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AIR & SPACE POWER JOURNAL

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INTRODUCTION

21ST CENTURY AIRPOWER

MODERN SPACEPOWER

DETERRENCE IN A MULTIPOLAR ERA

Shared Skies, Separate Orbits

The Next Chapter of Air and Space Force Education

World War II had unequivocally proven the strategic potential of airpower. In its wake, US Army leaders began deliberately planning a new, thorough system of professional education for its air component. They were determined to solve the pre-war problems that had hampered them—the division of doctrinal agencies and the absence of a tiered structure for junior and senior officer training. The solution was the creation of a unique and integrated school system dedicated to airpower thought and leader development. In March 1946, the Army Air Forces officially established Air University. By September of that year, a full twelve months before the US Air Force would become an independent branch of service, courses dedicated to air warfare theory were underway within this Army-built institution. This history offers more than just a parallel; it is a powerful precedent for how a parent service's deliberate stewardship can accelerate the development of a new service's unique educational foundation.

The historical echo resonates powerfully today as the Department of the Air Force (DAF) navigates a similar, and equally vital, inflection point. The establishment of the United States Space Force in 2019 initiated a new chapter in military evolution, with a parent service once again guiding a nascent force toward a strong and self-supporting future. Because Air University was born from the Army's deliberate support, we acutely understand our responsibility to serve as that same supportive incubator for the Space Force today. As the Commander of Air University, I believe this moment demands a clear, collaborative strategy. My vision is twofold: to deliberately support the Space Force's need for a distinct, Guardian-focused educational enterprise, while simultaneously refocusing and strengthening Air University's core mission as the world's premier institution for airpower. This is how we chart the next chapter for the warfighters who defend our shared skies and the boundless space above them.

Just as early airmen had to determine which functions were uniquely "air" versus those that remained part of the broader Army, leaders today must assess which institutions should support one service, and which should serve the entire Department. Air University recognizes the immense value of shared DAF institutions. The Air Force Institute of Technology, for example, provides highly specialized, graduate-level technical education that logically serves as a DAF-wide center for advanced learning. Similarly, the US Air Force Academy continues to function as a critical commissioning source for both services. Strategic broadening opportunities, such as fellowships, are also effectively managed as shared programs. Furthermore, the DAF-level School of Advanced Air and Space Stud-

ies remains a unique model, reserving specific seats for Guardians to ensure joint intellectual cross-pollination. This approach ensures efficiency, allowing the Space Force to leverage the Air Force's established institutional power where it makes the most strategic sense.

However, we also recognize that true domain mastery requires more than just shared classrooms. The imperative to build a unique Space Force culture stems from the fundamental purpose of military service: to contest and, when necessary, control a physical warfighting domain. Just as the Army was created for the land and the Navy for the sea, the Space Force was established to secure superiority in space. The differences between operating in the air and in space are even more distinct and dramatic than operating on land versus at sea. Unique operational concepts are required in an environment with no front lines and where threats move at orbital velocities. Furthermore, as strategic competitors have demonstrated, space is no longer a benign support environment but a battlefield from which US forces can be targeted.

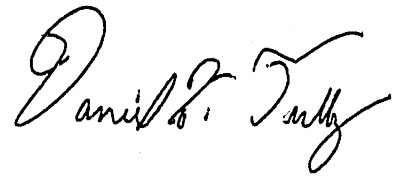
At Air University, we understand that winning in this domain requires Guardians who possess a deep, native understanding of these realities. We know we cannot build a Guardian ethos using an Airman's curriculum. Therefore, we fully support the principle that a Guardian's entire professional education must be focused on instilling the mindset, skills, and strategic theory required to achieve space superiority. To the greatest extent possible, a Guardian's education must be steeped in the unique theory, doctrine, and culture of the space domain.

This understanding is already reshaping how we operate at Maxwell Air Force Base. Today, Air University welcomes Space Force officers and enlisted personnel into our Professional Military Education (PME) schools, not merely as subordinate DAF members, but as true sister-service students, in the exact same way we welcome a Soldier, Sailor, or Marine. We are deliberately adapting our approach to give the Space Force the operational room it needs to grow its own institutional framework. This separation is not a rejection of Air Force support; rather, it is Air University fulfilling its historical mandate to help a new service build the foundation required to win in its respective domain.

To envision how this relationship will mature, the Department of the Navy illustrates a highly effective model in its relationship with the US Marine Corps. The two services are inextricably linked, yet when it comes to PME, their approach is a masterclass in organized separation. Marine Corps University is the Marine Corps' own distinct intellectual enterprise, instilling its unique warfighting ethos, and allowing the Corps to remain focused on its core mission, relying on its parent service to provide everything from medical and chaplain services to major logistical support. While the two services maintain their own PME ecosystems, they actively exchange students, ensuring joint effectiveness. This model provides a historical blueprint for how two distinct services can thrive through a combination of institutional independence and pragmatic, shared support.

Whatever final educational architecture the Space Force ultimately builds to meet its congressional and operational mandates, Air University's path forward is clear. We will aggressively hone our focus on the art and science of air warfare. At the same time, we will remain an always-available, collaborative DAF partner, ready to support the Space Force with specialized graduate-level education, DAF-level programs, and shared infrastructure.

The integration of all domains is essential for modern combat operations and is pertinent to all military education institutions. The deliberate evolution of air and space education into distinct paths is not a sign of division, it is a hallmark of strategic maturity. It is a recognition that true mastery in domains as complex as air and space requires dedicated focus, a principle understood by pioneers like General Muir S. Fairchild who guided the establishment of Air University. Today, we empower each service to cultivate deep, native expertise, exponentially enhancing the lethality and effectiveness of the entire Department of the Air Force. The Air Force and Space Force, born from a shared heritage and bound by common purpose, are moving forward together with the entire Joint Force—separate, but unified. This is how we will provide our nation with the integrated combat power required to compete, deter, and win now and into the future.



LT GEN DANIEL H. TULLEY, USAF
Commander and President, Air University

Dear Reader,

As we approach the 250th anniversary of the nation's birth this July, it is with great pleasure that we announce the relaunch of the distinguished *Air and Space Power Journal* (*ASPJ*).

The last year presented Air University Press with significant opportunities disguised as challenges. The discourse surrounding the future of our publications prompted a reevaluation of our business model, leading to a sharpened focus on lethality and the needs of the warfighter and the broader national defense community. As manpower reductions continue across the federal government, we bid farewell to esteemed colleagues who retired or pursued new endeavors. These constraints necessitated the consolidation of our journal lineup to maintain our commitment to serving the warfighter and enhancing strategic and operational lethality. Consequently, the revival of the esteemed *ASPJ* will effectively consolidate *Æther* and *Air & Space Operations Review* (*ASOR*), allowing for comprehensive coverage of air and space power topics.

This issue begins with a four-ship formation of articles in the 21st Century Airpower Forum. Lieutenant General (Ret) Dave Deptula leads with "The Enduring Primacy of Air Superiority in Modern Warfare," which offers a robust counterargument to recent discussions seeking to reframe how air superiority is perceived by policymakers and planners. He contends that the traditional view of air superiority remains indispensable for victory, viewing tactical innovations observed in recent conflicts as evidence.

Next, Dr. Peter Layton provides a more cosmopolitan perspective in "The New Heterogeneous Air Force Model." He argues that the production of manned air forces is unsustainable in a major conflict and that to be resilient, air forces must rapidly integrate unmanned systems and cost-effective technologies. Dr. Heather Venable's "Reconceptualizing Strategic Attack" then reexamines historical "strategic attacks," positing that they were often more accurately defined as operational. She proposes a revised, joint definition to mitigate interservice tensions and improve joint operations. Concluding the forum, Dr. William "Bill" DeMarco's "Lords of the New Church" takes an epistemological look at Air Force orthodoxy, arguing that the service risks prioritizing ritual over readiness and doctrine over adaptability.

In the Modern Spacepower Forum, Dr. Ben Zweibelson's "An Emergence of Space, Cyberspace, and Special Operations Forces Synthesis" asserts that recent technological advancements and their intersection with Special Operations Forces demands a doctrinal reassessment and offers two models to guide future development. Following that, Dr. Wendy Whitman Cobb's "The Many Restraints of Commercial Space" explores how the integration of commercial space systems into state power can create disincentives for aggression, potentially acting as a stabilizing force.

The issue concludes with the Deterrence in a Multipolar Era Forum. Dr. Adam Lowther and Dr. Stephen Cimbala's "Nuclear Strategic Parity in a Tripolar World" examines the challenges presented by the tripolar nuclear system of Russia, China, and the United States, proposing that the United States pursue a dynamic strategy of nuclear parity. Finally, Dr. James Waltz and Dr. Jeffrey Larsen's "Back to the Future" asserts that the revival of US conventional-nuclear integration will strengthen deterrence, emphasizing that both proponent and critic perspectives are crucial in the modern security environment.

These articles represent the scope of topics we will continue to address as we sunset *Æther* and *ASOR*. On behalf of the Air University Press team, we hope you will join us in celebrating the revival of *ASPJ* and enjoy this "inaugural" issue.

~The Editor

The Enduring Primacy of Air Superiority in Modern Warfare

DAVID A. DEPTULA

Air superiority is more essential to victory in warfare today than at any time since the concept first emerged over a century ago. From its roots in World War I, air superiority has consistently served as the backbone of successful military strategy. At its core, it grants two critical advantages: freedom to attack and freedom from attack. By controlling the air domain, a nation can shape the dynamics of conflict to its benefit. This enduring truth was most recently reaffirmed by Israel's application of airpower against Iran in June 2025.[1]

Air superiority is a mission that was forged in combat and paid for with the sacrifices of those who learned the hard truths of warfare. From the biplane dogfights of World War I to Israel's high-tempo air campaign against Iran, achieving and maintaining air superiority has proven indispensable to securing victory and achieving strategic objectives.[2]

This imperative endures even as warfare evolves to include drones, space, cyber capabilities, and other technological advances. Those who question this should consider the realities of Russia's war in Ukraine. It offers a stark contrast to Israel's campaign against Iran. Ukraine and Russia's inability to establish air superiority has locked both sides into a grinding war of attrition. Conversely, Israel's rapid attainment of air superiority over Iran enabled it to meet its strategic objectives with speed, precision, and operational freedom.

As small drones and loitering munitions proliferate across the Ukrainian battlespace, some analysts have proposed *air denial* as a viable strategy to deal with the challenges posed in a supposed *air littoral*.[3] Others have suggested that modern warfare should "move beyond air superiority."[4] Prominent technologists have questioned the need for advanced fighter aircraft when—in their

Lieutenant General David A. Deptula, USAF, Retired, is dean of the Mitchell Institute for Aerospace Studies.
Article originally written in May 2025.

1. Yaroslav Trofimov, "Israel Takes Control of Iran's Skies—a Feat That Still Eludes Russia in Ukraine," *The Wall Street Journal*, 15 June 2025, https://www.wsj.com/.

2. David A. Deptula, "Why Airpower Plays a Key Role in Israel's Military Campaign," *Forbes*, 23 June 2025, https://www.forbes.com/.

3. Maximilian K. Bremer and Kelly A. Grieco, "Air Denial: The Dangerous Illusion of Decisive Air Superiority," Atlantic Council, 30 August 2022, https://www.atlanticcouncil.org/.

4. Michael P. Kreuzer, "Beyond Air Superiority: The Growing Air Littoral and 21st Century Airpower," *Æther: A Journal of Strategic Airpower & Spacepower* 3, no. 3 (2024): 40.

view—uninhabited aircraft could achieve the same results at less cost.[5] Such critiques, reflecting confidence in the capabilities of modern technology, often confuse tactical improvisation with strategic sufficiency.

