Air Force, have now been relegated to quality control for what the Air Force

buys. Senior leader pleas for innovation and assertions of the value of STEM are essential but sound hollow to S&Es whose only avenues for innovation are what contract vehicle and type of money they are allowed to use. S&Es can drive the technological change the Air Force needs, but only if their brakes are taken off.

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ARTICLE

# Commercial SATCOM

## A Risk Mitigation Strategy

Jonathan K. Corrado

The US military's dependency on commercial satellite communications technology makes the force vulnerable when systems cannot meet the required operational characteristics for military use of satellite communications. The article presents Department of Defense satellite communication requirements and addresses areas of concern relating to military use of commercial satellite communications systems. Specifically, it analyzes concerns related to protection, control, reliability, interoperability, and access; recognizes the need for commercial satellite communications capacity; and gives a risk analysis with possible solutions to mitigate any potential vulnerabilities due to military use of commercial SATCOMs.

Unpredictability has characterized recent global events. From dynamic, geographically dispersed threats to nontrivial natural disasters, a wide spectrum of incidents occurs rapidly and, in most cases, abruptly, anywhere around Earth. Today's incident-guided reality stimulates a persistent necessity that military and US government users must be poised to deploy anytime, anywhere. To maintain this ready posture, the Department of Defense must have access to hardy, cost-effective, highly agile, and secure satellite communications (SATCOM) in short notice across the full spectrum of engagement.

The US military uses commercial and military SATCOM systems to meet its global communications needs. When a heavy allocation of military satellites is required, DOD leases available commercial SATCOM assets to meet unfilled requests and user needs. The Department also continues to provide beyond-line-of-sight communication capability to the military with commercial-band-only equipment.

Until recently, military satellite capabilities outperformed commercial satellite capabilities.[1] But in the current aggressive and globalized market, commercial satellite capabilities have matured and can now meet many DOD satellite service requirements. The commercial satellite market is rapidly growing to meet increased global demands for services, including fulfilling 40 percent of the Department's SATCOM needs.[2]

According to Northern Sky Research, a telecom industry research firm, The US military's SATCOM requirements will grow by 68 percent in the next decade.[3] This demand surge is due to the reallocation of US forces toward the Asia-Pacific theater, increased naval

1. SES Government Solutions, "MILSATCOM and COMSATCOM—Why They're Better Together," The Government Satellite Report (blog), August 30, 2019, https://ses-gs.com/.

2. Defense Business Board (DBB), *Report to the Secretary of Defense: Taking Advantage of Opportunities for Commercial Satellite Communications Services*, Report FY13-02 (Washington, DC: DBB, 2013), 1, https://dbb.defense.gov/.

3. DBB, *Taking Advantage*, 5.

patrols of critical sea lanes, amplified monitoring of world events, and growing involvement in the war on drugs.[4]

The current DOD SATCOM strategy includes an increased reliance on commercial systems and technology to support the needs of the military and national security agencies. But an assessment of the risks and potential vulnerabilities stemming from this practice indicates the Department's reliance on commercial SATCOM may present unacceptable levels of risk. This analysis will argue the US military's surging dependence on commercial SATCOM will become a vulnerability deriving from the availability, security, and command and control (C2) of commercial SATCOM systems.

This article will outline DOD requirements for commercial SATCOM contracts before addressing potential protection, control, legal, and issues with military use of commercial SATCOM. It will address access, interoperability, and the reliability of commercial SATCOM in a military context and analyze the drivers for US military use of commercial SATCOM, recognizing that military SATCOM systems do not provide the necessary capacity to complete all DOD missions effectively. The article will conclude with a risk assessment and possible mitigations.

## Communication Requirements and Commercial SATCOM

The US military's decision to rely increasingly on commercial contractors to supply and support its SATCOM requirements begins with an assessment of two key issues. First, the DOD's unique requirements for the satellite systems that it contracts and purchases could make identifying a suitable commercial provider challenging. At the same time, the commercial SATCOM sector's growth and development continues to attract government and defense contracts as the field provides options that support the varied demands for technological quality, communication features, and cost-range diversity.[5] Based on this range of features, military planners often view commercial SATCOM options as viable solutions that address military and national security communication requirements.

The Department's specific SATCOM requirements can be divided into three key categories. First, DOD mandates a set of broader-level planning and security-related compliance requirements that it publishes and delivers to private companies that compete for government contracting bids. These policies address the need for satellite systems that adhere to strict design, encryption, and cybersecurity standards.[6] Second, DOD specifications for SATCOM technical and operational features include the mandates that ensure a satellite system's functionality, interoperability within a given network, standardized architecture, and information-sharing capabilities.

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4. DBB, *Taking Advantage*, 5.

5. US General Services Administration, Complex Commercial SATCOM Solutions (CS3), n.d., accessed February 1, 2022, https://www.gsa.gov/.

6. Department of Defense (DOD), *DoD Satellite Communications*, DoD Instruction 8420.02 (Washington, DC: DOD, November 25, 2020), 3, https://www.esd.whs.mil/.

Finally, contracted systems need to adhere to the agency's specific policies for SATCOM operations. According to a report provided by the Joint Chiefs of Staff, this broader category includes two specific requirements. (1) These completed systems require the capacity for being effectively managed through a set of operational and accessible ground controls. (2) The systems should also feature a set of resilient communications infrastructure that can respond to and overcome potential technological challenges or enemy control or disruption attempts.[7] A related requirement in this same context includes a need to efficiently deliver information to selected users to secure the transmission and ensure the timeliness of the messaging.

The Department often seeks to meet these demands by relying on SATCOM systems provided through private commercial contractors. Military reliance on commercial satellite technologies derives from two key motivations. First, the complex and diversified nature of the commercial SATCOM sector enables contracting military agencies to develop highly selective requirements and accept bids from a range of potential providers. Market research related to the field indicates this sector comprises a complex set of competitors, including major firms such as Lockheed Martin and smaller-scale firms that focus on specialized service areas.[8]

By selecting from this group, DOD-affiliated agencies can ensure they can contract with suppliers who will comply with their stated requirements and specifications. Last, this approach also derives from the belief that by contracting with commercial SATCOM providers, defense and security agencies can avoid the risks and costs associated with developing government-specific SATCOM systems.[9]

While the requirements process is well documented and thorough, the reality is that not all commercial systems will meet every DOD requirement—cost-driven business models in the commercial sector are not always aligned with priorities in the security sector. When faced with an option to procure commercially provided bandwidth that may not meet all DOD requirements or be left without the desired capacity of satellite access, the Department must make choices that could result in vulnerabilities to either mission or information.

## Protection, Control, and Legal Issues

Department of Defense-related policies for SATCOM communication also entail considerations related to the variables of protection, C2, and the legality of operating specific systems within a given network. While the Defense Department and nonmilitary intelli-

7. Chairman of the Joint Chiefs of Staff (CJCS), *Department of Defense Satellite Communications*, CJCS Instruction 6350.01F (Washington, DC: CJCS, February 26, 2019), 5, https://www.jcs.mil/.

8. Research and Markets, *Global Communication & Military Satellite Communications (SatCom) Market Forecast to 2028* (Dublin: Research and Markets, December 2019), 4, https://www.researchandmarkets.com/.

9. Rick Lober, "Why the Military Needs Commercial Satellite Technology," Defense One, September 25, 2013, https://www.defenseone.com/.

gence agency affiliates continue to rely on commercial-based SATCOM systems, these actions might potentially create vulnerabilities across these same domains. Based on these assessments, increased agency reliance on commercial SATCOM systems can be viewed as a questionable and counterproductive strategy.

The concept of protection in the context of satellite operations typically includes two primary points of consideration. Fundamentally, military planners address the need to protect their SATCOM systems from any potential physical disruption that can negatively impact performance. According to a report provided by the US Army, the branch's leadership and personnel rely on SATCOM to provide imaging beyond the line of sight that can contribute to planning at the operational, strategic, or tactical levels.[10]

Accordingly, the primary need to protect functional satellites at the physical level would include methodologies to ensure operational integrity. Still, given the unique nature of satellite systems, these risks often represent minimal-level threat variables. In contrast, the risk factors related to an enemy's ability to hack, control, and falsely command these systems coupled with the potential for antagonists within an operational environment to disrupt a SATCOM's potential for seamless communication would represent likely and potentially serious threats.[11]

Since commercial SATCOM companies often rely on more widely used technical designs, enemy forces might possess the knowledge and skillsets needed to hack into the commercial SATCOM systems utilized by US military forces and intelligence agencies.[12] These same trends would thus compound the risks derived from an applied system's physical dimensions and capacities.

The concepts for optimized command and control in the context of applied DOD SATCOM systems include the following variables. First, users and stakeholders must have continuous and uninterrupted access to these systems. System users scattered across vast geographic distances need to have access to the same type of information that they can then apply toward their specific and unique operational goals.[13]

Second, SATCOM systems should feature accessible and resilient terminals that can ensure an authenticated user's ability to manage and communicate with it from their position. A third mandate assumes military leaders and personnel will have access to resilient networks to provide the coverage needed to link a unit to a specific SATCOM system. Fourth, these requirements additionally ensure satellite transmissions can be se-

10. US Army, *Army Field Experiments to Incorporate Commercial Satellite Constellations*, Combat Capabilities Development Command, Command, Control, Communications, Computers, Cyber, Intelligence, Surveillance, and Reconnaissance (CCDC C5ISR) Public Affairs, June 4, 2020, https://www.army.mil/.

11. National Security Telecommunications Advisory Committee (NSTAC), *Report to the President on Commercial Satellite Communications* (Washington, DC: NSTAC, November 2009), ES-2, https://www.cisa.gov/.

12. Tim Brauner, "Four RF Technology Trends You Need to Know for Satellite Communication Device Design," Aerospace & Defense Technology, October 1, 2020, https://www.aerodefensetech.com/.

13. US Space Force (USSF), *Vision for Satellite Communications (SATCOM)* (Washington, DC: USSF, January 23, 2020), 3, https://www.spaceforce.mil/.

cured and safely delivered from and to operational environments that feature varying levels of risk and potential threats.

A final C2-related consideration posits that commanders should have instantaneous and uninterrupted access to requisite data as they develop and revise their plans within an operational setting. The military's continued reliance on commercial-based systems includes the tendency to provide limited forms of bandwidth that can restrict the scope and reliability of SATCOM intelligence.[14]

The primary legal issues deriving from defense- and military-sector reliance on commercial SATCOM technology are related to the jurisdictional channels that govern satellite communications. In brief, military planners seek to ensure their satellites operate within discrete networks that are both segmented from and protected against the data transmitted by competing systems.

This assurance cannot be provided when leasing commercial satellite real estate. The complexity is compounded by the Department's tendency to rely on wide area and local area networks to control US military forces scattered across various geographical sites.[15] Continued reliance on commercial-based systems can create vulnerabilities related to the potential for civilian and enemy-controlled networks to interfere with dedicated US defense and military channels.

This broad look at the potential vulnerabilities associated with protection, command and control, and legal issues with the military use of commercial SATCOM clearly shows the need to accept some risk to mission in DOD contracting of commercial SATCOM systems. The next item of concern is the inability of commercial SATCOM systems to ensure the required capabilities of access, reliability, and interoperability when contracted for US military use.

## Access, Interoperability, and Reliability

An additional set of issues related to the Department's SATCOM policies include system access, interoperability, and reliability. The term access refers to the ability of a network's authenticated users to retrieve, apply, and contribute to the network's stored data. Access in this context aligns with the concept as defined by the confidentiality, integrity, availability triad model for information security.[16] In DOD-related settings, access represents a significant concern for the personnel who operate within theaters that are geographically distant from the United States and who may also be distant from any alternative forms of communication or reliable and secure communications infrastructure.

14. US Army, *Army Field Experiments*.

15. Randall Bland, "Latency: The Other Enemy on the Battlefield," Government Satellite Report (blog), March 11, 2015, https://ses-gs.com/.

16. Debbie Walkowski, "What Is the CIA Triad?," F5 Labs, July 9, 2019, https://www.f5.com/.

For users in these operational environments, a combination of weather, geography, and enemy actor threats could sever operational links between military units and the SATCOM systems that transmit requisite data to their positions. The US military's reliance on commercial constellations exacerbates these risks as many of these systems provide limited types of bandwidth.[17] Data processing latency, or the tendency for satellite systems to lag when delivering data to their users, also represents a risk that can limit access.[18]

Mitigation for access concerns is provided if coverage from a separate, equivalent system is also available to an operator, but this requires different systems to communicate. Interoperability, between various commercial providers and between military satellites and commercial satellites, has been a constant challenge for DOD SATCOM. The Air Force Research Laboratory has recently taken steps to address interoperability concerns between commercial and military satellites by contracting with ViaSat, a satellite communications company, to integrate commercial and government-owned systems into a seamless network.[19]

Looking at commercial SATCOM interoperability specifically, the Department developed a flexible modem interface (FMI) to enable communications between different commercial satellite systems, and it demonstrated the FMI device in 2019 onboard the International Space Station.[20] Having the FMI as a translator between different commercial services enables multiple providers to offer seamless services while protecting their proprietary technology.

With the commercial satellite sector continuing to grow with demand and the Department of Defense espousing a vision of networked commercial and military SATCOM, the interoperability of various commercial systems is the biggest hurdle to clear in enabling commercial SATCOM to meet DOD needs.

Satellite communications reliability can be defined as a system's ability to operate across diverse environments despite the challenges that might impact its operations. Reliability derives from access as it can be impacted by a combination of geographic, weather, enemy, and technological variables.

At one level, DOD reliance on commercial SATCOM might be viewed as a strategy that reduces the potential for the systems being interrupted as the systems are commercial products supported by commercial providers. But commercial SATCOM systems are often not built with defenses against intentional disruption by an enemy actor or hardened against potential wartime environment interference as features like these add additional unit cost,

17. NSTAC, *Report to the President*.

18. Bland, "Latency."

19. Sandra Erwin, "Air Force Enlists ViaSat to Help Integrate Commercial and Military Satellite Networks," Space News, March 15, 2021, https://spacenews.com/.

20. Irene Tzinis, ed., "Demonstrating a Space Communications Universal Translator with NASA," NASA (website), April 1, 2021, https://www.nasa.gov/.

weight, and complexity. These components are not needed for general day-to-day commercial use, which negatively affects its reliability for users on the operational front.