Airpower has always been shaped by those willing to question assumptions, challenge orthodoxy, and leverage emerging technologies to advance operational advantage. That spirit of innovation is the hallmark of air-minded thinking. Yet while innovation rightly demands that Airmen continuously reexamine assumptions, it does not absolve us from the obligation to critically assess the difference between suppositions and operational truth. While technological advancements continue to expand the range of military capabilities, maintaining air superiority persists as a fundamental and indispensable principle of modern warfare.

Definitions

A clear understanding of the terms associated with control of the air domain is essential to any serious discussion of airpower. The concepts of air superiority, air supremacy, and air parity describe different degrees of control, each with direct implications for joint operations, force survivability, and strategic success.[6]

Air Force doctrine defines air superiority as "that degree of control of the air by one force that permits the conduct of its operations at a given time and place without prohibitive interference from air and missile threats."[7] It is not an absolute or permanent condition but is gained and maintained in specific locations and time frames—windows of opportunity that enable freedom of action. Air superiority allows friendly forces to operate with reduced risk, while simultaneously denying the enemy the same freedom. The importance of air superiority has been demonstrated repeatedly: from the skies over Europe and the Pacific in World War II to the deserts of Iraq, Iran, and Syria and the mountains of Afghanistan. Since the inception of airpower, the success of every major US military operation has rested on the ability to control the air.

Air supremacy denotes an advanced state of aerial dominance in which enemy air forces are rendered incapable of mounting effective interference within a specified operational area. Achieving this condition is highly challenging when facing near-peer adversaries equipped with sophisticated air defenses. Yet, in every conflict since 1991, the United States enjoyed near-total air supremacy. It has experienced air supremacy for so long, the criticality of this condition and the necessity of allocating resources to achieve and sustain it have diminished. This level of air control enabled both Israel and the United States to substantially degrade Iran's nuclear program in June 2025.

5. Ryan Pickrell et al., "Elon Musk Says Human-Piloted Fighter Jets Like the F-35 Are Obsolete. Drone Tech Can't Yet Fill the Gap," *Business Insider*, 26 November 2024, https://www.businessinsider.com/.

6. Air Force Doctrine Publication (AFDP) 3-01, *Counterair Operations* (Department of the Air Force [DAF], 15 June 2023), 1–2, https://www.doctrine.af.mil/.

7. AFDP 3-01.

At the opposite end of the spectrum is air parity: a condition in which neither side has effective control of the air. In this environment, both friendly and enemy forces face persistent risk from aerial threats. Air parity often results in high attrition rates and degraded operational effectiveness. This was the default condition during World War II until the Allies achieved air superiority later in the European campaign. It is also the prevailing condition in Ukraine today—where dense ground-based threats, insufficient modern air capabilities, and a variety of other issues on both sides have produced a contested and highly lethal air environment.

Some analysts have proposed alternative terms such as *mutual air denial* to describe contested airspace.[8] Yet, this refers to a condition that is functionally equivalent to air parity and does not warrant new terminology. At low altitudes, this condition often results from dense concentrations of ground-based air defenses such as man-portable air defense systems (MANPADS), anti-aircraft artillery (AAA), and surface-to-air missile systems (SAMS), which deny flight corridors without necessarily granting the defender control of the skies.

These distinctions are not merely academic. They provide a doctrinal framework for operational planning and highlight why achieving air superiority—not merely denying it to the enemy—remains central to successful joint operations.

The Importance of Doctrine

Military doctrine is more than theory: it is the distilled wisdom of warfighting experience. It reflects lessons forged in the crucible of battle, paid for with blood, sacrifice, and hardship. Doctrine guides force development, operational design, and tactical execution. While doctrine must evolve with technological advances and lessons from current conflicts, it must also preserve the enduring principles that enable strategic success. Striking this balance is critical.

History offers stark reminders of what happens when militaries abandon proven doctrine in pursuit of untested ideas. After World War I, for example, France misread the character of future warfare, investing heavily in static fortifications such as the Maginot Line and emphasizing heavy tanks designed for linear defense. The result was strategic inflexibility—an army optimized for the last war, unable to counter Germany's mobile combined-arms approach in 1940.

Likewise in the interwar period, early airpower theorists such as Giulio Douhet championed strategic bombing as a war-winning capability, believing bombers could always penetrate enemy airspace and destroy industrial capacity with minimal opposition.[9] While strategic bombing ultimately played a pivotal role in World War II, its early execution suffered from theoretical overreach and technological limitations. Allied bombers incurred devastating losses until

8. Bremer and Grieco, "Air Denial."

9. Robert Dudnet, "Douhet," *Air Force Magazine*, 20 April 2011, 64, https://www.airandspaceforces.com/.

the introduction of longer-range escort fighters and more survivable aircraft designs. It took a second cycle of innovation—grounded in combat experience—to validate the role of strategic bombing as an effective campaign tool.

These examples underscore a critical point: doctrine must be adaptive but not ahistorical. It should integrate new tools and techniques while remaining anchored in operational truths. To jettison enduring tenets—such as the importance of air superiority—because of contemporary improvisations risks repeating past errors under modern conditions.

This is especially relevant today, as some propose new concepts such as mutual air denial or drone-dominated combat as strategic alternatives. These suggestions often stem from observations in constrained environments—such as Ukraine—where improvisation was driven by necessity, not preference. Without proper context, there is a danger that short-term tactical adaptations will be mistaken for long-term operational solutions.

The challenge for today's military leaders and strategists is to critically evaluate emerging lessons without abandoning time-tested principles. Doctrine must remain flexible enough to absorb innovation yet firm enough to avoid being reshaped by every new tactical trend. Success in future conflicts will depend on the ability to incorporate new technologies—such as uninhabited aerial vehicles (UAV), first-person view (FPV) precision-guided munitions (PGM), cyber tools, and electronic warfare—into a coherent doctrinal framework that remains grounded in strategic fundamentals.

Air superiority, for instance, is not just a legacy concept: it is a foundational condition for joint force effectiveness. Its relevance spans all domains and all levels of warfare. No amount of technological novelty can substitute for the operational freedom it provides. Doctrine that fails to account for this reality will leave the military unprepared for the demands of future conflicts.

Observations from Recent Conflicts

Confusing Ways and Means: Technology, Terminology and Misconceptions

The widespread use of UAVs in Russia's war in Ukraine—especially in the form of low-cost, FPV drones—has led some to question the enduring relevance of air superiority.[10] Proponents of this view argue that these developments mark the dawn of a new era in which control of the skies is no longer necessary or even possible. They have claimed that air superiority is an outdated goal given the increasing use of drone swarms and the distributed lethality that

10. Kreuzer, "Air Superiority."

results.[11] These arguments confuse adaptation under constraint with a shift in strategic logic.

What has occurred in Ukraine is not a doctrinal breakthrough, but an improvisational workaround driven by necessity. Ukraine had to come up with a means to effectively defend itself considering its weapon capacity deficiencies relative to Russia. The solution was to develop cheap, easy to produce and tactically effective PGMs—largely quadcopters with explosive charges—that could be effectively used both in traditional infantry and armor engagements.

Ukraine was also denied access to sufficient numbers of modern Western fighter aircraft and other means to conduct offensive counter-air operations. Its drone-centric adaptation reflects innovation under pressure—not the emergence of a preferred model for future warfare. Indeed, Ukraine's persistent lobbying for F-16s and other Western aircraft underscores its continued recognition of the importance of air superiority. A nation embracing air denial would not seek modern aircraft to achieve air superiority.

The actual effects of small UAVs and FPV drones are many. Perhaps the most significant in the context of the Russia-Ukraine war is that they provide individual soldiers access and control of their own PGMs. Before this war, PGMs were generally only applied in quantity by combat aircraft.

A second class of weapons incorporated by Ukraine, often redundantly termed "one-way kamikaze lethal attack drones" or some similar phrase, are in reality cruise missiles. Powered by propellers rather than turbojets, Ukraine uses these indigenously made inexpensive cruise missiles as a substitute for penetrating aircraft that could deliver PGMs to conduct strategic attack and interdiction missions inside Russia. It has not carried out these cruise missile attacks at a rate or intensity that would be possible with a robust coalition of air forces. Yet, by accelerating its substitute means and applying an effects-based strategy, they may ultimately give Ukraine a path toward strategic success.[12]

Contributing to some of the misconceptions emanating from Russia's war in Ukraine is that the term *drone* is so ubiquitous that it has become an imprecise descriptor encompassing a wide range of UAVs and munitions with varying capabilities and applications. Its ambiguity obscures the distinctions between small hobbyist toys, military aircraft, cruise missiles, and munitions, often leading to misunderstandings and inaccurate perceptions.

A notable example was the January 2024 claimed drone attack by the Islamic Resistance in Iraq on Tower 22 in Jordan that killed three US Soldiers. Some stated that it "was the first time in nearly 70 years that the US military lost ground combatants to an adversary airstrike, excluding missile attacks."[13]

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11. Bremer and Grieco, "Air Denial."

12. David A. Deptula, "Ukraine's Effects-Based Precision Guided Munition Strikes: Implications," *Forbes*, 12 June 2025, https://www.forbes.com/.

13. See Kreuzer, "Air Superiority."

The weapons used in that attack were in fact cruise missiles—in other words, munitions—not reusable strike aircraft. Moreover, no air defenses were assigned to protect the outpost—illustrating a failure of force protection policy rather than a failure of air superiority.

The fundamental error in the concept of air littoral and air denial is conflating what Ukraine is doing out of necessity with what it would choose to do if it possessed adequate means to achieve air superiority. To fit their preferred narrative, proponents of these terms make the assertion that Ukraine is executing an air denial strategy. In fact, Ukraine's actions result from significant strategic limitations in both capability and resource allocation.

FPV PGMs have undoubtedly transformed the tactical landscape of ground combat, but their adoption has primarily been fueled by strategic necessity due to the West's unwillingness and inability to supply Ukraine with sufficient conventional artillery and by the choice of two US administrations not to modernize Ukraine's air force as rapidly as Ukraine would like.[14] Ukraine's adoption of cruise missiles as substitutes for penetrating aircraft, and FPV PGMs as substitutes for precision artillery, illustrates tactical ingenuity—not an air denial strategy instead of air superiority. Proposing these improvisations as an enduring strategy that the United States should embrace risks building a future force on false premises. Denying the enemy the skies may delay defeat—but it is the ability to gain mastery of the skies that enables victory.

"Air Littoral": An Inaccurate Term

The term *air littoral*—drawing a parallel to maritime contested zones to describe contested airspace—to describe a low-altitude zone densely populated with drones, loitering munitions, and short-range air defenses offers no real advantage over existing terminology.

To begin with, the term is inappropriate. *Littoral* by definition refers to a coastal zone—terrain situated along the shore of a sea or lake.[15] There is no analogous boundary in the sky. The term *low-altitude airspace* already exists and generally describes the contested vertical domain in question. Moreover, advocates of the term air littoral define it as the "area from the Coordinating Altitude to the Earth's surface."[16] Coordinating altitude is a procedural airspace control measure already established in joint doctrine.[17] In other words, the area making up the supposed air littoral is already defined. Introducing unnecessary

14. Vadim Kushnikov, "US So Far Excludes Transferring F-16 Fighter Jets to Ukraine – Biden," MilitarNYI, 25 February 2023, https://militarnyi.com/.

15. *The Oxford Pocket Dictionary of Current English*, "littoral," accessed 11 July 2025, https://www.encyclopedia.com/.

16. Kelly A. Grieco and Maximilian K. Bremer, "Contesting the Air Littoral," *Æther: A Journal of Strategic Airpower & Spacepower* 3, no. 3 (2024): 11, https://www.airuniversity.af.edu/.

17. Joint Publication 3-52, *Joint Airspace Control* (Chairman of the Joint Chiefs of Staff, 13 November 2014), III-6, C-6, GL-4, https://irp.fas.org/.

new terminology that has not undergone a thorough vetting in the joint doctrine development process risks confusing what is already clear. More important, it risks misdefining the real challenge—optimizing the means to defeat enemy systems of relevance in low-altitude airspace.

Proponents go on to argue that the air littoral is "the airspace between ground forces and high-end fighters and bombers."[18] This is an inaccurate description considering that high-end fighters routinely operate at very low altitudes and recently demonstrated the ability to do so very effectively in defeating Iranian cruise missile attacks against Israel.

More fundamentally, the term air littoral reinforces a common flawed assumption about joint warfare: that land warfare will always be a fundamental component of every conflict with the implication that high densities of small drones/PGMs will be present virtually everywhere. This stems from the fundamental error of always tying airpower to landpower. That interpretation may be one of the greatest limitations of military perspective in the twentieth and twenty-first centuries as it disregards airpower's unique value as a key force of its own and a potential decisive strategic instrument.[19] Joint warfare is not intended to use every force every place and every time force is needed, but to apply the right force at the right place at the right time to achieve desired military effects.

The proliferation of small drones/PGMs demands attention. They are new tools in the conduct of warfare. The air littoral terminology misses that these low-altitude threats are specific to a particular conflict environment. In the Russia-Ukraine war their density is high only in the vicinity of the front lines of ground combat, which only exists because of the failure of either side to achieve air superiority.

Use of drones/PGMs at low altitudes over ground forces in close combat does not affect the significance or need for air superiority as a mission. Air superiority is a way toward achieving an end. The means by which it is achieved may vary depending on the severity of the threats present in low-altitude airspace in a particular area of interest. In Vietnam, over 80 percent of the US Air Force aircraft combat losses were due to AAA in the low-altitude environment.[20] To avoid these disastrous consequences, during Operation Desert Storm we designed air operations—to include the early achievement of air superiority—to avoid low-altitude airspace altogether. Not until ground forces were engaged during the final four days of that 43-day war was that limitation lifted, and then only when it became necessary to fly lower to save soldiers' lives.[21]

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18. Bremer and Grieco, "Air Denial."

19. Phillips P. O'Brien, "The Weirdest Air Campaign In History," Phillips's Newsletter, 27 June 2025, https://phillipspobrien.substack.com/.

20. Rebecca Grant, "The Crucible of Vietnam," *Air & Space Forces Magazine*, 1 February 2013, https://www.airandspaceforces.com/.

21. Thomas Keaney and Elliot Cohen, *Gulf War Airpower Survey Summary Report* (DAF, 1993), 22, https://apps.dtic.mil/.

Operations Desert Storm, Allied Force, and Israel's dominance over Iran during Operation Rising Lion showcased what air superiority can achieve when applied at scale: unfettered air operations that delivered strategic paralysis of enemy leadership, destruction of fielded forces, and rapid achievement of political objectives with minimal ground engagement. By contrast, Ukraine, lacking the ability to gain air superiority, was forced into a defensive campaign with incredibly heavy casualties. The lesson is that without air superiority even the most courageous and creative defense becomes a war of survival rather than one of decision.

Renaming established terminology does not enhance clarity; rather, it may obscure existing doctrine and redirect attention inappropriately. For example, there is evidence suggesting that the Army may be adopting the air littoral term to assert increased control over low-altitude airspace, an area traditionally managed jointly with the Air Force when both services operate in proximity.[22] On 30 April 2025, Secretary of War Pete Hegseth issued a memorandum instructing the Army secretary "to achieve air-littoral dominance," which implies an intention for the Army to obtain authority over the so-called air-littoral airspace.[23] From a joint operational standpoint, this approach raises several concerns. Specifically, the term air littoral is not in the DOW dictionary and has not gone through the joint doctrine development process. It is likely that advocates included this term during memo drafting to lend it legitimacy, potentially without the secretary of defense's full awareness of its disputed status or the lack of consent of its use by the Air Force.

The operational need shared by all the service components is not to substitute new terms for terms that already exist but to ensure that control measures for ground-based air defenses are integrated with aircraft from all the service components to effectively deal with large numbers of enemy cruise missiles, drones/PGMs at scale, and/or swarms of these munitions as appropriate to a particular conflict. The operational challenge is real; the solution lies not in semantics, but in capability, coordination, and strategic coherence.

Drones/PGMs and loitering munitions have undoubtedly reshaped the tactical environment, particularly in close combat ground operations. But their proliferation does not negate the relevance of air superiority. Air superiority is a strategic condition: a way to achieve operational freedom and strategic success. It is not defined by altitude, platform, or even size of the force—it is defined by effect.

The Dog that Didn't Bark: Russia's Air Force in Ukraine

Despite possessing overwhelming numerical and technological advantages, Russia has not achieved air superiority over Ukraine—a strategic miscalculation

22. Brandon W. Gulick, "Liminality: Opportunities in the Transition Space of the Air Littoral," *Æther: A Journal of Strategic Airpower & Spacepower* 3, no. 3 (2024): 67, https://www.airuniversity.af.edu/.

23. Pete B. Hegseth to senior Pentagon leadership, memorandum, "Army Transformation and Acquisition Reform," 30 April 2025, https://media.defense.gov/.

that may be one of the war's defining characteristics. The Russian Aerospace Forces (VKS) entered the war with nearly 350 combat aircraft in the vicinity of Ukraine out of approximately 1,130 total combat aircraft compared to Ukraine's 147 aging fighters.[24] Russian aircraft featured longer-range sensors and missiles, and Moscow enjoyed sanctuary from attack, due in part to US-imposed restrictions on Ukraine's use of Western-supplied weapons. Yet the VKS was unable to translate this advantage into control of the air.

This failure was due to deep flaws in Russian doctrine, leadership, training, and operational planning, as well as Ukrainian daring and ingenuity in capitalizing on these deficiencies. After three days of heavy losses during the opening days of the invasion, the VKS abandoned its offensive counterair campaign in favor of supporting stalled ground offensives around Kyiv.[25] This decision allowed Ukrainian air defenses—largely Soviet-era systems—to reconstitute and to contest the airspace. Ukraine's pilots adapted quickly, shifting tactics and relying on decentralized command and mobile air defense coordination. The result was a highly contested air environment that forced Russian aircraft to operate at standoff distances, often relying on glide bombs or cruise missiles in lieu of direct engagement.

Russia's doctrinal weakness was further compounded by its ground-centric military culture. The VKS and Navy are subordinate to the Russian Army in both planning and execution. As a result, Russia has used airpower primarily as an adjunct to artillery to support ground advances rather than achieving operational and strategic level effects. This misuse prevented Russia from exploiting its numerical airpower advantage.[26]

In the opening weeks of the war, Russian aircraft followed predictable routes and flight patterns, making them vulnerable to Ukraine's vast arsenal of MANPADS and mobile SAMS. Ukrainian forces reportedly downed eight Russian fighters in a single week through a combination of layered air defenses and tactical discipline.[27] Lacking a dynamic targeting process capable of conducting an effective suppression of enemy air defenses (SEAD) campaign, Russia never created the conditions necessary for sustained air operations at scale.

As the war has progressed, the VKS has improved its tactics, particularly in delivering glide bombs against fortified Ukrainian positions such as Bakhmut.[28]

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24. "Russian Air Force Current Inventory," WDMMA [World Directory of Modern Military Aircraft], updated 30 December 2024, https://www.wdmma.org/; and David Deptula and Christopher Bowie, *The Significance of Air Superiority: The Ukraine-Russia War*, Mitchell Institute Policy Paper 50 (Mitchell Institute for Aerospace Studies, July 2024), 3–4, https://www.mitchellaerospacepower.org/.

25. Deptula and Bowie, *Significance*, 5.

26. Deptula and Bowie, 3.

27. Deptula and Bowie, 6.

28. Donbas.Realities, "How Ukrainian Cities Were Wiped Out By Russian Glide Bombs And Artillery," Radio Free Europe/Radio Liberty, 25 April 2025, https://www.rferl.org/.

But these efforts remain largely tactical and localized. Russia continues to operate cautiously, unwilling or unable to commit to high-risk, high-reward air operations that might shift the strategic balance. Its failure to achieve air superiority has contributed directly to the conflict's stalemate—and to the resiliency of Ukrainian forces.

The lesson is clear: numerical superiority and sanctuary are not enough. Without effective doctrine, training, and leadership—and thus without a coherent strategy for gaining and exploiting air superiority—even a well-equipped air force cannot take advantage of its potential.

Israel's Air Operations: A Saga of Air Superiority

By contrast, since the October 7th attacks on Israel, the Israeli Air Force (IAF) has demonstrated the power of air superiority in modern warfare, executing a high-tempo, multi-theater air campaign with strategic precision. Through a deliberate combination of offensive counterair, SEAD, and irregular warfare operations, Israel secured air superiority—and in some areas, air supremacy—across multiple fronts: Gaza, Lebanon, Syria, and Iran.

Air superiority has served as the critical enabler for Israel's broader strategic objectives. In Lebanon, the systematic targeting of Hezbollah's integrated air defenses created an environment in which Israeli aircraft now operate with near impunity. IAF Chief Major General Tomer Bar remarked, "Nowadays we fly freely over the skies of Lebanon. We destroyed extensive capabilities that had been meant to create an off-limits zone in Lebanese skies."[29] This shift in the air domain enabled Israel to sustain pressure on Hezbollah while simultaneously executing operations elsewhere.

With enemy air defenses neutralized, non-stealth aircraft such as F-15Is and F-16Is as well as UAVs could operate alongside F-35I stealth aircraft, maximizing sortie rates and weapons delivery. Similarly, the freedom to maneuver in previously hostile airspace allows Israel to operate aircraft such as air refueling tankers over Syria and Lebanon in support of its broader objectives against Iran, allowing even greater overall strategic flexibility.

The scope and scale of recent Israeli air operations are unprecedented. Within the first four months of the Gaza conflict, the IAF struck over 31,000 targets, averaging 228 strikes per day—a tempo unmatched in IAF history.[30] By September 2024, Israel had conducted 8,300 cross-border attacks against Hezbollah in Lebanon—largely leveraging airpower. By contrast, Hezbollah has managed only

29. "Israeli Air Force Plans Continued Lebanon Overflights," FDD [Foundation for Defense of Democracies], 9 February 2024, https://www.fdd.org/.

30. Seth J. Frantzman, "Israeli Air Force Struck 31,000 Targets in Four Months of War," *Breaking Defense*, 20 February 2024, https://breakingdefense.com/.

1,900, illustrating the asymmetric advantage air superiority provides.[31] Israel's air superiority also enabled it to degrade and destroy highly defended and hardened targets. The targeting of Hezbollah leader Hassan Nasrallah exemplified this capability—F-15I fighters dropped over 80 bunker-busting munitions to destroy the underground command center where he was sheltering.[32]

Achieving air superiority over areas of its concern has provided Israel with remarkable strategic flexibility. The IAF has been able to rapidly employ airpower to concentrate effective force against specific adversaries in parallel. This operational agility was provided by a formidable Air Force that combines advanced stealth aircraft—F-35Is—with sophisticated sensor fusion and penetration capability against some of the world's most advanced SAMS; agile multirole combat aircraft (F-15Is and F-16Is) capable of delivering large payloads of precision direct and standoff weapons; aerial refueling tankers to extend their ranges to reach Iran and return; and a spectrum of uninhabited aircraft and drone/PGMs to both enhance situational awareness in an intelligence, surveillance and reconnaissance (ISR) role and to employ force as well. This airpower combination has allowed Israel to systematically reduce threats across numerous fronts while maintaining its defensive coverage of its homeland.

Airpower was a significant element in enabling Israel to dismantle Iran's proxy network. Israel retained the strategic initiative thanks to its control of the air. Israel's air superiority successes are not merely tactical or operational triumphs. Instead, they represent a model of twenty-first-century warfare in which airpower—when properly resourced, integrated, and employed—can enable decisive outcomes across theaters. Air superiority is not simply about winning battles; it is about shaping the entire strategic environment.