## DOD Commercial SATCOM Reliance

Satellite communications are vital to war-fighter support and sustainability, and the military will need additional capacity and system capability as new dynamic missions evolve, operations grow in new geographical regions, new technologies generate new communications requirements, and the distributed C2 system envisioned in the *JCS Capstone Concept for Joint Operations: Joint Force 2030* moves toward reality.[21]

Despite the potential vulnerabilities and risks presented in this article, a well-documented need for increased capacity of SATCOM systems for US military use exists. Government-developed systems, from cradle to grave, are expensive and provide a level of protection that is not necessary for all military SATCOM applications. The ability for commercial systems to maintain a level of communication and command and control between US forces has been proven, and it is a near certainty that this contracting process will continue.

Several arguments have contributed to the US military's reliance on commercial SATCOM technology. Commercial systems provide a flexible, easy-to-procure, cost-effective option for SATCOM use. Contracting SATCOM services relieves the Department of the research and development burden (i.e., cost), with market competition fueling technological advancements in commercial systems. The military can control cost by relying on tendering processes to select commercial SATCOM providers best qualified to fulfill a contract, taking advantage of market competition.

Further, commercial system performance and security are quickly advancing with an increased focus on cybersecurity in the commercial sector, which better aligns with DOD requirements. Finally, contracting out SATCOM services hinges on the belief that commercial contractors represent the most capable agents of delivering quality SATCOM systems while also adhering to scheduling and budgeting requirements. In contrast, government-developed programs have historically faced a cumbersome acquisition and employment process that leads forces to be more reactive than proactive in securing necessary communications paths.[22] All of these factors combined make military use of commercial SATCOM appealing.

These arguments, however, often do not address the challenges and risks that can derive from the Department's overreliance on commercial platforms. Primarily, protecting information transmitted via SATCOM should be of utmost concern. If the US military can contract a commercial SATCOM service, that same service (or system specification) may be available to US adversaries, creating an inherent vulnerability. While not all mili-

21. DBB, *Taking Advantage*, 1.

22. Rebecca Cowen-Hirsch, "A Path to an Integrated DoD Satellite Architecture via Commercial SATCOM as a Service," Via Satellite, February 13, 2020, https://www.satellitetoday.com/.

tary data passed via SATCOM needs an increased level of protection (e.g., Armed Forces Network), any SATCOM system's capability for military use should be at the top of any requirements list.

Additionally, reliability and access-related risks are amplified by requiring US military forces to rely on a complex set of competing SATCOM systems. The complexities deriving from these conditions also create C2-related challenges as military commanders and personnel attempt to rely on systems that can be impacted by disruptions generated through interoperability-related concerns. The Department could address these challenges by reducing the number of commercial SATCOM systems contracted for military use. Focusing DOD contract spending on a small number of commercial variants with dedicated security sector platforms is one mitigation of this issue.

## Risk Management

Given the potential risks that derive from the military's reliance on commercial SATCOM technologies to address its communication-related needs, the Department should address these risks in its current approach while further mitigating the risks with both policy and technology. An optimal approach would include the military's ability to generate the benefits from commercial SATCOM while protecting its users from the continued risks associated with an overdependency on commercial SATCOM.

In the near term, the Department of Defense could mitigate interoperability concerns and reduce overhead costs by reducing the number of commercial providers selected for tendering contracts. A recent decision by the US Army's executive leadership illustrated how this approach might represent a viable solution.[23] In a first-of-a-kind contract, the branch awarded a single-award blanket purchase to Peraton, a commercial SATCOM provider, to coordinate communications services for DOD operators in the US Africa Command operating region leveraging satellites and technologies across multiple commercial operators. The Army justified this approach by contending it would limit many of the risk factors related to systems access and interoperability.

While a singular network would reduce interoperability challenges, accessibility and reliability concerns remain. Having a dedicated commercial operations center to connect users to resources and address any challenges could ensure the users have relatively uninterrupted communications without tying up DOD satellite operations resources. As this is a new procurement model, potential challenges are unknown, but it appears to be a step in the right direction for reducing the number of commercial SATCOM contracts while continuing to provide access.

As a long-term option to more completely mitigate the risks for critical SATCOM, the Department and other intelligence and national security agencies should continue to field dedicated satellite systems to provide critical and protected communications to

23. "Peraton Awarded $219M Contract to Provide Satellite Communications to AFRICOM," Peraton News & Insights, March 3, 2020, https://www.peraton.com/.

authorized users. At the same time, they should leverage commercial SATCOM as primarily a surge capacity for noncritical communications such as entertainment and personal communications.

But as the delineation of critical and noncritical traffic versus military or commercial SATCOM use is not always clear, the use of commercial systems as a backup for critical traffic could also be employed to increase the overall probability of mission success. Such a move would provide redundancy, improve access, and increase the complexity of the problem from an adversary's perspective, providing security in depth.

Continuing to field government-owned satellite systems and focusing on channeling critical communications through DOD SATCOM can significantly mitigate the risks associated with commercial systems and reduce commercial satellite platforms' security and reliability requirements. With the new US Space Force acquisition model for future satellite systems, the Department could mitigate risks related to costs by leveraging recent commercial satellite advancements and commercial-off-the-shelf components where appropriate while continuing to draw from DOD in-house developments to keep the system protected by its singularity.[24] This solution would improve the variables of system access, interoperability, reliability, and security by ensuring all DOD-affiliated networks rely on the same satellite systems as they exchange and utilize the same data.

## Conclusion

As time goes on, the military's use of commercial SATCOM increasingly plays a more pronounced role in the military SATCOM architecture as the DOD looks to manage its resources more efficiently. With today's fiscally constrained environment of military budgets and decreased spending, defense planners are giving substantial consideration to commercial SATCOM, but risks lay in the balance.

The background and arguments presented in this article show the military's surging dependence on commercial SATCOM presents access, protection, and C2 vulnerabilities in myriad areas for operational US forces. Assured military communications relying heavily on SATCOM systems in a wartime environment will enable US battlefield success. The needed increase in SATCOM capacity has driven the Department to contract satellite usage from commercial providers. While the requirements are well defined, the commercial sector has its drivers (in cost and performance) that may not align with strict DOD requirements.

Historically, the military research and development machine has maintained the US military's technological edge. Reliance on commercial SATCOM systems will shift this responsibility outside of DOD lifelines, although not completely as the Department retains some in-house SATCOM systems. While commercial satellite communications are a viable solution for some high-data-rate transfer of noncritical information, the military

24. J. R. Wilson, "How Military Harvests Technology from Commercial Industry," *Military & Aerospace Electronics*, October 1, 2016, https://www.militaryaerospace.com/.

must be conscious that this increased SATCOM capacity is vulnerable and could be cut off at any time.

The US military need for SATCOM capacity beyond what military systems can provide is the main driver of its use of commercial satellite communications systems. The near-term cost benefits for almost on-demand satellite access for forces at the tactical and operational levels have greatly increased the communications capacity of the US military.

While the vulnerabilities highlighted in this article are stark and troubling, diligent system assignment and continued focus on protecting both military- and commercially developed satellite communications systems will lead to assured SATCOM use for US military forces. Management of all satellite communications systems within the Department of Defense will help mitigate the risks and vulnerabilities presented by the military use of commercial SATCOM systems.

Specifically, the consolidation of SATCOM management roles and responsibilities to the US Space Force should help spearhead and address these concerns. Continued focus on the management of the space domain can address some of the concerns presented here. Still, it is also clear the satellite communications field will need American ingenuity to maintain a competitive technological edge for assured access and protection.

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COMMENTARY

# One Team, One Fight

## The Department of the Air and Space Forces

Raj Agrawal and Aaron Brooks

The Department of the Air Force should be renamed the Department of the Air and Space Forces, signaling a coequal status between the leads for the air and space military domains. As part of this effort, key structures under the US Space Force and the US Air Force should be realigned to fall under the Secretary of the Air Force.

In 1996, US Air Force Chief of Staff General Ronald R. Fogleman articulated a vision of "transitioning from an *air* force into an *air and space* force on an evolutionary path to a *space and air* force."[1] Although the US Air Force never fully realized Fogleman's dream, the Department of the Air Force (DAF) still can.[2] While the Department retains legacy air force characteristics, such as a title that does not reflect its congressional space mandate, it can accelerate its evolution into an *air and space forces* department through two deliberate actions:

(1) Rename the DAF as the Department of the Air and Space Forces (DASF) to accurately reflect its statutory responsibility for the air and space domains, deliberately communicating the Air and Space Forces' coequal status as domain lead services within the Joint Force.

(2) Optimize DAF internal structures by realigning joint Air and Space Forces organizations from the US Air Force and US Space Force to the Office of the Secretary of the Air Force (SAF), ensuring a continued unity of effort and establishing unity of command.

## Background

Although originating as Air Force Space Command, the US Space Force required independence as only a dedicated service can properly support and advocate for spacepower within the Joint Force. *Spacepower: Doctrine for Space Forces* identifies terrestrial forces (land, naval, and air) as defined by attributes such as transit time, range, and endurance. Conversely, access windows, revisit rates, and mission lifespan govern space forces.[3]

The designation of the Space Force as the principal service for military operations in, from, and to the space domain signals the increasing importance of space to national se-

1. Ronald R. Fogleman and Sheila E. Widnall, *Global Engagement: A Vision for the 21st Century Air Force* (Washington, DC: US Air Force, November 1996) 9.

2. A version of this article appeared in the December 2021 issue of Space Force Journal.

3. John W. Raymond, *Spacepower: Doctrine for Space Forces*, Space Capstone Publication (Washington, DC: US Space Force (USSF), August 2020), 3–10.

curity.[4] For example, rapidly expanding space commerce, like commerce in any other domain, ultimately requires a security guarantee.[5]

Traditionally operating beneath geostationary orbit, military operations in the cislunar and deep space regions appear increasingly likely.[6] The Space Force may support orbital rescue and planetary defense missions alongside the National Aeronautics and Space Administration (NASA), while senior Space Force leaders have publicly stated Guardians may perform military human spaceflight missions within 20 years. Planetary defense operations include near-Earth object detection and the potential defense of Earth from catastrophic impact by natural objects such as asteroids.[7]

Although the nature of air and space as distinct domains make independent services desirable, they remain intimately linked. Secretary of the Air Force Frank Kendall stated, only the "Air and Space Forces have the ability to control the high ground . . . can project power on short notice to anywhere that it is needed . . . have the ability to confront and defeat aggression immediately, wherever it occurs . . . [and] have the ability to come to the aid of our global Allies and partners with little or no notice wherever aggression occurs."[8]

The Air and Space Forces share a common operating border—the air domain ends and the space domain begins at the point atmospheric effects become negligible.[9] This differentiates the DAF's Air and Space Forces from the Naval service, consisting of the US Navy and US Marine Corps under the Department of the Navy, and the US Coast Guard under the Department of Homeland Security. While the Air and Space Forces primarily operate in two different domains, the Naval service, including its land and air arms, predominantly operate in the maritime domain, encompassing the seas, coastal land regions, and adjoining airspace.[10]

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4. Office of the Secretary of Defense (OSD), *Functions of the Defense Department and Its Major Components,* Department of Defense Directive (DoDD) 5100.01 (Washington, DC: OSD, September 17, 2020), 38, https://www.esd.whs.mil/.

5. Peter Garretson, "Opinion: The First Duty of a Space Force Is to Protect Space Commerce," *Politico*, June 21, 2019, https://www.politico.com/.

6. M. J. Holzinger, C. C. Chow, and P. Garretson, *A Primer on Cislunar Space*, Air Force Research Laboratory (AFRL) 2021-1271 (Dayton, OH: AFRL, May 5, 2021).

7. Abraham Mahshie, "SpOC Commander Sees Spacefaring Guardians in Future," *Air Force Magazine*, July 23, 2021, https://www.airforcemag.com/.

8. Frank Kendall, "VIDEO: Kendall on the State of the Forces at AFA's Air, Space & Cyber '21," *Air Force Magazine* (website), September 23, 2021, https://www.airforcemag.com/.

9. Chairman of the Joint Chiefs of Staff (CJCS), *Joint Air Operations*, Joint Publication (JP) 3-30 (Washington, DC: CJCS, September 17, 2021), I-1, https://www.jcs.mil/; and CJCS, *Space Operations*, JP 3-14 (Washington, DC: CJCS, October 26, 2020), vii, https://www.jcs.mil/.

10. CJCS, *Joint Maritime Operations*, JP 3-32 (Washington, DC: CJCS, September 20, 2021), x, https://irp.fas.org/; and Kenneth J. Braithwaite, *Advantage at Sea: Prevailing with Integrated All-Domain Naval Power* (Washington, DC: Department of the Navy, December 2020), 1.

## The Time Has Come

A name establishes the first and perhaps one of the most significant impressions of an organization's roles and missions. For 72 years, the DAF's name accurately reflected the US Air Force as the sole service with primary responsibility for the air domain. But it is now incomplete with the establishment and necessary normalization of the US Space Force as a coequal service and space as a national security domain.

Some may attempt to justify keeping space out of the DAF's title by highlighting that the Department of the Navy's name excludes the Marine Corps. While the Space Force and Marine Corps are smaller services within their respective military departments, the Marine Corps serves as an extension of the Navy's fleets and supports the maritime fight. Marine Commandant David Berger wrote, "the luxury of presumptive maritime superiority deluded us into thinking the Navy existed to support Marine operations ashore. That era was a historic anomaly, and we need to refocus on how we will fulfill our mandate to support the Fleet."[11]

Conversely, the Space Force was not made independent to predominantly serve as a space corps supporting atmospheric Air Force operations. Instead, the Space Force serves as the Department of Defense's principal space domain service and as an equal partner to the Air Force in its role as the principal air domain service.[12] The Department of the Air Force should not constrain itself to a precedent set by a different military department under a different set of circumstances.

Moreover, the Department of the Air Force is the only military department with a domain reflected in its title—one that no longer encapsulates its full range of activities as defined by law.[13] The last time the DAF had an opportunity to change its name to embrace space was in 1981, when Congressman Ken Kramer recognized the advancing Soviet space threat required a new focus. Kramer introduced House Resolution 5130, the *Aerospace Force Act* that would have renamed the department and service to the Department of the Aerospace Force and US Aerospace Force and granted Title 10 authorities for space operations—something that only recently occurred with the Space Force's establishment.