Airpower Unleashed: The Rewards of Air Superiority

A core objective of Israel's national security strategy has long been the elimination of Iran's nuclear weapons program and its supporting military infrastructure such as its long-range ballistic missiles.[33] In June 2025, the ability to achieve that objective advanced significantly when Israel leveraged air superiority to launch Operation Rising Lion, a high-intensity air campaign deep into Iranian territory. The results confirmed an often underappreciated principle among military strategists: once air superiority is established, airpower can achieve strategic objectives with a level of speed, scale, and precision that surpasses options from any other domain.

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31. Mohammed Hussein, "Mapping 10,000 Cross-Border Attacks between Israel and Lebanon," *Al Jazeera*, 25 September 2024, https://www.aljazeera.com/.

32. Graham Scarbro, "A Closer Look at Israel's Use of 80 Bunker-Buster JDAMs in Beirut," *Proceedings* 150, no. 10 (2024), https://www.usni.org/.

33. Aaron Bernstein, *Israel's Divine Mission Against Iran: How Meticulously Israel Plans to Break Iran's Ayatollah's Neck* (Eigenverglag, 2025), https://books.google.com/.

The campaign began with months of preparation, including the October 2024 Operation Days of Repentance, during which the IAF systematically dismantled Iranian air defense systems to create operational access. Traveling 1,000 kilometers one way to reach targets deep inside Iran, Israeli aircraft—specifically its American-made F-35I stealth fighters—successfully penetrated and destroyed multiple advanced Russian-made S-300 SAMs.[34]

Commencing on 13 June 2025, Israel's surprise attack against Iran proper—Operation Rising Lion—targeted key military and nuclear leadership, command, control, and communications, primary components of Iran's nuclear weapons development, nuclear facilities, essential systems, and infrastructure; Iranian military installations; and critical military forces such as SAMs, missile launchers, aerial tankers, fighters, and others.[35] Iran retaliated by firing ballistic missiles at Israeli cities, causing damage and casualties.[36] In several respects, Israel's air campaign against Iran applied many of the same principles that the US-led coalition used in the extraordinarily successful Desert Storm air campaign of 1991 but adapted to Israel's particular campaign objectives.[37] Israel flew approximately 1,500 sorties with over 600 air refuelings, attacked 900 targets with about 1,500 aimpoints using around 4,300 munitions; 370 of the strikes were by fighter jets and the rest by UAVs—all without a single loss of a manned aircraft.[38] The Rising Lion air campaign lasted 12 days, ending on 24 June 2025.

It is important to highlight the performance of the IAF stealth F-35Is in achieving air superiority over Iran. Without the low observable characteristics (stealth) and situational awareness inherent in the F-35 design and systems, Israel could not have succeeded as it did. The IAF F-35Is conducted the initial penetration missions deep into Iran that neutralized Iran's air defenses and gathered real-time intelligence, while F-15I fighters followed with heavy payloads of up to 18,000 pounds to conduct sustained bombing together with F-16Is and a significant number of UAVs used both for ISR and weapons employment.[39] In addition, the F-35I served as an airborne sensor, providing

34. Sean Matthews, "Israel and US Modified F-35s to Enable Iran Attack without Refuelling, Sources Say," *Middle East Eye*, 14 June 2025, https://www.middleeasteye.net/.

35. "U.S. and Israeli Strikes Against Iranian Targets," JINSA [Jewish Institute for National Security of America], 24 June 2025, https://jinsa.org/.

36. Alia Chughtai, "Visualizing 12 Days of the Israel-Iran conflict," *Al Jazeera*, 26 June 2025, https://www.aljazeera.com/.

37. Diane T. Putney, *Airpower Advantage: Planning the Gulf War Air Campaign 1989–1991* (Air Force History and Museums Program, 2004), https://media.defense.gov/.

38. Emanuel Fabian, "'The Stars Aligned': Why Israel Set Out for a War Against Iran, and What It Achieved," *The Times of Israel*, 27 June 2025, https://www.timesofisrael.com/.

39. Yonah Jeremy Bob, "Israel Accomplished 'Revolutions' in Drone and Air Defense Systems During Iran War," *The Jerusalem Post*, 1 July 2025, https://www.jpost.com/; and Yaakov Lappin, "The F-35's key role in the war against Iran," JNS, 10 July 2025, https://www.jns.org/.

360-degree spherical situational awareness and threat warnings to non-stealthy aircraft operating in the threat arena.

By systematically nullifying Iran's air defenses, Israel achieved the air superiority required to conduct high-tempo operations across the breadth and depth of Iran. Israel's success demonstrates how effective air superiority can be in eliminating attempts to achieve anti-access and air denial by conducting effective offensive counterair operations that paved the way for sustained airpower projection. This was clearly demonstrated in the form of both Israel's own follow-on air strikes and the United States' Operation Midnight Hammer B-2 stealth bomber attacks on Iran's nuclear infrastructure.[40]

Beyond the direct military benefits that airpower delivered, achieving air superiority over Iran enables Israel to execute a follow-on strategy. With its nuclear facilities severely damaged, its military and nuclear program leadership truncated, and its enrichment efforts significantly disrupted, Tehran is forced into a permanent state of caution. That yields a strategy of denial by delay—a repeatable outcome, sustained through intermittent precision attacks. With air superiority established over Iran, Israel has already secured the means to pursue this strategy option repeatedly. Iran has no answer to Israel's airpower, and as a result, Israel can steadily take apart any attempt to rebuild its nuclear and ballistic-missile programs at will. This strategy also keeps Israel's alternatives open. Now, Tehran can only reconstitute its missile program under threat. It would have to carry out any new effort to enrich uranium or build covert facilities under the shadow of Israeli air attack, which imposes a level of strategic control over Iran.[41]

Israel's attainment of air superiority during Operation Rising Lion marked a strategic inflection point in the Middle East, fundamentally altering the political-military dynamics of the region. By penetrating deep into Iranian territory to achieve desired effects against military and nuclear program leadership, missile, and military targets, Israel demonstrated airpower's incredible level of operational reach, precision, and resilience. This achievement of air superiority redefined strategic deterrence in the region: Iran can no longer rely on geography or hardened facilities as a sanctuary. For Arab Gulf states, the operation elevated Israel's credibility as both a security guarantor and a capable counterbalance to Tehran's ambitions.

The broader consequences are equally profound. Israel's air superiority not only blunted Iran's regional influence by crippling key Islamic Revolutionary Guard Corps infrastructure and degrading nuclear capabilities, but it also shifted the balance of power across Iran's proxy network. Hezbollah, the Houthis, and others now operate under the threat of Israeli preemption. More-

40. August Pfluger and David Deptula, "A Spectacular Airstrike On Iran—and a Sobering Warning," *The Hill*, 27 June 2025, https://thehill.com/.

41. John A. Tirpak, "This Could Turn Out to Be the Successor to the Cold War Concept of Containment," *Air Force Magazine*, February 1999. https://www.airandspaceforces.com/.

over, the Operation Rising Lion air campaign validated a twenty-first-century model of warfare that integrates penetrating stealth aircraft, UAVs, standoff munitions, ISR fusion, cyber-electromagnetic dominance, and missile defense—establishing systemic air superiority, not just tactical success. In doing so, it dispelled the supposition that air denial strategies render air superiority obsolete. Far from outdated, air superiority—executed with the right doctrine, platforms, and political resolve—remains pivotal in modern warfare.

As a result, diplomatic leverage in the Middle East has markedly shifted to Jerusalem and Washington. With Iran forced to negotiate from a position of weakness and regional actors reassessing their security alignments, Israel securing air superiority over Iran has not only reshaped the battlespace but also the diplomatic terrain.

Israel's successful achievement of air superiority against Iran has changed the strategic environment of the Middle East forever. Summarizing the key contributors to that success Bar stated,

> I want to tell you what the decisive component is, because that also dictates what our flight policy should be. It's the stand-in capability over Tehran. If you ask me: "Commander, what is the decisive element of victory? Is it Natanz? Is it 80 surface-to-surface missile launchers?" It is aircraft over Tehran whenever we choose—that's a significant decisive component.[42]

In other words—air superiority.

The Limits of Air Denial

The recent conflicts in Ukraine and the Middle East reveal a fundamental divergence in strategic outcomes tied directly to air control: where air superiority is absent, wars degenerate into attritional stalemates. Where it is achieved, conflicts can be shaped decisively. The lesson is clear: air denial may frustrate an adversary's ambitions, but only air superiority enables operational success and strategic initiative.

Russia's war in Ukraine illustrates the perils of mutual air denial. The proliferation of FPV PGMs and loitering munitions has made maneuver costly and territorial gains rare. Neither Russia nor Ukraine has been able to seize the initiative decisively because neither side controls the air.[43] This kind of stalemate represents precisely what America's military must avoid in future conflicts. The contrast between Ukraine's defensive improvisation and Israel's offensive flex-

42. Israeli Defense Forces, "Commander of the Israeli Air Force: 'I Want to Tell You What the Decisive Component Is: Aircraft over Tehran Whenever We Choose,' " 27 June 2025, https://www.idf.il/.

43. Stacie Pettyjohn, *Evolution Not Revolution: Drone Warfare in Russia's 2022 Invasion of Ukraine* (Center for New American Security, 8 February 2024), https://www.cnas.org/.

ibility shows why air superiority—not air denial—is the strategic asymmetry that unlocks victory.

This lesson is particularly urgent for the United States, which must maintain credible readiness across multiple theaters around the globe—from Europe and the Middle East to the Indo-Pacific. In any future conflict, particularly with a peer adversary, air superiority will be essential to countering aggression, projecting power, and meeting strategic objectives. It cannot be assumed; it must be planned for, resourced, and achieved.

Some have suggested that drone-centric strategies offer a cheaper, more scalable alternative to full-scale airpower.[44] UAVs, collaborative combat aircraft, FPV PGMs, drone swarms and loitering munitions have tactical utility, but they cannot support strategic objectives on their own. The US military must resist the temptation to see them as silver bullets. These systems are tools—not substitutes—for a comprehensive airpower strategy. Their real value lies in integration with crewed aircraft, ISR systems, and command-and-control networks that can execute coordinated and cohesive air campaigns.

Of course, the growing threat from drones/low-cost PGMs involves all the services. Addressing these threats demands an integrated joint approach. Relying on million-dollar air-to-air missiles or SAM interceptors to counter $1,000 drones is unsustainable. Solving this problem will require rethinking air defense altogether. Directed energy, electronic warfare, counter-UAV systems, and rapid-response sensors must be developed, deployed, and integrated across all service components. Offensive counterair operations targeting enemy drone production, storage, and launch infrastructure will be a key part of the solution. Strategies to deal with China's potential aggression must not allow China sanctuary anywhere.

Air denial may delay defeat. Air superiority enables victory.

Conclusion: Air Superiority Is a Strategic Constant

The defining lesson from today's wars is clear: air superiority remains the cornerstone of decisive military power. Its absence results in strategic stagnation, bloody attrition-based fights, and prolonged conflict. Its presence enables rapid decision, strategic flexibility, and political leverage. From the trench-scarred plains of Ukraine to the skies over Tehran, modern conflict continues to validate these enduring truths.

Ukraine's use of drones/PGMs, cruise missiles, and loitering munitions—while innovative and effective in delaying Russian advances—has not led to operational breakthroughs. Ukraine has employed these systems out of necessity, not by choice, and they cannot substitute for sustained, theater-wide air con-

44. Pickrell et al., "Musk."

trol. By contrast, Israel's 2025 air campaign against Iran, made possible by the swift achievement of air superiority, demonstrates what modern airpower can accomplish: decapitation of command networks, destruction of strategic capabilities, deterrence through demonstrated reach, and freedom of action across multiple domains.

The United States must take heed. As it prepares for potential high-end conflict in the Indo-Pacific, rather than over-invest in cheap, small drones/PGMs, the United States must make prudent investments where such systems add value. Small drones have utility, but they lack the range, survivability, and punch required to project power across oceans or against peer adversaries. In any prolonged conflict—especially one involving China—victory will depend not on the ability to deny airspace temporarily but on the ability to dominate it decisively.

Air superiority remains a central doctrinal tenet of US military strategy. It must be resourced, modernized, and adapted to emerging threats—not redefined on the basis of a conflict with unique circumstances that do not reflect US military characteristics, capabilities, or capacity. That includes acknowledging the growing danger of low-cost precision munitions and drone swarms but doing so in an integrated fashion across all the services, not by adjusting air superiority fundamentals in favor of reactive denial strategies.

Tools alone do not win wars: appropriate and adequately resourced strategy does. Drones, loitering munitions, and layered defenses are necessary but insufficient components of such a strategy. They are tactical enablers, not strategic substitutes. What enables freedom of maneuver, persistence of force effects, mobility, and dominance across all domains is control of the air.

Innovation is essential. But discarding what works is not. Tactical advances should be integrated with doctrine, not used to invalidate it prematurely. The absence of air superiority in Ukraine demonstrates what happens when a combatant lacks that capability. Israel's rapid victory over Iran showcases the advantages that air superiority makes possible.

Air superiority enables success in major combat operations. It is not obsolete. It is essential, and it must remain a central tenet of US airpower. ✪

The New Heterogenous Air Force Model

Resilient, Scalable, and Massed

PETER B. LAYTON

Modern air forces are arguably unsustainable in a great power war as aircraft lost to hostile action are unlikely to be replaced before the war is decided. The production rates of modern manned combat aircraft are simply too slow. To survive past the initial stages of such a war, the traditional homogenous model air force designed around manned aircraft needs to evolve to incorporate rockets, missiles, and unmanned aerial systems. This new, heterogenous model can make air forces resilient, scalable, and able to employ mass. Moving from the traditional model has broad-ranging implications for doctrine, command and control, support, and training.

Once again there is talk of big wars where great powers will battle with conventional arms for several years, equipment and personnel losses are heavy, and nations are fully mobilized. In such conflicts, many assume air forces would play a leading role. They may, but probably only for a fleeting time. As presently designed, air forces are fragile entities that once broken cannot be quickly repaired and will consequently be absent for the remainder of a major war.

Today's air forces are primarily built around highly sophisticated, technically impressive aircraft. Yet this is their collective Achilles heel. Such aircraft, if lost, cannot be replaced for years. Moreover, the small numbers available at the start of a great war cannot be easily increased to provide the mass great power wars call for. In light of Russia's war in Ukraine, it is perhaps unsurprising that researchers from China's People's Liberation Army now consider a protracted great power conventional war would favor China, with the US defense industrial base unable to quickly replace combat losses and the margin of US technological superiority consequently progressively diminishing as the war continued.[1]

For much of the Cold War, resilience, scalability, and mass were considered less important when plans were devised and force structures designed for an

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1. Howard Wang and Brett Zakheim, *China's Lessons from the Russia-Ukraine War: Perceived New Strategic Opportunities and an Emerging Model of Hybrid Warfare* (RAND Corporation, 22 May 2025), 30.

expected clash between the great powers. Beginning with the Eisenhower administration in 1953, a great war with the Soviet Union was envisaged as short and all-out, and the industrial capacity to quickly replace substantial combat losses unnecessary.[2] The war plans assumed that after a brief opening phase involving conventional forces, there would be a large-scale thermonuclear exchange. One-shot air forces fit this scenario perfectly.

In the limited wars of Korea and Vietnam, the rate of attrition could be managed to stay within acceptable levels. The former conflict was before the short-war doctrine was embraced, while in the later war, aircraft lost were not directly replaced. Instead, production of new aircraft types better suited to emerging strategic circumstances gradually filled in the force structure gaps created, albeit not in the same numbers. About half of the more than 800 F-105 fighter-bomber fleet was lost in Southeast Asia, with their roles gradually taken over by other aircraft, mainly the F-4. In the post-Cold War period, resilience, scalability, and mass were also not problems, at least for the Western air forces involved in conflicts. The attrition rates experienced were very low, with the conventional warfighting phases short or virtually nonexistent.

In contrast, in the last great power air war, that of 1939 to 1945, the major characteristics of air forces were arguably resilience, scalability, and mass. In that conflict, many tens of thousands of aircraft were built and lost, air forces expanded hugely in size, and air battles often involved thousands of aircraft. Such numbers are almost unimaginable today. They bring into sharp focus the striking disconnect between contemporary air forces and the demands another great power war might make.

A new model for air forces is now needed. And unexpectedly, such a model is emerging through the use of airpower by non-Western forces, some state and some nonstate. It is this bourgeoning heterogeneous airpower model that provides the resilience, scalability, and mass that the traditional airpower model lacks. This article discusses the new model using recent air wars as examples. In examining such a framework in terms of its resilience, scalability, and mass, this article argues that air forces preparing to fight great power wars must become heterogeneous.[3]

For conciseness, the article does not describe the new model in depth, nor does it devise possible concepts of operations or ways in which it might be created. While some insights may be gleaned in the following discussion, these substantial topic areas remain for later articles to explore. Importantly, the article also does not consider strategic nuclear forces. Indeed, those few countries

2. Aaron L. Friedberg, *In the Shadow of the Garrison State: America's Anti-Statism and Its Cold War Grand Strategy* (Princeton University Press, 2000).

3. See also Peter Layton, "Heterogenous Air Power Is Here," *The Strategist*, ASPI: Australian Strategic Policy Institute, 19 June 2025, https://www.aspistrategist.org.au/; and "The Great U.S. Air Force Reboot Has Now Arrived," *1945*, 20 January 2025, https://www.19fortyfive.com/.

with them have already embraced heterogenous airpower. National nuclear forces are generally balanced across rockets, ballistic missiles, cruise missiles, and manned aircraft; manned aircraft do not dominate.

Heterogenous Air Forces

Non-Western airpower thinking, technology, and use have begun moving outside the conceptual framework created in the last century by Western airpower's successes. For many reasons, non-Western approaches have been less constrained by tradition and more eager to embrace new ideas and technological innovations. One example is the Islamic State dropping ordnance from modified consumer drones to provide light, close air support.[4] The airpower of non-Western actors has now diverged from the West's traditional model.

For a long time, air forces principally comprised manned aircraft and their training and support structures. This traditional model has been quietly expanding as rockets, cruise missiles, ballistic missiles, and unmanned aerial systems (drones) have gradually entered service. Even so, in conventional air warfare, manned aircraft dominated most debates and air force structures.

The difference now is not so much in the technological form, but in the relatively swift application of low-cost, readily available digital technology to unmanned systems. This technology was both created and shaped by the huge global consumer electronics market over the last few decades. Its use is a significant characteristic of this century and remains rapidly evolving, as exemplified by the rush of countless artificial intelligence (AI) applications. In the military domain, the seemingly sudden appearance in mid-2022 during Russia's war in Ukraine of small, low-cost consumer drones in very large numbers quickly grabbed both professional and public attention. This focus, however, has obscured a more fundamental shift.

Air operations have decisively moved from being homogeneous to heterogeneous. The means of air warfare have dramatically broadened. Air forces no longer need to be centered—nor should they be—on manned aircraft; the conceptual dominance of such aircraft is ending. Manned aircraft simply have become one means available among many, with all capabilities able to be used in a coordinated, synchronized, and collaborative manner to efficiently achieve operational objectives.[5]

Over the past few years, an extraordinary diversity of manned aircraft, rockets, cruise missiles, ballistic missiles, and drone systems have been used in air operations by non-Western countries including China, India, Pakistan, Ukraine, Russia, Israel, and Iran, and by political and military groups such as

4. Peter Layton, "The Privatisation of Air Power," in Nicole Townsend et al., ed., *Australian Perspectives on Global Air and Space Power: Past, Present, Future* (Routledge, 2023).

5. Layton, "Heterogenous Air Power."

Hamas and the Houthis.[6] Importantly, this innovative employment has been large-scale, enduring, and intensifying. Consequently, in 2024, as vice chief of the US Air Force, General James C. Slife observed, there is now a growing realization that "[we cannot] only [see] the future fight through the lens of our past platforms. If it operates in the air domain, it is airpower."[7]

The six-week period from early May to mid-June 2025 is illustrative of this new way of air warfare, where demonstrably manned aircraft were just one of the means used in combat. Early in May, a brief air war erupted between India and Pakistan. This involved subsonic and supersonic cruise missiles, glide bombs, hundreds of various types of drones, ballistic missiles, surface-to-air missile (SAM) systems, and very long-range air-to-air missiles. The air war featured some notable events, including the first time more than 100 beyond-visual-range missiles were exchanged in a single engagement; the first-ever mutual drone war between India and Pakistan, with probing missions, strikes, interceptions, and spoofing attacks occurring almost continuously; and the first time a country had successfully attacked the air bases of a nuclear-armed nation in a single strike that involved numerous sub- and supersonic cruise missiles and drones.[8] Manned aircraft were also involved but remained in their own national airspace, although as in Russia's war in Ukraine, this proved to be not as safe as anticipated. About the same time, two Russian Su-30 fighters were shot down over Russian territory by a Ukrainian unmanned surface vessel that fired modified air-to-air missiles from off the coast.[9]

Across May, the Houthis periodically launched ballistic missiles and drones at Israel some 1,000 miles distant, even while Israel undertook significant retaliatory manned aircraft strikes in response. The Houthis' attacks—among the longest range ballistic missile attacks in history—were mostly defeated by Israel's integrated air and missile defense (IAMD) systems. The shootdowns of

6. Peter Layton, "Non-Western Airpower: Diverse, Dissimilar and Disruptive," *The RUSI [Royal United Services Institute] Journal* 170, no. 1 (2025), https://doi.org/; Christopher Clary, "Four Days in May: The India-Pakistan Crisis of 2025," Stimson Center, 28 May 2025, https://www.stimson.org/; and Federico Borsari, "Rising Spider: Israel and Ukraine Change Warfare," Center for European Policy Analysis (CEPA), 16 June 2025, https://cepa.org/.

7. James C. Slife, "Airpower at Any Scale," *Æther: A Journal of Strategic Airpower & Spacepower* 3, no. 3 (2024): 7.

8. Baqir Sajjad Syed, "Risk of 'Unpredictable Escalation' Looms over Subcontinent," *Dawn*, 10 May 2025, https://www.dawn.com/; Joshua T. White, "Lessons for the Next India-Pakistan War," Brookings Institution, 14 May 2025, https://www.brookings.edu/; and News Desk, "How Pakistan Lost Its Airborne Warning and Control System During Operation Sindoor?," News18, 18 May 2025, https://www.news18.com/.

9. Simon Newton, "Ukraine Uses Sea Drones to Down Russian Fighter Jets in Apparent Historic First," *BFBS Forces News*, https://www.forcesnews.com/.

the Houthis' medium-range ballistic missiles by Israel's Arrow missiles were the first exo-atmospheric interceptions during combat.[10]

By late May, Russia was regularly launching hundreds of drones and smaller numbers of ballistic and cruise missiles in nighttime attacks on Ukrainian cities.[11] Many were defeated by the Ukrainian IAMD. Reversing this, in the last week of May, Russia claimed to have intercepted more than 2,300 Ukrainian drones.[12]

In early June, Ukraine used 117 drones in a covert attack on air bases deep in Russian territory, destroying or seriously damaging some 20 strategic bombers and other aircraft.[13] By then, Ukraine was building a so-called "drone wall" able to defend against Russian ground forces, impose attrition and prevent their advance.[14] The wall is actually a weapons engagement zone that is growing to be some hundreds of miles long, 15 to 25 miles thick, and several thousand feet high. It is intended to feature large numbers of attack drones, drone interceptors, drone mining systems, counter-drone systems, airborne sensors, and electronic warfare systems, and be supported using robotic logistics delivery systems.[15]

In mid-June Israel launched large-scale air operations against Iran using manned combat aircraft, air-launched ballistic missiles, cruise missiles, short-range drones, long-range/high-endurance drones, and glide bombs. Iran responded by firing more than a thousand ballistic missiles and drones against Israel; most were defeated by Israel's IAMD that fired hundreds of antimissile interceptor missiles and used manned fighter aircraft to shoot down drones.[16] This 12-day war, like the Houthi conflict, was unusual in that it was fought almost totally in the air. The protagonists did not share a border, making long-range air warfare the primary method of waging war.