At the hearing, Kramer testified that

> the suggestion of a name change is to stimulate thinking about the fact that our Air Force ought to be involved in both air and space in coequal roles, that too much emphasis to date has been placed on air and not enough emphasis on space. If we had an Aerospace Force as opposed to an Air Force, implicit in that name would be a recognition of the importance of space as another theater.[14]

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11. David H. Berger, *Commandant's Planning Guidance* (Washington, DC: US Marine Corps, July 2019), 2–5, https://www.hqmc.marines.mil/.

12. OSD, DoDD 5100.01, 38.

13. US Code (USC), USSF, "10 USC Ch. 908: The Space Force," https://uscode.house.gov/.

14. *Hearing on H.R. 5130 Aerospace Force Act before the Investigations Subcommittee of the Committee on Armed Services House of Representatives*, 97th Cong. 2nd Sess. (May 19, 1982) (9) (Statement of Congress-

In his written statement, Kramer observed that when the Air Force became independent in 1947, it only operated in the air domain. As it had now expanded into space, a name change was a logical "reflection of the new balance between air-mass and space operations."[15] He also noted such a change mirrored civilian practice with aircraft manufacturers becoming aerospace corporations during the previous two decades.

Despite earning the endorsement of General James E. Hill, former commander of North American Air Defense Command and US Air Force Aerospace Defense Command, the Department of the Air Force opposed the bill: "a name change as proposed implies that space is a coequal partner with air in Air Force operations. This implication is clearly misleading . . . and might imply that the Air Force should devote less time to its other critical needs in air operations. Such an implication is untrue and militarily self-defeating."[16]

The DAF's point of opposition in 1981 provides a benchmark to measure the relative justification for renaming today with a simple question: is space a coequal partner with air in the department? Fortunately, the department itself has already provided the answer, stating in a 2020 report to Congress that it is "one department with two coequal services and service chiefs," justifying a name that accurately reflects its composition and purpose.[17]

Kramer's assessed impact of a name change holds true today. First, such a change would stimulate thinking within the department that it should be involved in both air and space in co-equal roles rather than an air-centric department with a smaller, supporting space corps. Second, a name change would communicate to domestic and international audiences alike that the space domain is increasingly important to the United States government.

The armed forces have a long history of modifying major organizations' names to communicate an addition of roles and responsibilities or to highlight a new focus. In 1947, the Department of War, which oversaw the US Army and the semi-independent US Army Air Forces, was renamed the Department of the Army. This change occurred as the Department of the Air Force separated from the War Department, and the National Military Establishment, the predecessor to the Department of Defense, was created.[18] A more recent example occurred in 2018 when the US Pacific Command was renamed the US Indo-Pacific Command. This change was not made to reflect an addition to the com-

man Ken Kramer).

15. Kramer, *Hearing on H.R. 5130*.

16. *Hearing on H.R. 5130 Aerospace Force Act before the Investigations Subcommittee of the Committee on Armed Services House of Representatives*, 97th Cong. 2nd Sess. (May 19, 1982) (36) (Statement of Edward C. Aldridge Jr., Under Secretary of the Air Force), https://books.google.com/.

17. Sandra Erwin, "U.S. Space Force Organizational Plan Delivered to Congress," SpaceNews, February 3, 2020, https://spacenews.com/.

18. Steven L. Rearden, *History of the Office of the Secretary of Defense: The Formative Years 1947–1950* (Washington, DC: OSD, 1984), 34.

mand's area of responsibility but to strategically communicate the growing geopolitical importance of the Indian Ocean region.[19]

The civil air and space community also has a tradition of renaming to reflect an addition of space roles. In 1958 following the launch of Sputnik, the National Advisory Committee for Aeronautics (NACA) transformed from an *aeronautics* to a *space and aeronautics* agency, becoming the National Aeronautics and Space Administration.[20] Similarly in 1966, the Smithsonian National Air Museum's space collection grew so Congress determined it be renamed the National Air and Space Museum to communicate its true composition properly.[21]

## Air and Space or Aerospace

Two options could replace *air force* in departmental context: *aerospace* or *air and space*. In everyday usage, *aerospace* is often considered a synonym for *air and space*; however, its military origin and definition have deeply problematic implications for the space community. The Air Force invented the term *aerospace* in the late 1950s to stake a claim to space by declaring "air and space are not two separate media to be divided by a line and to be readily separated into two distinct categories; they are in truth a single indivisible field of operations."[22]

The view of a single aerospace domain, however, was dismissed by NASA, the National Security Council, and the Defense Department at large.[23] Despite widespread rejection, the Air Force was adamant in its belief that "air and space are a continuum—forever. . . . [That] there is space in air and air in space; it's just that the molecules further out are a long way apart."[24]

Aerospace power doctrine was developed by simply rebranding airpower doctrine without regard for the differing political, physical, and operational natures between air and space. But starting with Air Force Chief of Staff General Merrill A. McPeak in 1992, the aerospace construct was gradually replaced by an acknowledgment within the Air Force that air and space were distinct domains.[25] His successor, Fogleman, completely replaced *aerospace* with *air and space* in Air Force basic doctrine.[26] Although General

19. Scott Neuman, "In Military Name Change, U.S. Pacific Command Becomes U.S. Indo-Pacific Command," National Public Radio, May 31, 2018, https://www.npr.org/.

20. Jim Wilson, "NASA History Overview," NASA (website), April 2, 2018, https://www.nasa.gov/.

21. "History," Smithsonian National Air and Space Museum (website), https://airandspace.si.edu/.

22. Benjamin S. Lambeth, *Mastering the Ultimate High Ground* (Santa Monica, CA: RAND Corporation, 2003), 40; and John T. Correll, "Air and Space and Aerospace," *Air Force Magazine*, October 2016.

23. Lambeth, *High Ground*, 43–50, 129.

24. Lambeth, *High Ground*, 52.

25. Peter Hays and Karl Mueller, "Going Boldly-Where? Aerospace Integration, the Space Commission, and the Air Force's Vision for Space," *Aerospace Power Journal* 15, no. 1 (Spring 2001), https://www.airuniversity.af.edu/; and Lambeth, *High Ground*, 43–50.

26. Correll, "Aerospace," *Air Force Magazine*.

Michael E. Ryan, the next chief of staff, led a brief attempt to resurrect aerospace integration, General John P. Jumper put a permanent end to the concept, stating aerospace

> fails to give the proper respect to the culture and to the physical differences that abide between the physical environment of air and the physical environment of space. We need to make sure we respect those differences. I will talk about air and space. I will respect the fact that space is its own culture, that space has its own principles that have to be respected.[27]

US Allies followed the US Air Force's 2001 rejection of the aerospace construct, recognizing air and space as distinct domains. The UK Royal Air Force transitioned from airpower doctrine to air and space power doctrine in 2009, and in 2016, the Royal Canadian Air Force doctrine largely dropped its usage of aerospace.[28] The Royal Australian Air Force underwent a similar transformation almost a decade ago. Its 2013 edition of *AAP 1000-D: The Air Power Manual* states, "early air power theory considered aerospace to be a continuum in the vertical dimension crossing air and space. Contemporary theory considers air and space as two distinctly separate domains; however, airpower and spacepower are related."[29]

Other Allied air forces have begun transitioning to combined air and space forces. In 2020, the French Air Force became the French Air and Space Force to complement the establishment of the French Space Command.[30] Japan has stated its intent by 2023 to rename the Air Self-Defense Force to the Air and Space Self-Defense Force, while the UK Royal Air Force's Chief of the Air Staff has publicly suggested renaming the service the Royal Air and Space Force.[31]

Similarly, the Republic of Korea Air Force chief of staff stated in 2021 that establishing the Republic of Korea Air Force Space Center would help the service "make a leap to become the Space and Air Force."[32] Interestingly, US strategic competitors have instead embraced the concept of aerospace over the past decade. In 2009, the Iranian Islamic Revolutionary Guard Corps Air Force became the Islamic Revolutionary Guard Corps Aerospace

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27. John A. Tirpak, "Challenges ahead for Military Space," *Air Force Magazine*, January 2003, 26, https://www.airforcemag.com/.

28. Dominic Sims, *Putting Space into RAAF Aerospace Power Doctrine* (Royal Australian Air Force Base Edinburgh, Australia: Air Power Development Centre (APDC), 2008), 5–7; Canadian Forces Aerospace Warfare Centre (AWC), *Royal Canadian Air Force Doctrine,* 3rd ed. (Ottawa: AWC, 2016); and Centre for Air Power Studies, *AP 3000: British Air and Space Power Doctrine,* 4th ed. (Shrivenham, Oxfordshire, UK: Royal Air Force, 2009).

29. Geoff Brown, Australian Air Publication (AAP) 1000-D: *The Air Power Manual,* 6th ed. (Canberra, Australia: APDC, September 2013), 2, https://airpower.airforce.gov.au/.

30. Christina Mackenzie, "French Air Force Changes Name as It Looks to the Stars," *Defense News*, September 15, 2020, https://www.defensenews.com/.

31. Yuki Tatsumi and Pamela Kennedy, eds., *Key Challenges in Japan's Defense Policy* (Washington, DC: Stimson, 2020), 46; and Sophy Antrobus, "Imagining the RAF in 2040: The Chief of the Air Staff Speaks from the Future," King's College London (website), January 27, 2021, https://www.kcl.ac.uk/.

32. Park Si-soo, "South Korea's Air Force Opens Space Ops Center," SpaceNews, October 4, 2021, https://spacenews.com/.

Force, and in 2015, the Russian Air Force merged with the Aerospace Defense Troops to form the Russian Aerospace Forces, "prompted by a shift in the center of gravity . . . towards the aerospace sphere," according to Russian Defense Minister Sergey Shoygu.[33]

## Executing Renaming

A transition from the Department of the Air Force to the Department of the Air and Space Forces would be seamless yet send a clear and unequivocal message that the Air Force department has transformed into the Air and Space Forces department. The DAF has a tradition of renaming air organizations when they gain significant space roles—in 1968 Air Defense Command became Aerospace Defense Command, and Fourteenth Air Force became Fourteenth Aerospace Force.[34] More recently, in 2003, the National Air Intelligence Center became the National Air and Space Intelligence Center (NASIC), while Air Force air operations centers were briefly known as air and space operations centers from the mid-2000s until 2014.[35]

Renaming would affect the DAF headquarters elements, Air and Space Forces awards and decorations, and joint Air and Space Forces field organizations that support both services—whether they are situated within the Air Force, Space Force, or the Office of the Secretary of the Air Force. This is not a revolution but rather marks a singular moment in the ongoing evolution of these organizations from air to air and space.

- Department of the Air Force (DAF) → Department of the Air and Space Forces (DASF)
- Secretary of the Air Force (SecAF/SAF) → Secretary of the Air and Space Forces (SecASF/SASF)
- US Air Force Academy (USAFA) → US Air and Space Forces Academy (USASFA/ASFA)
- Air Force Reserve Officer Training Corps (ROTC) → Air and Space Forces ROTC
- Air Force Research Laboratory (AFRL) → Air and Space Forces Research Laboratory (ASFRL)
- Air Force Cross → Air and Space Forces Cross
- Airman's Medal → Airman and Guardian's Medal

The Air and Space Forces should also ensure aerospace and air and space do not describe single-domain or single-service functions. For instance, the Air Force's 2A aerospace main-

33. Defense Intelligence Agency (DIA), *Iran Military Power: Ensuring Regime Survival and Securing Regional Dominance* (Washington DC: GPO, August 2019), 66–67, https://www.dia.mil/; and DIA, *Russia Military Power: Support Great Power Aspirations* (Washington DC: GPO, 2017), 58, https://www.dia.mil/.

34. Air Force Historical Research Agency (AFHRA), "Air Defense Command," January 10, 2008; and AFHRA, "Fourteenth Air Force (Air Forces Strategic) (AFSPC)," March 16, 2010, https://www.afhra.af.mil/.

35. AFHRA, "614 Air Operations Center (AFSPC)," April 7, 2015, https://www.afhra.af.mil/; and AFHRA, "National Air and Space Intelligence Center (ACC)," July 9, 2019, https://www.afhra.af.mil/.

tenance enlisted career fields, including aerospace ground equipment and aerospace propulsion, deal almost exclusively with aircraft.[36] Similarly, NASIC's space functions are being separated into the Space Force's National Space Intelligence Center.[37] These organizations should change their names once space mission responsibility is transferred to the Space Force to distinguish primary roles and avoid unnecessary confusion.

- National Air and Space Intelligence Center (NASIC) → National Air Intelligence Center (NAIC)
- Aerospace Ground Equipment (AGE) → Aviation Ground Equipment (AGE)
- Aerospace Propulsion → Aircraft Propulsion

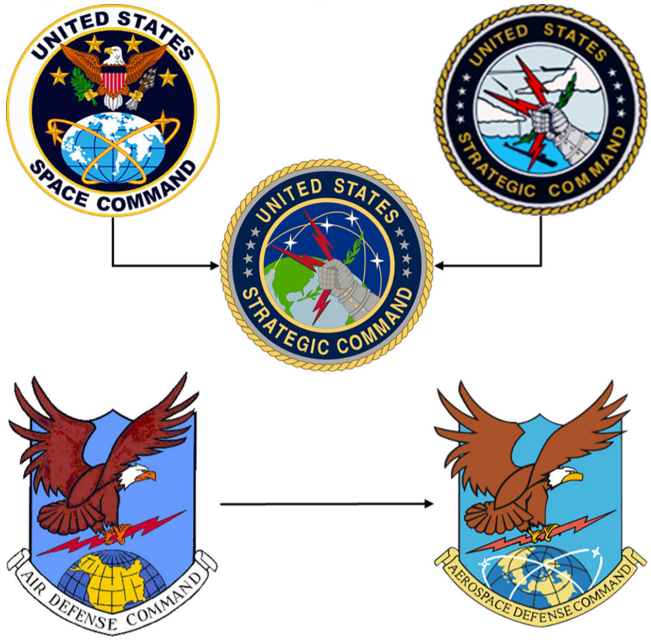


**Figure 1. Incorporation of space heraldry into the new post-2002 US Strategic Command emblem (top) and USAF Aerospace Defense Command emblem (bottom)**

Visual updates to departmental emblems should also complement the name change, fully emphasizing that the organization is one department with two coequal services. This follows the Joint Chiefs of Staff's recent addition of a fifth sword, representing the Space Force, to its identification badge.[38] As shown in fig. 1, such a heraldic change occurred

36. Air Force Personnel Center (AFPC), *Air Force Enlisted Classification Directory: The Official Guide to the Air Force Enlisted Classification Codes* (San Antonio, TX: AFPC, October 31, 2021), 116, 142, 144, https://kansasregents.org/.

37. Kimberly Underwood, "Space Force Prepares to Launch National Space Intelligence Center," *Signal Magazine*, April 27, 2021, https://www.afcea.org/.

38. Jim Garamone, "Redesigned Joint Staff Badge Reflects Addition of Newest Military Service," Defense News, October 4, 2021, https://www.defense.gov/.

before when US Air Force Air Defense Command added two polar orbits with stars representing its space forces to its shield when it became Aerospace Defense Command.

A similar change occurred in 2002 when US Space Command and US Strategic Command merged to form a new and historically distinct US Strategic Command. The new Strategic Command emblem incorporated the gauntlet clenching lightning bolts and an olive branch from the old Strategic Command, which it had, in turn, inherited from the Air Force's Strategic Air Command. The Earth, orbits, and stars were taken from US Space Command to represent its space forces.[39] Similarly, when the French Air Force became the French Air and Space Force, it modified its logo to include the curvature of the Earth, representing an evolution, rather than revolution, in its character.[40]

The Department of the Air Force's seal is ripe for change as it includes significant air symbolism but holds no representation of space.[41] After the path of US Strategic Command, US Air Force Aerospace Defense Command, and the French Air and Space Force, the DAF can preserve the most important elements of its airpower heritage while also incorporating space heraldry. This would serve as an identifiable representation of its transition to the Department of the Air and Space Forces and distinguish the US Air Force from the DAF.

The US Air Force is often represented by the Department of the Air Force seal in military displays and shares the DAF's crest on its flags, creating an inaccurate impression that they are the same entity. Permitting the US Air Force to follow a similar path as the US Space Force in creating its seal and modifying its flags, potentially based on the historic Hap Arnold wings design, will help correct this misconception and further connect Airmen with their heritage.

## Realigning the Structure

Much like its title, the DAF's structure reflects a time when it only consisted of the Air Force. The Space Force has effectively integrated itself into the department, deriving 75 percent of enabling functions from the DAF while its garrison commands are staffed largely by 8,000 Airmen placed under Space Force command.[42] The Space Force has also begun to split space-centric functions from the Air Force, developing plans for a Space War College and Space Command and Staff College.[43] But both the Air and Space

39. "Command Emblem," US Strategic Command (website), December 2021, https://www.stratcom.mil/.

40. Mackenzie, "French Air Force."

41. "United States Air Force Seal," Air Force Historical Support Division (website), n.d., accessed February 14, 2022, https://www.afhistory.af.mil/.

42. Christopher Merian, "US Space Force Establishes New Garrisons," US Space Force Public Affairs (website), July 24, 2020, https://www.buckley.spaceforce.mil/; and "Air Force Materiel Command Takes On Role as Servicing Major Command for Space Force," Air Force Materiel Command Public Affairs, August 4, 2021, https://www.spaceforce.mil/.

43. Underwood, "Space Force Prepares"; and Meredith Roaten, "AFA NEWS: Space Force Revamping Education and Training Courses," *National Defense Magazine*, September 21, 2021, https://www.nationaldefensemagazine.org/.

Forces jointly share two specific mission areas: basic research and development and officer commissioning programs.

The Air Force Research Laboratory (AFRL) leads basic research and development for the Air and Space Forces, reorganizing under a "one lab, two services" construct.[44] This path has been identified as more beneficial than splitting off a separate Space Force Research Laboratory, as both the Air Force and Space Force share a common interest in many of the same basic technologies with artificial intelligence, materials, human performance, and information technology being specifically noted by AFRL leadership.[45] It also mirrors how the Department of the Navy's Office of Naval Research supports both the Navy and Marine Corps.[46]

The US Air Force Academy and Air Force Reserve Officer Training Corps both commission Air and Space Forces second lieutenants. Whether Officer Training School and basic military training should remain joint or split off by service is an open question that is beyond this article's scope.

Having established the world's first Department of Astronautics in 1958, the Air Force Academy has been particularly vocal about also serving as the Space Force Academy, adding a space war-fighting minor and incorporating space into all aspects of the academic education and military training programs.[47] The Naval service also shares the same US Naval Academy and Naval ROTC programs, commissioning Navy ensigns and Marine Corps second lieutenants.[48]

There are benefits to keeping these institutions as joint Air and Space Forces organizations. Academy and ROTC cadets do not typically select their service and specialization until their junior year. Air Force Academy training programs such as the Cadet Space Operations squadron's FalconSAT operations and Davis Airfield's airmanship programs provide Academy and select ROTC cadets with a taste of the operational Air and Space Forces before choosing what could become a life-long career. The Air Force Academy is also creating the Space Force Azimuth officer selection program, further ensuring the right talent gets to the right service.[49] Ultimately, producing space-minded Air Force

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44. Leslie Heck, "AFRL Promotes 'One Lab, Two Services' at Space Symposium," Air Force Research Laboratory Public Affairs, September 9, 2021, https://www.afrl.af.mil/.

45. Shaun Waterman, "Air Force Research Laboratory Will Realign, Not Split," *Air Force Magazine*, August 3, 2020, https://www.airforcemag.com/.

46. "Office of Naval Research Home Page," Office of Naval Research (website), accessed November 9, 2021, https://www.onr.navy.mil/.

47. "World's First Astronautics Department Celebrates 50 Years," Air Force Public Affairs, March 7, 2008, https://www.af.mil/; and Rachel S. Cohen, "Air Force Academy Looks to Become a Place for Space," *Air Force Magazine*, November 25, 2020, https://www.airforcemag.com/.

48. "About," Naval Reserve Officer Training Corps (website), n.d., accessed November 9, 2021, https://www.netc.navy.mil/; and "About USNA," US Naval Academy (website), n.d., accessed November 9, 2021, https://www.usna.edu/.

49. Cohen, "Place for Space."

officers and air-minded Space Force officers builds the foundational joint mindset required to win the future fight.

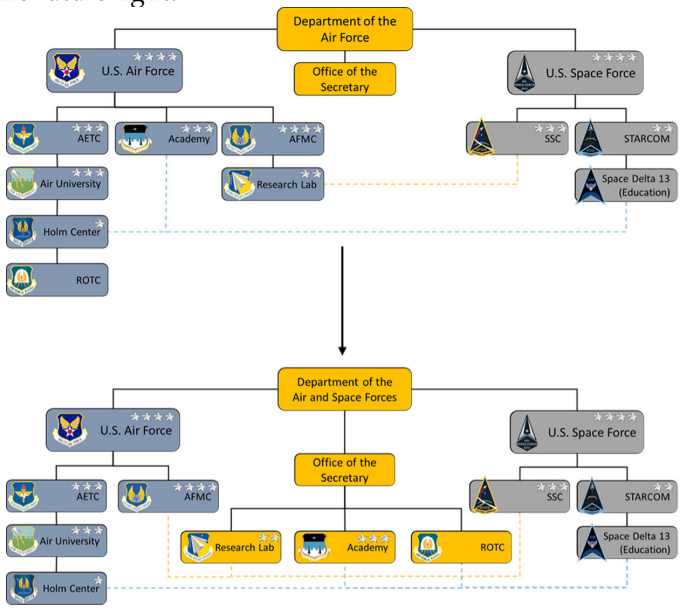


**Figure 2. Current alignment (top) and proposed alignment (bottom) of joint Air and Space Forces functions.**

Note that dashed lines indicate a coordinative relationship between joint and service elements (gold for research and development, blue for officer commissioning).

The natural synergies and air- and space-minded leadership across AFRL, the Academy, and ROTC help ensure a unity of effort between the Air and Space Forces. But as shown in fig. 2, unity of command is fractured as these organizations all reside within the US Air Force. The Air Force Academy is a direct reporting unit to the Chief of Staff of the Air Force, and the Air Force Research Laboratory is one of Air Force Materiel Command's six centers. The ROTC program is part of Air University's Holm Center—itself a component of the larger Air Education and Training Command.[50] The Space Force is represented at the Air Force Research Laboratory through Space Systems Command, and it coordinates with ROTC and the Air Force Academy through Space Training and Readiness Command's Space Delta 13 (Education).[51]

50. "Units," Air Force Materiel Command (website) n.d., accessed November 9, 2021, https://www.afmc.af.mil/; "Holm Center," Air University (website) n.d., accessed November 9, 2021, https://www.airuniversity.af.edu/; and "2021 USAF & USSF Almanac: FOAs, DRUs, and Civil Air Patrol," *Air Force Magazine*, June 30, 2020, https://www.airforcemag.com/.

51. "About Space Systems Command," Space Systems Command (website), n.d., accessed November 9, 2021, https://www.ssc.spaceforce.mil/; and "Space Delta 13 Activates to Lead STARCOM Education and Accessions," Air University Public Affairs, September 14, 2021, https://www.maxwell.af.mil/.

Ultimately, there is a risk that organizations jointly shared by the Air and Space Forces will inherently favor the Air Force so long as they are an integral element of the air service and if focus on space is lost over time.[52] Ensuring this scenario never materializes requires a unity of command outside the traditional Air Force service chain of command. To provide this, the Air Force Academy, ROTC, and AFRL should be realigned from the US Air Force to the Office of the Secretary of the Air Force. Such organizational alignment has already been demonstrated to work, with the Office of Naval Research not situated as a part of the US Navy but instead as a component of the Department of the Navy reporting to the Assistant Secretary of the Navy for Research, Development, and Acquisition.[53]

Similarly, the Department of the Air Force Rapid Capabilities Office is accountable to a joint DAF-Defense Department board of directors that includes the Air Force and Space Force service chiefs.[54] Ultimately, either organizational construct preserves a unity of effort between the Air and Space Forces while ensuring unity of command at the departmental echelon.

## The NASA Model

The Department of the Air Force is not the first organization to undergo a change from an air entity to an air and space entity. It can look to the past for inspiration, taking note of successes and failures. No organization has managed this evolution as well as NASA, the closest civil counterpart to the Department of the Air Force. Like the DAF, NASA began as an exclusively air-focused organization. Established in 1915 as the National Advisory Committee for Aeronautics, the research agency was charged with advancing American aviation in the face of European technological superiority. The agency quickly began cooperating with the Army Air Service, building a relationship that has endured between NASA and the Air and Space Forces to this day.[55]

While NACA's charter did not specifically include a provision for rocketry and space research, it advanced into space regardless, much like the Air Force. Under the leadership of former Air Force General James H. Doolittle, NACA developed a comprehensive aeronautics and space program, including plans for human spaceflight and a worldwide space tracking system.[56] By 1957, a full third of NACA's research was focused on space, making it the obvious choice to reorganize into NASA the following year.[57]

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52. Shaun Waterman, "Space Force 'Very Happy' with Air Force Research Lab Realignment," *Air Force Magazine*, October 27, 2021, https://www.airforcemag.com/.

53. "About ONR," Office of Naval Research (website), n.d., accessed November 9, 2021, https://www.onr.navy.mil/.

54. "Rapid Capabilities Office," US Air Force (website), n.d., accessed November 2020, https://www.af.mil/.

55. Robert E. Bilstein, *Orders of Magnitude: A History of the NACA and NASA, 1915–1990* (Washington, DC: NASA, Office of Management, Scientific and Technical Information Division, 1989), chap. 1, https://history.nasa.gov/.

56. Bilstein, *Orders of Magnitude*, chap. 3.

57. T. A. Heppenheimer, *Countdown: A History of Space Flight* (New York: Wiley, 1999), 156.

Although most famous for its space accomplishments, NASA still maintains a robust aeronautics program and has a dual mandate for space *and* aeronautics research. It led the development of fly-by-wire and winglet technology while also conducting cutting edge flight test programs such as the joint USAF-NASA X-15, the swept-wing X-29, and the XV-15 tiltrotor demonstrator.[58] The agency is developing the X-59 to test quiet supersonic flight, conceptualizing new vertical lift technology, and working to return American astronauts to the Moon.[59] NASA has achieved these successes in air and space through treating each as a distinct domain, organizing and budgeting them as such.[60] The DAF should follow this synergistic model.

## Conclusion

Secretary Kendall has described the Air and Space Forces as "one team" within the DAF, dedicated to "one fight."[61] The Space Force's independence is a necessary evolution, driving the development of military spacepower while permanently ending the scarring legacy aerospace power integration had on Air Force Space Command. But while space forces may operate in a vacuum, the Space Force cannot—especially in an era that Joint All-Domain Operations will define. Being built upon the hard-fought successes of the Air Force and Marine Corps ensures the US Space Force will not require a separate Department of the Space Force.

Instead, it can develop a united front with the Air Force—equal partners in air and space. Evolving into the Department of the Air and Space Forces sends an unequivocal message that the United States places the relative importance of the Space Force and space domain as equal to the Army and land domain, the Naval Service and maritime domain, and the Air Force and air domain. ✈🚀

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58. Bilstein, *Orders of Magnitude*, chaps. 7–8; and "Aeronautics," NASA (website), n.d., accessed November 9, 2021, https://www.nasa.gov/.

59. J. D. Harrington, "NASA's X-59 Quiet Supersonic Research Aircraft Cleared for Final Assembly," NASA Public Affairs, December 19, 2019, https://techxplore.com/; and Harrington, "NASA Renews Support of Vertical Lift Research Centers of Excellence," NASA Public Affairs, August 11, 2021, https://www.nasa.gov/.

60. Lambeth, *High Ground*, 129.

61. Kendall, "State of the Forces."

COMMENTARY

# POWs in the Age of the Internet

Jan Kallberg, Todd Arnold, Stephen Hamilton, and Mark Visger

The emergence of deepfakes has challenged long-standing protocols concerning prisoners of war in the Geneva Conventions. The United States, its Allies, and partners must educate servicemembers about the potential exploitation of any recorded media obtained if they become prisoners of war.

A future great power conflict could potentially involve large numbers of prisoners of war (POWs)—US, Allied, and partner nations—imprisoned by regimes that could seek to utilize and exploit these captives for propaganda gain. Deepfakes and digital manipulation technology provide an advantageous opportunity for a captor aiming to mitigate international humanitarian law concerns regarding the rules for POW treatment. Such an adversary could use manipulated audio and images of POWs to forward their cause, undermine the Alliance cohesion, attack the mutual will to fight, and reduce POWs' will to resist.