In considering these busy six weeks in mid-2025, it is evident that heterogenous airpower can employ very large numbers—certainly hundreds of elements at a time and sometimes thousands. These are numbers unimaginable with present-day manned combat aircraft. Moreover, heterogenous airpower is relevant to small- and large-scale offensive and defensive air operations and can be used asymmetrically.

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10. "Israel Intercepts Missile Launched by Yemen's Houthis," *Al Jazeera*, 9 May 2025, https://www.aljazeera.com/; and Kyle Mizokami, "This Groundbreaking Ballistic Missile Intercept Was Also the First Combat in Space," *Popular Mechanics*, 17 November 2023, https://www.popularmechanics.com/.

11. Max Hunder and Jeff Mason, "Russia Launches War's Largest Air Attack on Ukraine, Kills at Least 12 People," *Reuters*, 26 May 2025, https://www.reuters.com/.

12. "Drone War, Ground Offensive Continue Despite New Russia-Ukraine Peace Push," *Al Jazeera*, 27 May 2025, https://www.aljazeera.com/.

13. Strategic Studies Department, "Significance and Implications of Ukraine's Operation Spiderweb," TRENDS Research & Advisory, 3 June 2025, https://trendsresearch.org/.

14. Mick Ryan, "Ukraine's Drone Wall," *Futura Doctrine*, 23 May 2025, https://mickryan.substack.com.

15. Oleh Velhan, "100 Days to Reform: Commander of Unmanned Systems Forces Launches Sweeping Overhaul in Ukraine," *RBC Ukraine*, 5 June 2025, https://newsukraine.rbc.ua/.

16. Bilal Y. Saab and Darren D. White, "Lessons Observed from the War Between Israel and Iran," *War on the Rocks*, 16 July 2025, https://warontherocks.com/.

Often noted is the cost asymmetry between the cheap, unsophisticated drones used by the Houthis and their countering by expensive, state-of-the-art US Navy SAMs.[17] A different example is the asymmetric defeat of the Iranian air defense system in the June air war using what has been termed a disaggregated collaborative air operation.[18] This apparently involved Israeli F-35I aircraft and drones mapping hostile radar and SAM sites in support of long-range, air-launched ballistic missiles fired by F-15Is and F-16Is, and attacks by short-range loitering munition drones.[19] The Iranian SAM systems could defend against manned combat aircraft but were not capable against the ballistic missiles and drones used.[20]

The heterogenous model is demonstrably effective, but its biggest advantages over the traditional homogenous model centered on manned aircraft is in offering resilience, scalability, and mass.

Resilience

Resilience involves both the speed of recovery from attacks and the reduction of the impact of attacks.[21] For air forces, timely recovery from combat losses has become challenging as modern manned aircraft have low production rates; the highest currently is the F-35 line with an output of 13 aircraft per month.[22]

As US Air Force chief of staff, General Charles Q. Brown Jr. argued that in a future great power war, American Airmen "must be prepared to fight through combat attrition rates and risks … that are more akin to the World War II era than the uncontested environment" of the post-Cold War period.[23] During its four World War II years, the United States lost dozens of aircraft a day, more than a 1,000 a month.[24] Even assuming a somewhat lower daily attrition rate of 2 percent means a nominal 100 unit force after 35 days is re-

17. Jake Epstein, "The U.S. Navy Has Fired Off Nearly $1 Billion in Weapons Fighting Threats from Iran and the Houthis," *Business Insider*, 17 April 2024, https://www.businessinsider.com/.

18. J. Michael Dahm, "Disconnected by Design: A New Way to Employ 5th-Gen Jets," *Air & Space Forces Magazine*, 25 July 2025, https://www.airandspaceforces.com/.

19. Joseph Trevithick, "Israeli F-16I Shown Loaded-Up With Four Rampage Stand-Off Missiles (Updated)," *The War Zone*, 30 October 2024, https://www.twz.com/air/.

20. Ashish Dangwal, "Air-Launched Ballistic Missiles: How Israel 'Exploited' Loopholes In Iran's Defenses & Easily Hit Its Targets," *Eurasian Times*, 7 November 2024, https://www.eurasiantimes.com/.

21. *National Disaster Resilience Strategy/Rautaki ā-Motu Manawaroa Aituā* (New Zealand Government Ministry of Civil Defence & Emergency Management, 2019), 18.

22. Greg Waldron, "Lockheed Aeronautics Boss Details F-35 Delivery Ramp-Up Plan," *Flight Global*, 24 July 2024, https://www.flightglobal.com/.

23. Charles Q. Brown Jr., *Accelerate Change or Lose* (Department of the Air Force, August 2020), 3, https://www.af.mil/.

24. Michael Peck, "60 B-52s Shot Down in One Day? Today's U.S. Air Force Can't Survive World War II Losses," ' *Forbes*, 9 September 2020, https://www.forbes.com/.

duced to half its size. This low rate would still need four of today's F-35 production lines just to sustain numbers; the higher World War II average rate would require more than 75.

Creating such additional production lines would take some years. In World War II, the average time between the start of building an airframe plant and full-rate production was 31 months; for aeroengines 23 months.[25] Modern aircraft and engines are much more complicated, suggesting even longer times today. Any new aircraft and engine factories set up during a major war would be unlikely to be making meaningful numbers of new aircraft until after the war was decided.

On the other hand, additional production lines could be established before a war started. A new government-owned/contractor-operated industrial base could be built and sized to quickly replace the expected manned aircraft losses that a long, big war might inflict. Yet, having dormant capacity just in case raises issues of high establishment cost, large infrastructure requirements, substantial continuing skilled workforce demands, and high ongoing costs to keep the industrial base up to the latest aircraft build standards.

These problems are at least partly the result of modern manned combat aircraft becoming progressively extraordinarily complicated, as the famous 1979 Norman Augustine analysis of US fighter aircraft cost growth since 1910 highlighted. According to "Augustine's Law," the unit cost per new aircraft increased by an order of magnitude every 20 years, reflecting the continual rise in technical sophistication.[26] In contrast to this, the recent direction to acquire very large numbers of small battlefield drones reflects that compared to an F-35, for example, such drones are technologically primitive.[27]

The impact of a major war's attrition rates, set against low manned aircraft production rates, means an air force's combat force would steadily decline over time and probably not recover until post-war. Today's airpower model, built around highly sophisticated, technically complicated aircraft, is inherently not resilient.

Russia's invasion of Ukraine in February 2022 is an instructive real-world illustration of such a scenario. Both Russian and Ukrainian air forces suffered unacceptable attrition rates at the start of the war. In response, both then quickly moved to carefully husbanding their remaining manned aircraft while shifting to a heterogenous airpower model, where rockets, missiles, and drones played significant roles.

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25. R. J. Overy, *The Air War, 1939–1945* (Papermac, 1987), 167.

26. Gregory C. Allen and Isaac Goldston, "Updating Augustine's Law: Fighter Aircraft Cost Growth in the Age of AI and Autonomy," Center for Strategic & International Studies, 19 December 2024, https://www.csis.org/.

27. Secretary of Defense, Memorandum for Senior Pentagon Leadership, Commanders of the Combatant Commands, Directors Of Defense Agencies, Subject: Unleashing U.S. Military Drone Dominance, 10 July 2025, https://media.defense.gov/.

The production rate of these technologically simpler assets is considerably higher than that of manned aircraft. As an example of relative production rates, in late 2024 Russia each month made about two combat aircraft, some 50 Iskander rockets, 100 cruise missiles, 500 Shahed drones, and more than 300,000 first-person view (FPV) drones.[28]

The counterargument is that manned aircraft are reusable. Rockets, missiles, and drones are generally one-use items. Yet, in a major war, production rates make up this difference. Manned aircraft, rockets, missiles, and drones will all be consumed in a war, but only manned aircraft cannot be produced at a rate that keeps pace with usage. A force structure of rockets, missiles, and drones is resilient in being able to recover losses at speed; a force structure solely composed of modern manned aircraft is not.

Furthermore, resilience also includes reducing the impact of attacks. Manned aircraft and their air bases are difficult to protect as the adoption of agile concepts that aim to widely disperse aircraft recognize.[29] By comparison, attacks on rocket, missile, and drone forces are likely to have less impact as there can be much greater numbers of them to engage, they can be mobile, and widespread dispersal is easier.

Scalability

The higher production rates of rockets, missiles, and drones allows a much quicker expansion in the force employing them. An extreme example is FPV drones; one Ukrainian manufacturer is producing 4,000 a day with the country overall making 5 million annually. Such extraordinary rates are possible using digital technology, fourth industrial revolution techniques, and distributed production across some 150 companies.[30]

Moreover, combat aircrew typically take years to train so that even if large numbers of appropriate aircraft suddenly arrived, they might be unusable. Learning to operate and maintain rockets, missiles, and drones involves far less

28. Олександр Коваленко, "Що відбувається з російською бойовою авіацією: яких втрат вона зазнала на війні в Україні та скільки ВПК виробив літаків," Oboz.ua, 27 May 2025, https://war.obozrevatel.com/; Jack Watling and Nick Reynolds, *Tactical Developments During the Third Year of the Russo–Ukrainian War* (RUSI, February 2025), 19; Boyko Nikolov, "Russia Produces 300,000 FPV Drones Monthly, Trains 5,200 Operators," Bulgarianmilitary.com, 5 January 2024, https://bulgarianmilitary.com/; and Matthew Bint and Fabian Hinz, "Russia Doubles Down on the *Shahed*," IISS [The International Institute for Strategic Studies], 14 April 2025, https://www.iiss.org/.

29. Air Force Doctrine Note 1-21, *Agile Combat Employment* (Curtis LeMay Center for Doctrine Development and Education, 23 August 2022), https://www.doctrine.af.mil/.

30. Martin Fornusek, "Ukraine Has Capacity to Produce 5 Million FPV Drones Per Year, Advisor Says," *The Kyiv Independent*, 29 March 2025, https://kyivindependent.com/.

time. FPVs again offer an extreme example: courses run by accredited commercial operators train Ukrainians to use combat FPVs in 35 to 37 days.[31]

The production rates of manned aircraft, rockets, missiles, and drones vary considerably. Consequently, a heterogeneous force structure would have highly different levels of expansion, with the balance across the force varying almost daily. Such a force gains scalability, although at the cost of constant change in what that force materially comprises.

Amplifying the ongoing change is that such a force can exploit innovation.[32] Innovations in unmanned systems are inherently simpler to achieve and generally more affordable than in manned aircraft. Innovation with unmanned systems can be frequent and ongoing. In Russia's war in Ukraine, there is now a 3-month innovation cycle of prototyping, experimenting, testing, mass producing, and then fielding drones.[33] In contrast, it takes many years to introduce innovations into modern aircraft; the long, drawn out F-35 Block 4 upgrade is an exemplar, being at least five years later than originally planned even after being reduced in capability.[34]

The slow pace of manned aircraft improvements reaching frontline service was also evident during World War II and was related to the time to build aircraft factories as noted earlier. These lengthy times meant that the aircraft design initially chosen for a new factory to be built to produce was unlikely to still be operationally viable by the time full-rate production was reached. Accordingly, newly manufactured aircraft usually underwent significant modifications at separate facilities to bring them up to a usable combat standard. For the US Army Air Forces (USAAF), about 25 to 50 percent of the total labor spent in making its military aircraft occurred at modification centers.[35]

The time from initial orders being placed to delivery to combat units became ever more protracted as the war went on. At the end of the war in Europe, the USAAF was arguably flying obsolescent aircraft designs compared to the Luftwaffe with its swept-wing jet fighters, cruise missiles, air-launched stand-off weapons, and medium-range ballistic missiles. Yet, the USAAF in markedly constraining the implementation of innovative ideas, enabled large-scale production at pace, whereas the continual German search for *wunderwaffe*, or

31. See, for example, "Training to Become a UAV Pilot: FPV School UKRAINE," WeTrueGun, 2025, https://wetruegun.com/.

32. Layton, "Air Force Boost."

33. Oleksandra Molloy, *Drones in Modern Warfare: Lessons Learnt from the War in Ukraine*, Australian Army Occasional Paper No. 29, (Australian Army Research Centre, 2024).