## The Future Conflict

The risk of becoming a POW has steadily disappeared from the minds of US military members after two decades of counterinsurgency and antiterrorism operations. The memories of the Cold War and the Soviet occupation of Eastern Europe—and the general understanding of what captivity means—are diminishing. This prospect, however, should not be forgotten as the potential for the capture of sizeable numbers of POWs in a large-scale conflict is a distinct possibility.

The general strategic direction has recently changed from counterterrorism and antiterrorism operations toward great power competition and potentially protracted conflicts involving near-peer nation-states. Since the Cold War, air mobility, standoff weaponry, capabilities for deep strikes into enemy territory, and faster decision cycles have created a new battlefield. The modern battlefield is ever changing. High-paced engagements and mobility cross multiple war-fighting domains create the potential for a fragmented, fluid fight. In this unpredictable, widespread, rapidly changing, and violent environment, the potential for large numbers of POWs is high.

## Different POW Experiences

Each North Atlantic Treaty Organization (NATO) nation has a unique experience regarding prisoners of war. In most cases, events during World War II are the foundation for the general public's perception. For example, the understanding of what it means to be a POW for the United States, the United Kingdom, and France is based on the Korean and Vietnam Wars. For the British, it is the Falklands.

For today's NATO, the Balkan wars of the 1990s are the most recent conflicts with numerous POWs. Some countries obeyed the international laws, treating POWs fairly and complying with the Geneva Conventions. More common, however, are examples where regimes sought to exploit POWs as propaganda tools to forward the regime's cause and undermine home-front support by seeking to have prisoners appeal to end the war effort. This history of abuse raises the concern that utilizing deepfakes to manipulate POWs' voices and images could be a highly effective component of psychological operations.

## Accelerating Information Flow

The current internet-driven information flow differs radically from the past; there was no widely embraced internet and social media until well into the global war on terrorism, decades after the Balkan wars. The internet has radically changed how information, true or not, can be delivered at unprecedented speed and scale.

Once only seen as a vehicle for positive societal impact and democracy, the world now understands the internet can also be used for less altruistic purposes. Dual-use technology is not novel or unique to the current information age; mass printing and rail commerce created social mobility and consolidated democracy in many countries.[1] Conversely, these developments were the foundation for the early Soviet totalitarian propaganda machine in the 1920s.[2] Information technology develops at an accelerating speed, and we can be informed as events happen in real time. Still, the same wide information dissemination can mislead, disinform, undermine democracy, and negatively influence entire populations in unanticipated ways.

## Deepfakes

Fake imagery, audio, and videos are not novel or new concepts. Many countries' disinformation and propaganda campaigns used doctored imagery or audio in the past century. For example, when Leon Trotsky fell out of favor after Soviet Premier Vladimir Lenin's death, the government erased Trotsky's presence in all public images of early Soviet leadership.[3]

Deepfakes—detailed advanced manipulation of high-resolution digital multimedia files—can make the subject of the deepfake appear to be in a situation or location they

1. Roger Woods, "Mid-Nineteenth Century Migration from Norfolk to London: Migratory Patterns, Migrants' Social Mobility and the Impact of the Railway?" (master's diss., School of Advanced Study, University of London, 2014).

2. Adelheid Heftberger, "Propaganda in Motion: Dziga Vertovs and Aleksandr Medvedkins Film Trains and Agit Steamers of the 1920s and 1930s," *Apparatus* 1 (2015), https://www.apparatusjournal.net/.

3. J. D. Swerzenski, "Fact, Fiction or Photoshop: Building Awareness of Visual Manipulation through Image Editing Software," *Journal of Visual Literacy* 40, no. 2 (2021); Dimitris Poulopoulos, "How to Produce a DeepFake Video in 5 Minutes," Towards Data Science, April 2, 2020, https://towardsdatascience.com/; and Lisa Bode, Dominic Lees, and Dan Golding, "The Digital Face and Deepfakes on Screen," *Convergence* 27, no. 4 (2021).

never were. A highly believable deepfake can be created from as little as 15 minutes of video and audio footage.[4] In the case of POWs, the captors would have more than enough time to generate adequate audio and video of their prisoners to create robust deepfake audio and video files.

For example, the captor's interrogation team could repeatedly interrogate prisoners, a well-established tactic designed to identify an inconsistency or slip that discloses protected information. The interrogators could capture audio, video, and image files without the prisoners' knowledge or consent while routinely interrogating them about insignificant details and mundane daily events.

These repeated interviews, which for the POWs would seem a futile exercise in trying to make them cooperate, would instead generate a substantial repository of digitized material for the captor to fabricate deepfakes. Moreover, retrievals of social media, public information, and current events through open-source intelligence would provide bountiful material to inject in these deepfakes, reinforcing the perception the deepfake is genuine.

Despite POWs resisting collaboration and acting according to their defense force's code of conduct, technology could manufacture imagery and audio that makes them "artificial" collaborators.

## Supporting the Captor's Regime

The adversary can use POW deepfakes for propaganda purposes in three primary ways: support the regime, undermine the will to defend and fight, and distort and influence a captive's sense of reality.

### *Support*

If an authoritarian and totalitarian regime lacks legitimacy, it could reinforce its rationale to the population by presenting the opponent as illegitimate, promoting the message life is better living under the regime. Almost 70 years of Soviet domestic agitation and propaganda followed this construct. In the Soviet narrative, rulers of Western countries were bourgeoise that ripped the productivity and gains from the working class, leaving the Western working class abused and suppressed. Soviet leaders used their propaganda machine to convince their populace that even if the Soviet Union's conditions were less than optimal, the situation in the West was worse.[5]

Authoritarian regimes rely on propaganda units to maintain social order and suppress resistance to the regime. The Chinese government's current focus on national unity and societal stability is promoted by the political propaganda arm, which historically has presented narratives from captives as a part of its domestic propaganda.

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4. Michail Christos Doukas et al., "Head2head++: Deep Facial Attributes Re-Targeting," *EEE Transactions on Biometrics, Behavior, and Identity Science* 3, no. 1 (2021).

5. Robert G. Kaiser, "The Soviet Pretense," *Foreign Affairs* 65, no. 2 (1986).

### *Undermine*

The next propaganda method is the immediate release of deepfakes to the global public through social media, file sharing, social networks, and other internet platforms. Even though such a release of deepfake POW imagery is likely in violation of the Third Geneva Convention, such a deepfake could depict and push narratives of war crimes, atrocities, rejection of the Alliance war effort, pleadings to end the war, and other propaganda. Captors could distribute the videos and audio back to the POW's home nation on a broad scale to undermine the war effort and stress soldiers' families, influence politicians, fuel ethnic cleavage, and seek to break up Ally and partner cohesion to weaken support for the war.

A recent concern is deepfakes of senior military leaders and politicians in which the manipulated media presents statements these individuals never said. Deepfakes of public leaders do not serve the adversary well in the long-term because these deepfakes can be fact-checked, and the officials are accessible for media and news outlets. But such deepfakes can provide short-term benefits even after being identified as manipulated and fake. These deepfakes can also cast temporary doubt on legitimate statements by public figures. With POWs, however, there would likely be no way to communicate and verify message validity. As a result, the POW deepfakes would likely generate a more prolonged, influential, and plausible intended effect for the adversary's interest.

### *Distort and Influence*

In the third propaganda method, the captor could show deepfakes to POWs to manipulate them. Most great power conflicts in the last century started with the actors believing they were engaging in a short-term conflict, only to realize later they were in a protracted and enduring conflict.[6] During World War II, Korea, and Vietnam, POWs were captives for several years—the sign of an enduring conflict.

In a similar situation, the captor could control the flow of information to POWs and could use deepfakes to feed false and misleading information over time. Even if a prisoner of war could ascertain each deepfake was a false portrayal of information, it is highly likely that, over time, isolation and pressure from surrounding conditions could induce a POW to accept deepfakes as legitimate. The captor could then utilize deepfakes to indoctrinate, psychologically destabilize, and manipulate the captive's mental state.

## Third Geneva Convention

The protections afforded POWs have remained constant since the adoption of the Third Geneva Convention in 1949; provisions relating to the treatment of POWs were not updated in the Additional Protocols to the Geneva Conventions adopted in the

6. Stuart Hallifax, " 'Over by Christmas': British Popular Opinion and the Short War in 1914," *First World War Studies* 1, no. 2 (2010); and Karl-Heinz Frieser, *The Blitzkrieg Legend: The 1940 Campaign in the West* (Annapolis, MD: Naval Institute Press, 2013).

1970s. This fact is unfortunate, as unresolved interpretative issues remain. That said, the current treaty provisions provide some helpful guidance.

Specifically, Article 13 requires POWs be protected "against insults and public curiosity."[7] This provision builds on the baseline Article 13 requirement of "humane treatment" and Article 14 requirement of "respect for their persons and their honor."[8] Particularly egregious incidents from World War II such as the parading of POWs or publication of POW photographs in the press that resulted in a war crimes conviction and prison term, provided the impetus for these provisions.

More recently, captors have released photographs of POWs for other, arguably legitimate purposes, such as proof of life, proof of capture, or to document inappropriate treatment. While not definitively resolved, one could argue they released photos in such situations for purposes other than humiliation or public curiosity.

Despite this fact, the publication of a deepfake to public audiences either in the captor or captive's country would appear to violate the prohibition of public curiosities. The US *Department of Defense Law of War Manual* concludes "displaying POW's in a humiliating fashion on television or on the internet [is] prohibited."[9] All NATO allies would likely concur with this conclusion. It is difficult to imagine a public release of a deepfake that would not implicate the prohibition on public curiosity.

The use of deepfakes in interrogation, on the other hand, is not as clearly resolved by the Geneva Conventions. While POWs are only required to provide the standard name, rank, date of birth, and serial number, the detaining power can certainly engage in questioning to procure additional information.

Article 17 prohibits "physical or mental torture" as well as "any other form of coercion" to obtain such information in such questioning.[10] Here it is difficult to make broad or sweeping conclusions as to whether the use of deepfakes in an interrogation would constitute coercion for two reasons: (1) each instance will be dependent on the specific facts in question, and (2) states have different understandings of what constitutes coercive conduct in their domestic law.

In the United States, for example, police are not prohibited from lying to suspects during police interrogations. But such conduct may be considered when determining whether a suspect provided any resulting statement voluntarily and in accordance with the Fifth Amendment privilege against self-incrimination. One could argue the repeated use of deepfakes in an interrogation would constitute coercion, but there are no clear answers at this point.

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7. United Nations, Geneva Convention Relative to the Treatment of Prisoners of War of 12 August 1949 (Geneva: United Nations, 1949), 97, https://www.un.org/.

8. United Nations, *Prisoners of War*, 97.

9. Department of Defense (DOD) Office of General Counsel, *Department of Defense Law of War Manual* (Washington, DC: DOD, June 2015, updated December 2016), https://dod.defense.gov/.

10. United Nations, *Prisoners of War*, 98.

## Conclusion

Servicemembers must be provided education on deepfakes to prepare them for this possibility if captured. Each member nation's legal departments should develop legal positions on the use of deepfakes of POWs and be prepared to communicate those positions to work toward a common understanding under international law. Finally, additional research is needed on detecting and countering deepfakes.

The United States and its Allies and partners must transition from shared POW experiences in World War II, Korea, Vietnam, and the Balkans. Today, the tools the captors can use for propaganda and manipulation are far more advanced and have unprecedented reach. Adversaries are ready to use that reach to sow discord among the Alliance and partner nations, undermine our mutual will to fight and, in conflict, drive opinion toward a conflict resolution that favors them. ✈

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# The Joint Targeting Enterprise and the DOD Digital Transformation

Hugh Curry

Joint targeting is central to every aspect of operational planning. When the Joint Warfighting Concept and digital initiatives are viewed through the lens of the Joint targeting enterprise, it is clear Joint targeting is the best way to achieve the Department of Defense's digital transformation.

Most modernization initiatives and programs are focused on finding, fixing, finishing, exploiting, and analyzing moving or dynamic targets in the operational battlespace. These initiatives overlook the critical operational importance of having enough vetted, predetermined targets on the shelf.[1] Joint targeting, therefore, is integral to every aspect of operational planning. When the new Joint warfighting concept (JWC) and digital initiatives are viewed more holistically through the entire Joint targeting enterprise (JTE) lens instead of focusing on one aspect of it—improving dynamic targeting—it is evident that Joint targeting is ideally suited to achieve the digital transformation sought by the Department.

Michael Mazarr recommends being prepared to "deliver . . . firepower onto attacking forces in the first weeks of a conflict" to prevent an adversary from achieving regional hegemony or conquest.[2] This action would serve as a conventional deterrent and suggests the JTE should prepare for the fight-tonight, worst-case scenario. Many JTE modernization initiatives and programs currently in development under the Joint warfighting concept and the digital modernization umbrellas will improve readiness if successfully developed and integrated.

Joint targeting is intrinsic to every phase of military planning and operations—from steady-state strategy development and campaign planning, to the commencement of hostilities, to assessment—utilizing data and information from across many networks and domains including the defense intelligence enterprise.[3] According to Joint Publication 3-60, "Targeting is the process of selecting and prioritizing targets and matching the appropriate response to them, considering operational requirements and capabilities. Targeting requires a continuous, analytic process to identify, develop, and affect targets to meet commander objectives."[4]

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1. James Kitfield, "Hard Lessons from America's Longest Wars," Breaking Defense, December 14, 2017, https://breakingdefense.com/.

2. Michael J. Mazarr, "Time for a New Approach to Defense Strategy," War on the Rocks, July 29, 2021, https://warontherocks.com/.

3. Chairman of the Joint Chiefs of Staff (CJCS), *Joint Targeting*, Joint Publication 3-60 (Washington, DC: CJCS, 28 September 2018), I-1; and US European Command (USEUCOM), "Target Strategy Intelligence Planning Team Overview," briefing to Military Targeting Committee, slide 3, October 7, 2021.

4. CJCS, *Joint Targeting*, I-1.

As differentiated from human intelligence or collections targeting,

> Joint targeting provides planners with access to detailed information on the targets, supported by the nominating component's analytical reasoning that links the targets with the desired effects. . . . A target is an entity or object that performs a function for the adversary considered for possible engagement or action. A target's importance derives from its potential contribution to achieving a commander's objective(s) or otherwise accomplishing assigned tasks.[5]

Joint targeteers assist planners in planning for a worst-case scenario if diplomacy fails and a major conflict erupts against a near-peer or great power competitor.[6] A targeteer is "an individual who has completed requisite training and guides the joint targeting cycle in their current duties."[7] Joint targeteers work with intelligence analysts and are responsible for developing all-source intelligence to understand target sets, identify vulnerabilities, and help planners select viable Joint targets for military operations.[8]

Tasks Joint targeteers perform are complex and demanding, requiring attention to consequential details. The lives and livelihoods of Americans and citizens of our Ally and partners nations are possibly at stake if a detail is overlooked.[9] These targeteers ensure selected Joint targets meet the objectives and intent of war plans and meet the Laws of War requirements to mitigate civilian harm and suffering.

Executing the various tasks well requires enough trained and experienced Joint targeteers and intelligence analysts to begin Joint target development. It takes time to discover, develop, and produce all-source intelligence and target system analyses and select appropriate Joint targets—ideally well before hostilities commence.[10] Target system analysis is "an all-source examination of potential target systems to determine relevance to stated objectives, military importance, and priority of attack."[11] This analysis includes fixed facilities and intelligence on military organizations, including their command and control structures, personnel, and supporting infrastructure.

According to the *DOD Dictionary*, order of battle is "the identification, strength, command structure, and disposition of the personnel, units, and equipment of any military

5. CJCS, *Joint Targeting*, I-1.

6. Mazarr, "New Approach."

7. CJCS, *DOD Dictionary of Military and Associated Terms*, November 2021, s.v. "targeteer," https://www.jcs.mil/.

8. Eric Washabaugh, "The Robot, the Targeter and the Future of U.S. National Security," The Cipher Brief, March 8, 2021, https://thecipherbrief.com/.

9. Mike Nagata, "Focus on the Enablers for Long Range Precision Fires," Breaking Defense, "July 28, 2021, https://breakingdefense.com/.

10. CJCS, *Joint Targeting*, GL-9.

11. CJCS, *DOD Dictionary of Military and Associated Terms*, November 2021, s.v. "target system analysis," https://www.jcs.mil/.

force."[12] During steady-state operations, when units are out of garrison, terrain and deployment locations are also placed in a database that is used to more efficiently find and fix them if hostilities commence.[13] History has shown this can take years, depending on the complexity, magnitude of adversary infrastructure and military organizations, available data, availability of collection assets, and numbers of dedicated intelligence analysts.

Joint targeting is also a function of urgency. If such targeting is deemed a priority, the time to develop enough quality Joint targets might be reduced to months. Yet this is a best-case scenario when supporting intelligence organizations are all-in on production. Tensions, indications, warnings, posture, and current situation will always dictate urgency, but it is critically important to have enough appropriate, valid Joint targets on the shelf should there be a fight-tonight contingency. Having no Joint targets prepared for operations against a relatively low-threat adversary may unnecessarily prolong a fight. In a conflict with a great power competitor—a fight-tonight scenario—the opening salvos could be lost if we do not have enough vetted Joint targets to engage.

A good strategy and plan usually translate into viable Joint targets. Joint targeting converts strategy into discrete actions against Joint targets by linking ends, ways, and means.[14] The selection of Joint targets is one of the last tasks of a detailed plan in preparation for D-Day. As events escalate to the point hostilities are imminent, the questions of who, what, where, and how many Joint targets will be answered and refined by targeteers and planners. These targeteers and planners are located within all echelons of higher command.[15]

The process of developing and selecting Joint targets is agnostic to the capabilities to be delivered, which will be assigned depending on desired effects.[16] Desired effects are dependent on the intent of the strategy and the assumptions and progress of the campaign plan. As the plan evolves or is executed, desired effects also depend on the current situation, including the conventional weapons and delivery platforms available and nonkinetic capabilities ready to be delivered or initiated.

All desired effects depend on access to Joint targets—limited by factors such as geography, range, electromagnetic spectrum, network firewalls, passwords, and vulnerability to attack and opportunity. Joint targeteers are instrumental in estimating desired effects, based on these limitations, that commanders and operators use to make engagement decisions.

Joint targeteers, analysts, and planners are responsible for assessing delivered effects. Joint targeteers assess effects delivered on individual Joint targets and contribute critical assessments of the overall effects delivered to various Joint target sets. Planners and ana-

12. JCS, *DOD Dictionary of Military and Associated Terms*, November 2021, s.v. "order of battle," https://www.jcs.mil/.

13. Nagata, "Precision Fires."

14. US Air Force (USAF), *Targeting*, Air Force Doctrine Publication 3-60 (Washington, DC: Department of the Air Force, November 12, 2021), 3, https://www.doctrine.af.mil/.

15. USEUCOM, "Planning Team Overview."

16. Kathryn Bailey, "Jointly Planning to Ensure Sensor, Shooter Technology Dominance," US Army News, March 18, 2020, https://www.army.mil/.

lysts use these assessments to determine if the Joint force is achieving the campaign plan objectives. When effects are delivered to dynamic Joint targets, making good assessments is exponentially more complex. Historically, this part of Joint targeting is not usually done well since it is not frequently rehearsed and accomplished at scale. When a major conflict occurs, assessments of effects delivered against dynamic Joint targets require dedicated collection and many intelligence analysts.

The current perilous global strategic security environment requires us to reassess the necessary resources that enable Joint targeting to line up with the *2018 National Defense Strategy* priorities. Much work remains to scale Joint targeting capabilities for conflict against adversaries identified in the Strategy.

In the last five years, the Department of Defense has increased the numbers of personnel by 50 percent in most commands and services dedicated to Joint targeting. But there is still a shortage of sufficiently trained and experienced personnel that cannot be compensated with the current state of the automation tools at their disposal.[17] Indeed, the current stovepiped networks and automation tools make Joint targeting tasks unnecessarily tedious even if there were enough personnel.[18]

Therefore, since Joint targeting is intrinsic to every phase of military operations, it can help evaluate digital modernization programs and initiatives in development. For example, Joint targeting is dependent on multiple "authoritative data sources" entered into databases and characterized as sufficient enough to be developed into valid Joint targets.[19] Data is dependent on collection.

Collection is dependent on collection assets and analysts' access to what is collected. Likewise, postattack assessments are also dependent on collection and timeliness. Collection data and information could come from any domain and platform and should be agnostic to the platform or the receiving integrating network and architecture. What is important is to have access to timely collected data that can be analyzed inside the decision cycles of our competitors, or if conflict erupts, our adversaries.

In this regard, a measured approach to improve the overall automation efficiencies required for reach-back presents use case opportunities to digitally transform the Joint warfighting concept and the defense intelligence enterprise that will have cross-functional multiplying effects. This includes empowering the Joint targeting enterprise with machine learning and artificial intelligence (AI) that could vastly improve Joint target analysis—including target system analysis and target selection, prioritization, and assessment at scale—especially in a time-compressed scenario.[20]

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17. Office of the Undersecretary of Defense for Intelligence & Security (OUSDI&S) Combatant Command Joint Targeting Manpower Statistics, June 24, 2021.

18. USDI&S Joint Targeting Intelligence Modernization briefing, August 2021.

19. Brad D. Williams, "JADC2 Implementation Plan 'Weeks Away': J6's Parker," Breaking Defense, September 8, 2021, https://breakingdefensenews.com/; and Nagata, "Precision Fires."

20. Williams, "JADC2 Implementation Plan"; and Nagata, "Precision Fires."

But this will require determining how many Joint warfighting concept and defense intelligence enterprise AI initiatives exist and understanding their purpose. Although these initiatives seem to be driving toward the same singularity—vastly improved war-fighting capabilities appropriate for the digital age—most initiatives are being developed in ignorance of others and are primarily focused on sensor-to-shooter capabilities against dynamic targets.

The underlying assumption for these capabilities is that persistent theater and tactical intelligence, surveillance, and reconnaissance platforms, adequate national technical means, communications access and connectivity, and precision, navigation, and timing assets will be available to deliver precision weapons accurately on target. These assets may not be available or accessible in the degraded communications environments expected in conflicts with China and Russia—one critical reason commanders need on-the-shelf Joint targets.[21]

Moreover, even if US forces had sufficient collection and connectivity to put iron on target, collectors and weapons operators need to know generally where to look to find and finish dynamic units and equipment. This information only comes by preconflict Joint target and target system analysis development, which can be vastly improved with machine-assisted analysis and AI. During Operation Desert Storm, when coalition forces had air superiority over Iraq and dedicated intelligence, surveillance, and reconnaissance collection platforms, they could not effectively locate and finish the Scud launchers being moved between hiding sites in western Iraq. Iraqi forces could periodically launch Scud missiles into Israel and Saudi Arabia throughout the campaign.[22] Artificial intelligence could smartly assist these fires missions.

There is also the conundrum of how to integrate legacy programs of record (PoRs) with AI. Should the Department improve current legacy PoRs by making them more interoperable as it transitions to new networks and architectures and attempts to add algorithms to assist Joint targeteers and analysts smartly? Or should the military scrap ill-performing or unused PoRs and move toward the potential of algorithmic warfare? Considering the perilous global strategic security environment for the Joint targeting enterprise, it should be a combination of both.[23] The Department of Defense cannot afford to lose the current PoRs' albeit limited interoperable connectivity in order to reap the windfall of its resources and develop new architectures, networks, and software tools to enable AI.

For a short time, sustainment funding for and some improvement of prioritized legacy PoRs should be continued in parallel with the funding of new networks and architectures that have the data-centric properties to be platform agnostic and can enable the use of algorithms to meet war-fighting needs. The military can then sunset legacy Joint targeting PoRs if the new capabilities, enabled by AI, vastly enhance the current production capacity

21. Andrew Eversden, "Army Futures Command Outlines next Five Years of AI Needs," C4ISRNET, August 12, 2021, https://www.c4isrnet.com/.

22. Stewart M. Powell, "Scud War, Round Three," *Air Force Magazine*, October 1, 1992, https://www.airforcemag.com/.

23. Nathan Strout, "Palantir: "With Joint All-Domain Command and Control, the Pentagon Is Finally Catching Up," C4ISRNET, August 12, 2021, https://www.c4isrnet.com/.

of the enterprise. This is also a way to gradually acclimatize the operational and intelligence support communities—steeped in the mindset of legacy PoRs—to accept and train AI and develop new analytical techniques and procedures that will come with the use of AI.[24]

In conclusion, the development of new data-centric Joint Warfighting Concept and defense intelligence enterprise initiatives cannot be done in a vacuum. In the near future, all can provide elements of data, empowered by algorithms, which can transform the efficiency and effectiveness of the Joint targeting enterprise. Prioritizing Joint targeting will probably not address all the missions inherent in the JWC's functional battles. Yet the process of providing access to data from all domains and platforms through the holistic lens of Joint targeting will facilitate improvement in most of them.[25]

The functional battles are Joint All-Domain Command and Control, Joint fires, contested logistics, and information advantage. The mantra should be, "how does an initiative eventually help to put a bomb or a nonlethal capability on target, and will it enhance timely assessments for decision making?"

As Congressman Mike Gallagher recently wrote, "What we actually need to integrate is more conventional hard power. . . . Giving Chinese forces certainty that we are targeting them is the most important task for restoring our conventional deterrence posture."[26] If and when violent conflict erupts, American military operations will finally reap the rewards of American ingenuity that ushered in the Digital Age, transforming the so-called American way of war. ✈

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24. Brad D. Williams, " 'If We Don't Change, We're Going to Lose': Air Force Strategy Dep. Chief Hinote," Breaking Defense, September 20, 2021, https://breakingdefense.com/.

25. Theresa Hitchens, "The Joint Warfighting Concept Failed, until It Focused on Space and Cyber," Breaking Defense, July 26, 2021, https://breakingdefense.com/.

26. Mike Gallagher, "The Pentagon's 'Deterrence' Strategy Ignores Hard-Earned Lessons about the Balance of Power," *Washington Post,* September 29, 2021, www.washingtonpost.com/.

# Nuclear War Avoidance

## Why It Is Time to Start Worrying, Again

Louis René Beres

In the aftermath of the US withdrawal from Afghanistan and in the face of growing strategic competition, complex existential issues of nuclear war avoidance remain front and center. The following article will examine the pertinent history of nuclear deterrence and the determinable risks of a future nuclear war. In the present moment, Russia's aggressions against Ukraine plainly underscore these grave risks.

*The fox knows many things, but the hedgehog knows one big thing.*
Archilochus, *Fragments*

Cited by Sir Isaiah Berlin, *The Hedgehog and The Fox* (1953)

## In the Beginning

Once upon a time, beginning in the 1950s, nuclear war avoidance became humankind's main survival imperative.[1] This understandable rank-ordering was visible on evening news programs and in movies. Popular films such as *On the Beach*, *Fail Safe,* and *Dr. Strangelove* (*or How I Learned to Stop Worrying and Love the Bomb*) reinforced the reality that the prospects of a nuclear war were conspicuous, urgent, and infinitely perplexing. The beginning of the Cold War (today, perhaps, this should be called "Cold War I") reflected a more characteristic preference ordering of rich nations than poor ones, but one obvious fact always remained clear: if the world failed to prevent a nuclear war, all other indispensable human values would be imperiled.[2] These other values included population stabilization, ecological stability, and justice/human rights. After Hiroshima and Nagasaki, no other atomic bombs existed anywhere on earth. *Prima facie*, in stark contrast to the present moment, those were very different times from the standpoint of nuclear deterrence.

In the "old days," scholars could still speak more-or-less reasonably about nuclear disarmament or denuclearization. From the standpoint of North Korea today, however, denuclearization would represent an irrational expectation. For Kim Jong Un, getting rid of

1. This article is dedicated to the memory of US Air Force General John T. Chain Jr., a former Strategic Air Command (SAC) commander and director of SAC's Joint Strategic Target Planning Staff. General Chain was a long-time personal friend and coauthor of Professor Beres, the author of this article. He died on July 7, 2021.

2. Louis René Beres, "Steps Toward a New Planetary Identity," *Bulletin of the Atomic Scientists* 37, no. 2 (February 1981), https://www.tandfonline.com/.

his extant atomic arms and infrastructures must remain contrary to Pyongyang's basic security requirements. Moreover, in June 2020, two years after the Singapore Summit, Kim's Foreign Minister Ri Son Gwon announced that any earlier expressed hopes for accommodation with then-US President Donald J. Trump had become untenable.