34. Jon Ludwigson et al., *F-35 JOINT STRIKE FIGHTER: Actions Needed to Address Late Deliveries and Improve Future Development*, GAO-25-107632 (US Government Accountability Office, September 2025), 6, https://www.gao.gov/.

35. B. Holley, *Buying Aircraft: Matériel Procurement for the Army Air Forces* (Office of the Chief of Military History, Department of the Army, 1964), 532.

"wonder weapons," did not. Speedy quantity production of less sophisticated aircraft prevailed, with scalability proving a war winner.

Uniquely, the new heterogeneous air force model can combine scalability and rapid innovation. Yet, this combination means the elements comprising such an air force will experience considerable churn numerically, in type and in performance. It is unlikely to be the "set and forget" form of air force that the homogeneous air force comprised of 30-year-life manned aircraft has become.[36]

Mass

Heterogeneous airpower gives air forces the potential to employ large numbers of elements, or mass. Just in the first two weeks of February 2025 alone, Russia deployed over 7,500 FPV drones to the front line and in one single day used over 1,000.[37] These numbers would be inconceivable using only manned aircraft.

Away from the battlefield, Russia's strategic air campaign against Ukraine also uses mass. An example is the attack on the night of 24 May 2025 that employed nine Iskander ballistic missiles; 55 Kh-101 and Kalibr cruise missiles from Tu-95 and TU-160 bombers and warships; one Kh-22 cruise missile from a Tu-22M3 bomber; four Kh-59/69 guided aircraft missiles probably from Su-34 strike fighters; and 298 attack and decoy drones.[38] It is notable that the manned aircraft did not penetrate Ukrainian airspace, instead employing only stand-off missiles, and that large numbers of easily produced drones dominated.

Less apparent is that the heterogeneous attack used relatively little infrastructure compared to what an all-manned aircraft attack would have needed. Modern air combat aircraft require air bases and airfields of varying sizes. In contrast, the Iskanders and drones that provided the bulk of the attack require much smaller launch systems, and these can be dispersed widely. Heterogeneous airpower imposes much less demand for specialized infrastructure than traditional homogenous airpower.

Significantly, the mass employed is not necessarily all one kind or type of element. A heterogeneous air force can include multiple diverse constituent elements, each optimized for specific tasks. For battlefield tasks, there are now low- and medium-altitude reconnaissance drones, electronic warfare and GPS jamming drones, communication relay drones, bomber drones, FPV ground attack drones, FPV drones for air defense against helicopters and hostile drones, mine-laying drones, and ambush drones that wait for enemy vehicles to approach. These drones can also be used in conjunction with assorted rocket, ballistic missile, and cruise missile attacks against proximate command and

36. Layton, "Air Force Boost."

37. "Russia's Record Use of FPV Drones: February 2025 Projections," *Espresso*, 17 February 2025, https://global.espreso.tv/.

38. Alex Stezhensky, "Russia Attacks Ukraine with Nearly 300 Drones and 69 Missiles," *NV: The New Voice of Ukraine*, 25 May 2025, https://english.nv.ua/.

control facilities, transport infrastructure, and logistic caches. Air-launched large glide bombs can be similarly used as these provide the explosive weight smaller rockets, missiles, and drones lack.

Russia's strategic air campaign is similar in featuring an extensive use of decoy drones to confuse, distract, and saturate Ukrainian air defenses. For instance, Gerbera drones mimic Shahed 136 attack drones by having a similar visual, electronic, and radar signature. Gerberas are constructed from plywood, foam, and some simple electronics, and cost a tenth of an attack drone. Some are fitted with a 20-pound warhead while others have reconnaissance capabilities installed that provide either rudimentary bomb damage assessment imagery or radar emitter identification.[39] In addition, Shahed attack drones can also be optimized for use against specific target sets through using thermobaric warheads, cluster munitions, or varying sized combined-effect blast/fragmentation warheads.[40]

Conclusion

The ability to create and employ such large-scale packages of diverse air assets has traditionally been restricted to the United States. Indeed, some argue that the Russian Aerospace Forces failed in the early days of Russia's war in Ukraine because it could not build large air combat packages of different types of manned aircraft.[41] Heterogenous airpower has overturned this convention, allowing most states to now devise and use large offensive and defensive air packages.

At the strategic level, the rise of heterogenous airpower makes the balance of power in the international system more fragile. In the recent past, the traditional airpower model created a balance that changed only slowly as manned aircraft stayed in service for decades. In contrast, heterogenous airpower includes cruise missiles, SAMs, ballistic missiles, and many types of drones—all built using technologies that can be rapidly updated, quickly upsetting long-standing military power balances.[42]

Emerging technologies, like AI, are now being rapidly incorporated into many missiles and drones, potentially changing their performance and capabilities dramatically. Such concerns are further deepened as many emerging technologies come from the civil sector. Devised for consumer sale, such technologies

39. Igor Anokhin and Spencer Faragasso, *Russian Decoy Drones That Depend on Western Parts Pose a Great Challenge to Ukrainian Defenses* (Institute for Science and International Security, 18 December 2024), https://isis-online.org/.

40. Anna Fratsyvir, "Russia Used Thermobaric Weapons in Drone Strike on Kharkiv, Ukrainian Prosecutors Say," *The Kyiv Independent*, 3 May 2025, https://kyivindependent.com/; Yevheniia Hubina, "New 90-kg Warheads Installed on Russian Shahed Drones," *Ukrainska Pravda*, 20 May 2025, https://www.pravda.com.ua/; and David Hambling, "Horror as Russian Drones Target Kyiv with Mystery Cluster Bombs," *Forbes*, 2 May 2025, https://www.forbes.com/.

41. Matthew Galamison and Michael Petersen, "Failures of the Russian Aerospace Forces in Ukraine," *Air & Space Operations Review* 2, no. 3 (2023), https://www.airuniversity.af.edu/; and Layton, "Heterogenous Air Power."

42. Layton, "Heterogenous Air Power."

may appear suddenly, be affordable, and quickly proliferate globally. The commercially acquired drones used by Russia are an example of this.[43]

A key issue in designing a heterogenous air force is balancing across the manned aircraft, rocket, missiles, and drone alternatives. Achieving resilience, scalability, and large numbers depends on choosing a balance appropriate for the war being fought. The US Navy has for several years suggested gradually adopting a 40 percent manned fighter aircraft/60 percent drone balance, but this conceptualization overlooks the roles other unmanned systems undertake.

An alternative is something akin to the British Army's proposed 20/40/40 split to increase its lethality without increasing its troops—where its combat capability would consist of 20 percent conventional platforms such as tanks and artillery; 40 percent expendable, largely autonomous systems; and 40 percent from reusable, AI-enabled assets.[44] When applied to heterogenous air forces, this split would suggest 20 percent of combat power might come from manned aircraft, 40 percent from expendable autonomous systems such as rockets, ballistic and cruise missiles, and the remaining 40 percent from reusable assets like drones. The precise balance chosen would be a matter for analysis and judgment, but the 20/40/40 conceptualization highlights that heterogeneous model air forces would need to embrace lower cost systems able to be rapidly produced at scale.[45] This implies stepping away from—or at least reducing the purchases of—costly unmanned systems such as some proposed collaborative combat aircraft designs where estimated unit costs are around $35 million each.[46]

Instead, an emphasis might be placed on designing simplified missiles and drones that can be mass produced quickly and at low-cost from readily available, locally-sourced materials and components. Being able to rapidly scale up heterogenous airpower to meet urgent strategic and tactical demands arguably requires adopting such an engineering philosophy. Some modern missiles are very complicated with low production rates and long build times; they are incompatible with the heterogenous air force model paradigm.

Iran's airpower export strategy might be instructive. Iran exports deliberately simplified rockets, missiles, and drones to those with a limited capacity to manufacture, maintain, and operate complicated equipment. This extends to designing equipment others can manufacture under relatively rudimentary conditions, such as was done by Hezbollah in Lebanon following its 2006 war

43. Layton, "Heterogenous Air Power."

44. James Wharton, "Explainer: What 20-40-40 Means and How It Will Transform Army's Combat Effectiveness," *BFBS Forces News*, 10 June 2025, https://www.forcesnews.com/.

45. Layton, "Heterogenous Air Power."

46. Travis Sharp, "CCA Sticker Shock: Coming Soon to a Congressional Hearing Near You?," *Breaking Defense*, 22 May 2025, https://breakingdefense.com/.

with Israel.[47] Simplification also reduces costs, allowing larger numbers to be acquired.[48] In mass producing Iranian Shahed drones, Russia continues to simplify their design, aiming to drive unit cost down from the initial $375,000 to about $50,000.[49] By mid-2025, Russia had already launched almost 29,000 Shahed drones at Ukraine, reaching some 54,500 by year's end.[50] No other airpower means can approach such mass.

Simplification, however, involves accepting a reduced operational performance, including having lower reliability drones, rockets, and missiles. Even so, fielding a cruder form of airpower can still be effective, as the Houthis demonstrated in successfully upsetting Red Sea merchant shipping through using a mix of attack drones, ballistic missiles, and antiship cruise missiles. Notably, the Houthis use of antiship ballistic missiles in October 2023 was the first combat use of this class of weapon.[51]

Moreover, this shift toward low-cost, quick-to-manufacture missiles is accelerating. Ukraine will soon receive more than 800 rapidly developed, US-made, low-cost, and long-range air-launched cruise missiles, with another 2,500 planned.[52] Taiwan is working with US-based defense technology firm Kratos to quickly develop a similar capability.[53] European missile company MBDA has also designed a low-cost missile able to be mass produced within a year.[54] Already in use is Russia's 250-nautical mile-range Banderol cruise missile, constructed using many parts imported from up to 30 companies around the world.[55]

Most future air wars are now likely to involve well-coordinated, large-scale heterogenous air operations at the front line, during battlefield air interdiction missions and in deep strategic air attacks. Such operations would be designed to combine the capabilities of various manned aircraft, rockets, missiles,

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47. Fabian Hinz, *Missile Multinational: Iran's New Approach to Missile Proliferation* (IISS, April 2021), https://www.iiss.org/.

48. Layton, "Air Force Reboot."

49. Eric Tegler, "$375,000 - The Sticker Price for an Iranian Shahed Drone," *Forbes*, 7 February 2024, https://www.forbes.com/.

50. "Explainer: Ukraine Pins Hopes on Interceptor Drones as Air Strikes Get Bigger," *BBC Monitoring*, 26 June 2025, https://monitoring.bbc.co.uk/. Igor Anokhin, December 2025 Updated Analysis of Russian Shahed-type UAVs Deployment Against Ukraine (ISIS, 2 January 2026), https://isis-online.org/.

51. Sébastien Roblin, "We Might Have Just Seen the World's First Anti-Ship Ballistic Missile Attack," *Popular Mechanics*, 2 December 2023, https://www.popularmechanics.com/.

52. Steve Trimble, "U.S. Innovation Hurries New Cruise Missile to Ukraine," *Aviation Week and Space Technology*, 5 September 2025, https://aviationweek.com/.