As the North Korea example shows, we don't yet live in a reasonable world; accordingly, realistic peace strategies should include various fundamental compromises. On specific matters of nuclear war avoidance, this means, inter alia, continuously refining threat-based strategies of escalation dominance and nuclear deterrence.[3] At an even more rudimentary level, citizens of nuclear and near-nuclear states accustomed to competitive postures of belligerent nationalism will need to achieve certain explicit transformations of strategic consciousness.

## Realpolitik

More precisely, these citizens and leaders should detach their accumulated hopes for immortality from the nation's geopolitical success. Throughout history, geopolitics—Realpolitik—have often been associated with personal and collective immortality. German historian Heinrich von Treitschke observed "individual man sees in his own country the realization of his earthly immortality."[4] Earlier, German philosopher Georg Friedrich Hegel opined the state represents "the march of God in the world."[5] This deification of Realpolitik, a transformation from a mere principle of action to a sacred end in itself, drew its originating strength from a doctrine of sovereignty first advanced in the sixteenth and seventeenth centuries.

Initially conceived as a principle of internal order, the doctrine of sovereignty underwent a specific metamorphosis, whence it became the formal or justifying rationale for international anarchy—that is, for the global state of nature. First established by Jean Bodin as a juristic concept in *De Republica* (1576), sovereignty became regarded as a power absolute and above the law. Understood in terms of modern international relations, this doctrine encouraged the notion that states lie above and beyond any form of legal regulation in their interactions with each other.

What can this possibly mean? Have not students of world politics always been instructed that their subject centers on some vague quality called power? These instructions have not been wrong, but they have generally failed to identify the greatest conceivable form of power. This is power over death or the promise of immortality. What meaning

3. Louis René Beres, "Nuclear Decision-Making and Nuclear War: An Urgent American Problem," *War Room*, November 8, 2018, https://warroom.armywarcollege.edu/; and Beres, "United States Nuclear Strategy: Deterrence, Escalation and War," Small Wars Journal, January 28, 2020, https://smallwarsjournal.com/.

4. Louis René Beres, "Looking Beyond Shadows: Death, Time, and Immortality," Horasis, November 4, 2021, https://horasis.org/.

5. Beres, "Looking Beyond Shadows."

could they bear for the citizens of a nation that has always prided itself on being practical, not intellectual? The short answer here is nuclear deterrence.

Nuclear deterrence is a game major world leaders may inevitably have to play. These leaders can choose to learn this complex game purposefully and skillfully or merely deal with it inattentively or inexpertly. Calculably gainful plays are theoretically possible, but these will be based upon variously enhanced capacities for threat assessments and strategic decisions. In the final analysis, as we should already have learned from history, including the unraveling of American power in Afghanistan, winning will not mean what we originally thought. It will not be about acquiring geopolitical supremacy and hegemony but about enabling systemic cooperation and a reassuringly continuous dynamic of de-escalation.

A viable global civilization is indispensable to every nation's plausible survival. Ultimately, however, such a civilization will be constructed upon much more than presumptively favorable balances of military power; it will be founded upon suitably fashioned visions of *human oneness*. "Civilization," writes Lewis Mumford correctly, "is the never-ending process of creating one world and one humanity."[6]

## The Intellectual Core

All this refashioning will require many things seen by the fox, especially high-quality scholarship. Though our national foreign policy makers will insist this has always been the case, sending assorted flag officers to high-quality graduate programs is not nearly enough. Pertinent strategic inquiries should be more expressly grounded in logic and the scientific method, never in political clichés or seemingly learned syntax.

Foreseeably, controlling nuclear proliferation will become increasingly important and potentially overriding. Under no circumstances should any sane and capable scholar or policy maker ever recommend the further proliferation of nuclear weapons, a fallacy of strategic reasoning earlier called the "porcupine theory." Lest anyone think this sort of recommendation is absurd or inconceivable, a long history of nuclear porcupines—strategists and observers—correlates expanding nuclear proliferation with expanding global security.[7]

On its face, any such confused endorsement must represent the *reductio ad absurdum* of all possible intellectual misjudgments. Among component hazards, it would be problematic to assume nuclear deterrence credibility should be positively correlated with anticipated threat destructiveness. Indeed, from the standpoint of stable nuclear deterrence, the likelihood of an actual nuclear conflict between states could sometimes be inversely related to the plausibly expected magnitude of catastrophic harms. The former administration favored such vaporous threats as complete annihilation or total destruction over well-reasoned threats. Such proclamations, seemingly imagined as reasonable or tough,

6. Louis René Beres, "Getting Beyond Power Politics: Narratives for a Trust-Centered World Order," Horasis, January 24, 2021, https://horasis.org/.

7. Louis René Beres, "The Porcupine Theory of Nuclear Proliferation: Shortening the Quills," *Parameters* 9, no. 1 (July 4, 1979), https://press.armywarcollege.edu/.

could only have reduced US nuclear deterrent persuasiveness. This is only an informal presumption, however, because we are presently considering a unique or unprecedented event, one of inherently limited predictive capacity.

Another understanding of the probability of a nuclear war is utterly primary or axiomatic. It stipulates determinable differences in probability must depend at once on whether the particular war in question is intentional or inadvertent. A further division must then be made between an inadvertent nuclear war caused by miscalculation and one occasioned by accident, hacking, or computer malfunction. Apart from such antecedent conceptual divisions, no meaningful scientific estimations of nuclear war likelihood could ever be made.

## Relevant Military Exercises

In August 2021, the United States conducted or led expansive military exercises, including an exercise staged by the US Navy 5th and 2nd Fleets (close to the Mediterranean Sea and Black Sea, respectively), and Large Scale Global Exercise 21, led by the United States and Allied forces, focusing on the Indo-Pacific Ocean area. All exercises were conducted with China and Russia openly identified as hypothetical adversaries.

In response, China conducted one large-scale military exercise in the South China Sea during same period and another jointly with Russia in China's Northwest Region. Significantly, the United States conducted its exercises far from the US homeland, but China and Russia launched their exercises close to home. Cumulatively, such exercised maritime and troop movements expressed elements of a so-called Cold War II.

Looking ahead, both the air domain and outer space are apt to become further militarized, subject to steadily expanding nuclear war preparations and operations. The attendant and correspondingly greater risks of nuclear crisis and nuclear war are worrisome, especially a nuclear war by accident or miscalculation.

For decades, competent nuclear strategists have dealt with nuclear proliferation, including authentic thinkers who clearly understood that the variously staggering costs would outweigh any alleged benefits of nuclear proliferation. Seventeenth-century English philosopher Thomas Hobbes instructs that although international relations are conducted in a "state of nature," it is nonetheless a more benign condition than the condition of individual man in nature. With individual human beings, Hobbes reflects, "the weakest has strength enough to kill the strongest."[8]

With the advent and probable spread of nuclear weapons, however, there is no longer any reason to believe the international state of nature to be more tolerable. Most obvious in this connection are the proliferation-associated risks of inadvertent nuclear war, accidental nuclear war, nuclear war by irrationality or coup d'état, and nuclear war by miscal-

8. "Leviathan, Chapter 1.13, Thomas Hobbes," Genius, accessed January 27, 2021, https://genius.com/.

culation. The prospects for irrational decision making by national leaders, including the president of the United States are just as concerning.[9]

To date, the underlying fragility of global geopolitics has been an incontestable presumption. Foreseeably, this will not change in any auspicious directions. The Westphalian system remains fundamentally unchanged.[10] Westphalian dynamics stand in stark contrast to the legal assumption of solidarity between all states in their presumably common struggle against aggression and terrorism. It remains rooted in anarchy and is being worsened by chaos.

Although composed in the seventeenth century, Hobbes' *Leviathan* may still offer us a vision of this fearful condition in modern world politics. During chaos, which is a "time of War," "every man is Enemy to every man. . . . and . . . the life of man is solitary, poor, nasty, brutish, and short."[11]

Still, Hobbes believed the condition of nature in world politics was less chaotic than that same condition extant among individual human beings. This was because of what he had called the "dreadful equality" of individual men in nature concerning the ability to kill others.[12] This once-relevant differentiation has effectively disappeared with the continuing manufacture and spread of nuclear weapons, a spread soon apt to be exacerbated by an already-nuclear North Korea and by a nearly nuclear Iran.

## Changing Balance of World Power

Historically, the idea of a balance of power—an idea of which the nuclear-age balance of terror is a variant—has never been more than a facile metaphor.[13] In fact, it has never had anything to do with ascertaining true equilibrium. As such, a balance is invariably a matter of individual and subjective perceptions, and adversary states can never be sufficiently confident that strategic circumstances are meaningfully oriented in their favor. Consequently, each side in a still-Westphalian world order must perpetually fear it will be left behind. In essence, the continual search for balance, though traditionally reassuring, only produces ever-widening patterns of insecurity, inequality, and disequilibrium.

At the start of the first Cold War, the United States began to codify rudimentary orientations to nuclear deterrence and nuclear war. The world was tightly bipolar, and the clear enemy was the Soviet Union. Tempered by a shared knowledge of the horror that had ceased (temporarily) in 1945, each superpower understood a conspicuously core need

9. Louis René Beres, "What If You Don't Trust the Judgment of the President Whose Finger Is over the Nuclear Button?," *Bulletin of the Atomic Scientists*, August 23, 2016, https://thebulletin.org/.

10. Treaty of Peace of Munster, October 1648, 1 Consol. T. S. 271; and Treaty of Peace of Osnabruck, October 1648, 1 Consol. T. S. 119.

11. "Leviathan."

12. "Leviathan."

13. Albert Wohlstetter, *The Delicate Balance of Terror* (Washington, DC: RAND Corporation, 1958), https://www.rand.org/.

to expand global cooperation (to wit, the United Nations) as a necessary adjunct to Westphalian conflict preparedness.

With the start of the nuclear age, American national security was premised on grimly primal threats of massive retaliation. Over time, especially during the Kennedy years, this bitterly corrosive policy was softened by subtler and more nuanced threats of flexible response. Along the way, a coherent and generalized American strategic doctrine was crafted, in increments, to accommodate systematically almost every conceivable kind of adversarial encounter. Scientifically and historically grounded, this doctrine was developed consciously and with deliberate prudence. But in its actual execution, much was actually left to visceral or seat-of-the-pants calculations. In this regard, the 1962 Cuban Missile Crisis speaks for itself.

As earlier generation defense intellectuals—Thomas Schelling, Bernard Brodie, Albert Wohlstetter, Herman Kahn, and others—already understood, strategic doctrine is a net. Only those who cast can reasonably expect to catch. Nonetheless, even the benefits of casting must remain subject to various considerations of individual human personality. In the terms of professional strategic thinkers, there would always remain an idiosyncratic factor. Looking ahead to potential nuclear war threats and crises, these idiosyncratic factors could interact in variously unforeseen ways with each other, creating correspondingly unseen synergies. In part, at least, these synergies can be anticipated and exploited.

In the face of such irremediable uncertainties, the point is not to prevent them altogether (that would be impossible) but to prepare for them diligently, comprehensively, and analytically.

## Cold War II

For a time after the collapse of the Soviet Union, the world became increasingly multipolar. But we now seem to be witnessing the evolution of a second Cold War. There will likely be more conspicuous points of convergent interest and cooperation between Washington and Moscow this time. In principle, at least (e.g., current mutual concerns for controlling Jihadist terrorism), Cold War II could offer an improved context for identifying overlapping strategic interests. But now there are apt to be certain other primary players, most plausibly China.

Details matter. Even after the extension in force of the Treaty between the United States of American and the Russian Federation on Measures for the Further Reduction and Limitation of Strategic Offensive Arms (New START), Moscow continues to reinvigorate its production of intercontinental ballistic missiles (ICBMs) and supporting infrastructures. This represents a predictable Russian response to fears America may be expanding its plans for expanded ballistic missile defense in Europe and (as corollary) for enlarging North Atlantic Treaty Organization blueprints to advance presumptively aggressive strategies of encirclement.

Strategic planners are also focused on already-nuclear North Korea and Pakistan and a prospectively nuclear Iran. Among other issues, Tehran's repeated calls for removing

Israel as a state have been exterminatory; in law, they represent an "incitement to genocide." Military nuclear developments in North Korea, Pakistan, and Iran could ultimately prove synergistic, circumstances that are largely unpredictable and potentially even overwhelming. North Korean nuclear know-how could impact other regions of the world; for example Pyongyang has had significant nuclear dealings with Syria.

In the early 2000s, North Korea helped Syria build a nuclear reactor, which Israel later destroyed in 2007. Although, unlike the 1981 *Operation Opera* on a nuclear facility in Iraq, this preemptive attack in the Deir ez-Zor region of Syria, was presumptively a second expression of the so-called "Begin Doctrine," it also illustrated, because of the North Korea-Syria connection, a broader global threat to US ally Israel.[14]

Legal considerations of justice also factor in these matters. *Nullum crimen sine poena;* "No crime without a punishment," was a key principle of justice reaffirmed at Nuremberg in 1946 and likely originated in the Hebrew Bible and its *Lex Talionis* or law of exact retaliation.[15] Popular viewpoints notwithstanding, the Abraham Accords have had no discernible effects on preventing nuclear war in the Middle East.[16] If anything, Iran was only made more belligerent by the Accords' design to diminish Iranian power. Moreover, certain major Sunni Arab states—Egypt, Saudi Araba—may soon feel new incentives to nuclearize themselves. And with the Taliban now in control of Afghanistan, already-nuclear Pakistan will likely become more influential in the region.

## Whither China, India, and Russia?

More-or-less plausible issues of enemy irrationality will emerge in all these increasingly ambiguous cases. Expressions of decisional irrationality could take different or overlapping forms. These include a (1) disorderly or inconsistent value system; (2) computational errors in calculation; (3) an incapacity to communicate efficiently; (4) random or haphazard influences in the making or transmittal of particular decisions; (5) and the internal dissonance generated by any structure of collective decision making—assemblies of pertinent individuals who lack identical value systems and/or whose organizational arrangements impact their willing capacity to act as a single or unitary national decision maker.

Regarding such special situations where leadership elites in Beijing, Islamabad, Delhi, Tehran, or elsewhere might sometimes value presumed national or religious obligations more highly even than national physical survival, the precarious logic of de-

14. Louis René Beres, "Israel's Preemption Lesson: 10 Years Later, Operation Orchard Shows the Value of Preemptive Strikes, *U.S. News & World Report*" September 6, 2017, https://www.usnews.com/.

15. Louis René Beres, "A Crime without a Punishment," *Washington Times,* July 16, 2013.

16. US Department of State (DOS), "The Abraham Accords," n.d., accessed January 24, 2020, https://www.state.gov/; Bill Chappell, "Sudan and Israel Agree to Normalize Relations in U.S.-Brokered Deal," National Public Radio, October 23, 2020, https://www.npr.org/; and DOS, "Joint Declaration: the Kingdom of Morocco, the United States of America, and the State of Israel, December 22, 2020, https://www.state.gov/.

terrence could fail. Such failure need not be incremental and manageable. It could be sudden and catastrophic.

Any such fearful scenario is perhaps improbable, but it is by no means inconceivable. This hesitancy-conditioned probability calculation is effectively mandated by variously fixed limitations of science. As indicated earlier, one can never speak reliably about the probability of unique events. Fortunately, of course, there has never been an authentic nuclear war.

## Synergies and Nuclear Doctrine

Pertinent synergies could clarify or elucidate the world political system's current state of entropy and could become conceptually dependent upon each national decision-maker's time horizon. Again, leaders of the United States and its Allies and partners must understand the various possible interactions or synergies between changing adversaries and their ties to China, Syria, and Russia. A new question should arise in managing such strategic threats: Will Cold War II help our imperiled planet or hurt it even more? Such queries will always represent intellectual not political questions. Above all, they will need to be addressed at suitably analytic levels.

Strategic policies must deal with a variegated assortment of subnational threats involving weapons of mass destruction (WMD) terrorism. Until now, insurgent enemies were sometimes able to confront states with serious perils and in various theatres of conflict, but they were never actually capable of posing any catastrophic hazards to a nation's homeland. Now, however, with the steadily expanding prospect of WMD-equipped terrorist enemies—possibly, in the future, even well-armed nuclear terrorists—humankind could face dire strategic situations.[17]

For the United States, the post-withdrawal situation in Afghanistan portends heightened chances of WMD terrorism against the homeland and certain Allies and partners. Adversarial particulars remain unclear, but the resurgence of ISIS-Khorasan and the strengthening of other Islamist groups may bode ill for rational enemy decision making.

To face such an unprecedented security situation, national leaders will need to arm themselves with properly fashioned nuclear doctrine and policies. Such doctrine and policies should never represent seat-of-the-pants reactions to ad hoc threats. Instead, because generality expresses a trait of all serious meaning in science, such doctrine and policies should be shaped according to broad categories of strategic threat. In the absence of such previously worked-out conceptual categories, human leadership responses are almost certain to prove inadequate or worse.

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17. Bennett Ramberg, *Destruction of Nuclear Energy Facilities in War* (Lexington, MA: Lexington Books, 1980); Ramberg, "Attacks on Nuclear Reactors: The Implications of Israel's Strike on Osiraq," *Political Science Quarterly* 97, no. 4 (Winter 1982–83), https://www.jstor.org/; and Ramberg, "Should Israel Close Dimona? The Radiological Consequences of a Military Strike on Israel's Plutonium-Production Reactor," Arms Control Association (website), September 3, 2008, https://www.armscontrol.org/.

With regard to synergies, such portentous intersections could occur between certain military and nonmilitary threats. For example and prospectively most ominous, would-be synergies between nuclear proliferation and disease pandemic could pose variously grave threats. In the conceivably worst case, a man-made plague of nuclear war would coincide with a natural plague of pathogens. Any such "force multiplication" should be prevented at all costs.

## The Question of Rationality

All strategic policies have been founded upon some underlying assumption of rationality. Rationality and irrationality have now taken on specific meanings. More precisely, an actor (state or substate) is presumed determinedly rational to the extent its leadership always values national survival more highly than any other conceivable preference or combination of conceivable preferences.

Conversely, an irrational actor might not always display such a determinable preference ordering. We Americans have always presumed our enemies—states and terrorists—would invariably value their continued survival more highly than any other preference or combination of preferences. But this core assumption can no longer be taken for granted.

Confronted, inter alia, with *Jihadist* enemies, states, and terrorists, world leaders must quickly understand our primary threats to retaliate for first-strike aggressions could sometimes fall on deaf ears. This recalls the issue of Palestinian statehood and nuclear risk. For Israel, the main problem with a Palestinian state would not lie in its prospective nuclearization but rather its generally weakening effect on the Jewish state. Along somewhat similar lines of reasoning, the loss of Afghanistan did not create any specifically nuclear war risks for the United States per se. But it does contribute to an incremental diminution of US military influence (especially in the region). Moreover, Islamic Pakistan, which is already nuclear, has been strengthened by the American loss and could, among other reactions, become more expressly risk tolerant on various strategic challenges issuing from India.

This holds true whether we would threaten massive retaliation or instead, the more graduated and measured forms of reprisal termed "nuclear utilization theory." Conspicuous preparations for nuclear war fighting should be conceived not as distinct alternatives to nuclear deterrence but as essential and even integral components of nuclear deterrence.

Some years ago Colin Gray, reasoning about US-Soviet nuclear relations, argued a vital connection exists between "likely net prowess in war and the quality of prewar deterrent effect."[18] Elsewhere, responding to this writer, Gray said essentially the same thing.

18. Colin Gray, "National Style in Strategy: The American Example," *International Security* 6, no. 2 (Fall 1981): 35, https://www.jstor.org/; and Gray, "Presidential Directive 59: Flawed but Useful," *Parameters* 11, no. 1 (March 1981): 34.

"Fortunately, there is every reason to believe that probable high proficiency in war-waging yields optimum deterrent effect."[19]

Ultimately, sensible nuclear doctrine must recognize the critical connections between law and strategy. From the formal standpoint of international law, certain expressions of preemption or defensive first strikes are known as anticipatory self-defense.[20] Expecting possible enemy irrationality, when would such protective military actions be required to safeguard the human homeland from diverse forms of WMD attack? *Prima facie*, this is now an all-important question.

## International Law and Targeting

Decision makers and commanders face pertinent jurisprudential issues. Recalling that international law is part of the law of the United States, how could anticipatory military defense actions be rendered compatible with conventional and customary obligations? In the words of Justice Horace Gray, delivering the judgment of the US Supreme Court in *Paquete Habana* (1900), "International law is part of our law, and must be ascertained and administered by the courts of justice of appropriate jurisdiction."[21] This critical matter must be raised. Moreover, the specific incorporation of treaty law into US municipal law is expressly codified at Article 6 of the US Constitution, the so-called Supremacy Clause.[22]

From the standpoint of international law, it is always necessary to distinguish preemptive attacks from preventive ones. Preemption is a military strategy of striking first in the expectation that the only foreseeable alternative would be to be struck first oneself. A preemptive attack is launched by a state that believes enemy forces are about to attack. On the other hand, a preventive attack is not launched out of any genuine concern about imminent hostilities but rather for fear of some longer-term deterioration in a prevailing military balance.

In a preemptive attack, the enemy action's anticipated duration is presumptively very short; in a preventive strike, the anticipated interval is considerably longer. A related problem here is the practical difficulty of accurately determining imminence and the correlated problems of postponement. To the point, delaying a defensive strike until an imminent threat would be tangibly ascertainable could sometime invite an existential harm. A pertinent state's resort to anticipatory self-defense could be nuclear or nonnuclear and be directed at either a nuclear or nonnuclear adversary. By definition, any such resort involving nuclear weapons on one or several sides could prove catastrophic.

19. Gray, "Flawed but Useful," 34.

20. For the sources of international law, see: "History," International Court of Justice (website), n.d., accessed January 24, 2022, https://www.icj-cij.org/; and Statute of the International Court of Justice, art. 34, para. 1, 59 Stat. 1031, T.S. No. 993, 3 Bevans 1153, 1976 Y. B. U. N., 1052.

21. US Supreme Court, The Paquete Habana, 175 U.S. 677 (1900), https://supreme.justia.com/.

22. Tel–Oren vs. Libyan Arab Republic, 726 F. 2d 774 (1984).

General John T. Chain, former USAF Strategic Air Command chief and Joint Strategic Target Planning Staff director to whom this article is dedicated, recognized that world leaders must understand that any proposed national strategic doctrine should consider and reconsider the key issues of nuclear targeting. Relevant operational concerns here would concern vital differences between the targeting of enemy civilians and cities (so-called countervalue targeting) and targeting of enemy military assets and infrastructures (so-called counterforce targeting). Plausibly, most national leaders still do not realize that the actual essence of massive retaliation was always an unhidden plan for countervalue targeting.

Any such partially resurrected doctrine could sound barbarous or at least inhumane, but if the alternative were less credible systems of nuclear deterrence, certain explicit codifications of countervalue posture might still represent the best way to prevent millions of civilian deaths from nuclear war or nuclear terrorism.

Ultimately, neither preemption nor countervalue targeting could ever guarantee absolute security for planet Earth. It is nonetheless imperative that America put serious strategic thinkers back to work on these and other critically related nuclear warfare issues. Prescribed thinking should generally be dialectical. The dialectician, says Plato, is the special one who knows how to ask and then answer vital questions.

## Deeper Issues

### *The Soul*

Further, global rescue must always go beyond narrowly physical forms of survival. At stake is not just the palpable survival of Homo sapiens as a distinct animal life form, but also the species' essential *humanitas,* that is, its sum total of individual souls seeking redemption. Sigmund Freud and Carl Jung both thought of the soul as the intangible essence of a human being, its *humanitas.* Neither Freud nor Jung ever provided any precise definition of the term, but it was never intended by either in some ordinarily familiar religious sense. For both psychologists, it represented a recognizable and critical seat of mind and of passions *in this life.*

Interestingly in the present analytic context, Freud explained his predicted decline of American civilization by invoking various express references to soul. Freud was disgusted by any civilization so apparently unmoved by considerations of true consciousness (e.g., awareness of intellect, literature, and history); he even thought the crude American commitment to perpetually shallow optimism and material accomplishment would inevitably occasion sweeping emotional misery.

### *Chaos*

For now, however, too few have displayed any meaningful understanding of the less tangible but still vital variant of human survival—chaos. Whether described in the Old Testament or other major sources of ancient Western thought, chaos can also be viewed

as a source of human betterment. In essence, chaos prepares the world for all things, both sacred and profane.

As its conspicuous etymology reveals, chaos represents the yawning gulf or gap wherein nothing is, but where all civilizational opportunity must originate. Appropriately, the great German poet Friedrich Hölderlin observed "there is a desert sacred and chaotic which stands at the roots of the things and which prepares all things."[23] Even in the pagan ancient world, the Greeks thought of such a desert as *logos,* a designation that indicates to us it was presumed to be anything but starkly random or without conceivable merit.

## In the End

The first time after the Cuban Missile Crisis that a world leader will face an authentic nuclear crisis, the response should flow seamlessly from broad and previously calibrated strategic doctrine. It follows that national leaders should already consider how this complex doctrine should best be shaped and codified. Whatever the particulars, these leaders must acknowledge at the outset the systemic nature of our world order problem. "The existence of system in the world," says French philosopher Pierre Teilhard de Chardin, "is at once obvious to every observer of nature, no matter whom."[24]

Any planetary system of law and power management that seeks to avoid nuclear war must recognize a significantly underlying axiom: as egregious crimes under international law, war and genocide need not be mutually exclusive.[25] On the contrary, as one may learn from history, war could sometimes be undertaken as an efficient manner of national, ethnic, racial, or religious annihilation.[26] This was almost certainly the case with respect to Germany's World War II aggressions, crimes oriented deliberately to Adolph Hitler's always primary war against the Jews. When the war in question becomes nuclear, the argument must become unassailable.

In light of Russia's 2022 war against Ukraine, it is time to start worrying again about nuclear war avoidance, but this time, just worrying will not be enough. The only reasonable use for nuclear weapons on this imperiled planet will still be as controlled elements of dissuasion and never as actual weapons of war. The underlying principles of such a rational diplomatic posture go back long before the advent of nuclear weapons. In his oft-studied classic *On War*, ancient Chinese strategist Sun-Tzu reminds succinctly, "subjugating the enemy's army without fighting is the true pinnacle of excellence."[27]

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23. Louis René Beres, "Convergence and Chaos: Intersecting Security Threats to the United States," Jurist, November 30, 2020, https://www.jurist.org/.

24. Pierre Tielhard De Chardin, *The Phenomenon of Man* (New York: Harper Perennial, 2008).

25. Convention on the Prevention and Punishment of the Crime of Genocide, January 12, 1951, 78 U.N.T.S. 277.

26. Lucy S. Dawidowicz, *The War Against the Jews: 1933–1945* (New York: Penguin Random House, 1986).

27. Sun Tzu, *The Art of War*, trans. Samuel B. Griffith (Oxford: Oxford University Press, 1963).

There can be no more compelling strategic dictum. This distilled wisdom represents the "one big thing" for US strategists, commanders, and policy makers to know. It would be best not to have any enemies in the first place, of course, but such residually high hopes would be without any intellectual foundation. They would always remain unsupportable.

The unwelcome outcomes in Afghanistan and recent Russian invasion of Ukraine do not portend heightened nuclear warfare prospects per se, but they do suggest a generally widening diminution of American power. Among other things, this diminution could spawn various regional or even global crises that bring the United States into a much larger ambit of WMD scenarios, ones involving both war and terror. Even if the United States does not become involved in any such crises directly, other states or even the wider world could quickly become entangled *in extremis atomicum*.

Immediately, to whatever extent possible, national leaders should make all appropriate intellectual and analytic preparations for nuclear war avoidance. In carrying out this responsibility, especially careful attention should be directed to the scenarios of inadvertent nuclear war, as well as narratives pertaining both to accidental nuclear conflict and to a nuclear war resulting from miscalculation. All the while, prospects for a deliberate nuclear war should never be downplayed; preparations for credible nuclear deterrence must be continuously maintained at the highest possible levels. To meet this urgent requirement, leaders of nuclear and near-nuclear states must first acknowledge the recurrent seriousness of a global atomic threat. This is not a time for any leadership complacence. Instead, it is an optimal time to "start worrying again."

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