53. Daisuke Sato, "Taiwan Develops Low-Cost Cruise Missile," *Defence Blog*, 27 August 2025, https://defence-blog.com/.

54. George Allison, "MBDA Reveals Crossbow as Affordable 800km Strike Product," *UKDJ* [*UK Defence Journal*], 10 September 2025, https://ukdefencejournal.org.uk/.

55. Thomas Newdick, "New Small Russian Cruise Missile Captured by Ukrainian Intelligence," *The War Zone*, updated 12 May 2025, https://www.twz.com/.

and drones so as to most effectively overcome hostile air defenses and inflict the requisite damage. An important concern would be managing the manned aircraft rate of loss, given that replacing these may be doubtful. This management would involve the prudent weighing of the likelihood of attrition against operational needs and an underlying desire to continue operating them as long as practical.

The air forces that undertake these heterogenous air operations will be remarkably dynamic in actively balancing across the many diverse capabilities, having constantly changing numbers of force elements available and in featuring embedded innovation. Such air forces will require doctrine, command and control, support, and training different to that traditionally embraced.

Heterogenous air forces will no longer be defined by a single piece of equipment: the manned aircraft. This may trouble traditionalists; however, the need to be able to fight a protracted major war undermines old ideas about air forces and airpower. In such a conflict modern manned aircraft simply take too long to build, and this inflicts serious operational deficiencies. Air forces now urgently need to become resilient, be scalable, and possess mass. Heterogenous airpower looks to be the way of the future. ✪

Reconceptualizing Strategic Attack

Implications for the Air Force

HEATHER P. VENABLE

This article reconceptualizes strategic attack, addressing the ambiguity surrounding the concept in both airpower history and doctrine. A review of current doctrine and case studies from World War I to the present reveals that much of what is considered strategic attack—thought to dominate the US Air Force's history in practice—is actually operational in nature. A more joint-minded way of considering the service's history demonstrates how a revised and refined understanding of strategic attack can ease ongoing tensions among the military services and strengthen airpower's role in joint operations.[1]

More than one hundred years have passed since Airmen first began using long-range bombers to target an adversary's cities, seeking to have a number of strategic and operational effects that ranged from destroying infrastructure to disrupting supply lines to demoralizing the enemy. Yet confusion reigns—both in airpower historiography and doctrine—as to what such strategic attack actually entails and what it does not.

This confusion creates ongoing tension that undermines joint operations, in part because such an expansive view of strategic attack tends to reinforce the perception that the Air Force values strategic attack above all else, especially close air support.[2] For airpower practitioners, then, it is important to understand the muddled and problematic nature of past and current thinking on strategic attack within the national security community. Additionally, largely eliminating the argument that airpower can be used independently helps the Air Force improve its reputation for jointness. Finally, using a more precise and narrow definition of strategic attack puts airpower history in perspective, revealing that since the inception of the Army Air Corps, airpower historically has

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1. Thank you to Colonel Donny Seablom, USAF, and Dr. Ryan Wadle for reading various drafts. Thank you to my peer reviewer for pushing me to incorporate more recent campaigns.

2. Caitlin Lee et al., *Rare Birds: Understanding and Addressing Air Force Underrepresentation in Senior Joint Positions in the Post–Goldwater-Nichols Era* (RAND Corporation, 2017), 26.

provided far more *strategic effect*—defined as an impact that helps to meet political objectives—through operational rather than strategic attack. Given how contentious such air warfare is among the Air Force's sister services, recognizing and addressing this reality can improve joint relations.

What Is Strategic Attack?

Scholars themselves cannot agree on what constitutes strategic attack. One analyst defines this practice as "attacks [against] fixed military, industrial, and civilian targets in and near political or economic centers."[3] By this definition, almost any strike could be considered a strategic attack as long as it occurred near "political or economic centers." In a similar vein, this analysis uses the term *strategic interdiction*, which is problematic if viewed in terms of effect.[4] For example, striking a tank factory would be perceived to be strategic interdiction. This may sometimes be the most efficient way to destroy tanks, but planners seek to destroy tanks primarily to have operational effects, undercutting an opponent's military strategy on the battlefield.

Another scholar offers a more focused definition of strategic attack as the "use of air power against targets that were chosen specifically because of the damage to the enemy that would result in advance of any battle, such as factories, cities, and transport systems."[5] Yet such a definition emphasizes eroding the enemy's military capabilities before they can be brought to bear on the battlefield. This version resembles the previous definition of strategic and operational interdiction while ignoring the true marks of strategic attack—non-military targets such as cities, political leadership, or the economy.

Yet another analysis homes in on targeting "a country's warmaking potential rather than at its deployed armed forces."[6] This narrow definition similarly excludes a range of potential political targets, once again highlighting operational attack more than strategic attack. Its economic focus, however, is most in keeping with how the US Army Air Forces itself conceived of strategic bombardment in World War II.[7]

Finally, a perspective that considers the aims of strategic attack makes the unusual distinction that it must have effects in multiple theaters as well as "fulfill national or multinational objectives." Elsewhere in this analysis, however, certain elements echo the tendency of many scholars to refer more to operational than strategic attack. For example, the analysis claims that strategic at-

3. Robert Pape, *Bombing to Win: Air Power and Coercion in War* (Cornell University Press, 1996), 46.

4. Pape, *Bombing*, 72 and 75.

5. Phillips Payson O'Brien, *How the War Was Won* (Cambridge University Press, 2015), 18.

6. Mark Clodfelter, *The Limits of Air Power: The American Bombing of North Vietnam* (University of Nebraska Press, 1989), 2.

7. *The Official Guide to the Army Air Forces: A Directory, Almanac and Chronicle of Achievement* (Pocket Books, 1944), 255.

tack "generally and directly relate[s] to the opponent's ability to maintain forces in the field as well as his will to resist." This example mimics the first two analysts' interdiction-heavy focus. From this perspective, however, even an air superiority campaign is "in its effects, a strategic attack."[8] According to this line of thinking, if air superiority constitutes strategic attack, then it would follow that almost all airpower history consists of strategic attacks.

Considering these varied approaches to the concept, this article proposes that whether a strike is a strategic or operational attack is determined largely by a planner's primary intended effect. If, above all else, a strike seeks to directly affect the political level of war—that is, non-military targets—then it is strategic. By contrast, if an attack focuses on affecting an opponent's military strategy—whether it be by attacking a tank or a tank factory, for example—it is operational.

This delineation aligns with the theory of victory according to the first generation of Airmen—to obviate the need to defeat an opponent's military, a lesson they believed World War I made self-evident.[9] This approach also overlaps to some extent with the idea of effects-based operations in that planners should consider what specific effects they seek beyond simple destruction.[10] While one scholar correctly states that only the target can ultimately decide what strategic effects an attack may have by determining how to react, it is also impossible for planners to anticipate that reaction, making this approach more feasible for current officers.[11]

A Narrower View of Strategic Attack

The key distinction, then, between strategic attack and operational attack is whether the mission seeks to have a direct effect at the enemy's political level, including impacts on their political leaders, transportation systems, civilian population, general economy, and other non-military targets. The operational level of war, by contrast, focuses on "translat[ing] broad military strategic objectives into tangible tactical activities."[12] Seeking operational effect, then, secures military objectives and sucks effort into the very maw of war, which Italian Air Marshal Giulio Douhet and others desperately wanted to avoid by advocating for attacking the military itself or its supply source.

This distinction more neatly organizes the desired effects of an attack as either strategic or operational. For example, strategic attack is exemplified in Germa-

8. Mark J. Conversino, "The Changed Nature of Strategic Air Attack," *The US Army War College Quarterly: Parameters* 27, no. 4 (1997): 34.

9. Giulio Douhet, *Command of the Air* (repr., Air University Press, 2019); and see also B. H. Lidell Hart, *Strategy*, 2nd edition (Penguin, 1991), 349.

10. See, for example, John T. Correll, "The Assault on EBO," *Air & Space Forces Magazine*, 1 January 2013, https://www.airandspaceforces.com/article/0113ebo/.

11. Colin Gray, *Airpower for Strategic Effect* (Air University Press, 2012).

12. Peter Mientus, "The Importance of Effective Joint Operational Level Warfare and How to Achieve It," *The Three Swords Magazine* 36 (2020): 53; https://www.jwc.nato.int/newsroom/three-swords/.

ny's unrestricted U-boat campaign against Great Britain and the United States during World War II, where planners desired above all to isolate and starve Britain so Germany would not have to defeat its opponent on the battlefield.

The argument is not that only non-military attacks will directly affect political leadership. It is that the actual effects are unpredictable, most especially when it comes to human decision-making. Moreover, operational attack is an indirect and generally slow way to change political will.[13] In some cases, planners might be seeking to have both operational and strategic effects, but generally one effect will be of primary importance. Focusing on the effect planners intended or intend reveals the contexts in which strategic and operational attack have been most successful and when they have failed.

Strategic Attack Doctrine in the US Air Force

Air Force Doctrine Publication (AFDP) 3-70 notes that strategic attack is a method of "bypass[ing] surface forces and strik[ing] directly at the enemy's heart."[14] It further explains that one need not engage in "attrition or decisive battle" to meet political objectives. The purpose of strategic attack, versus traditional warfare, is to leapfrog "operational-level effects" (fig. 1).[15]

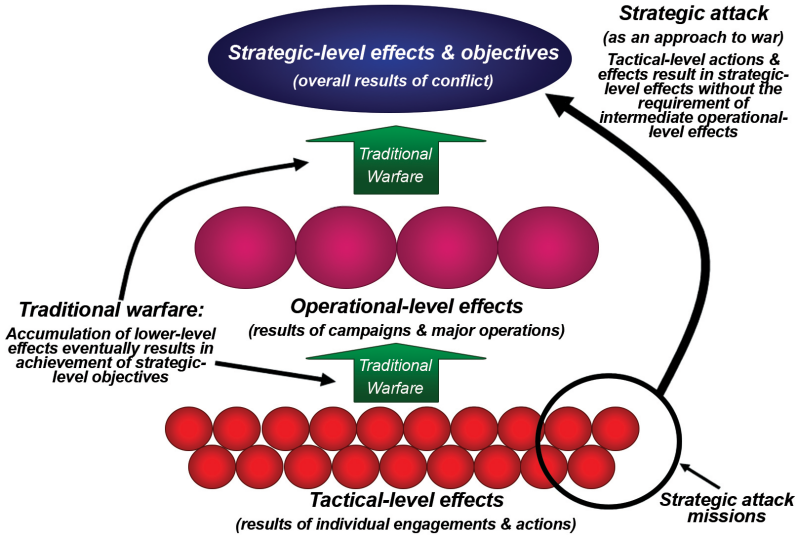

Figure 1. Differences between strategic attack and operational attack

13. John A. Warden III, "The Enemy as a System," *Airpower Journal* (Spring 1995): 43.

14. Air Force Doctrine Publication 3-70 (AFDP), *Strategic Attack* (Curtis LeMay Center for Doctrine Development and Education, 22 November 2021), 3; https://www.doctrine.af.mil/Doctrine-Publications/AFDP-3-70-Strategic-Attack/.

15. AFDP 3-70, 7.

AFDP 3-70, however, simultaneously undercuts traditional understanding by insisting that strategic attack can "achieve national or military strategic objectives."[16] The premise of strategic attack is to avoid military objectives.

Elsewhere, AFDP 3-70 problematically interweaves various theories of victory, including paralysis theory, systems theory, and complexity theory. It vaguely remarks, for example, that strategic attack's "most distinguishing feature is its focus on high-level effects against enemy systems." Having not defined or given an example, AFDP 3-70 quickly shifts to another planning concept: centers of gravity, stating: "Through application of force against enemy centers of gravity (COGs), [strategic attack's] goal is to achieve strategic, war-winning effects by the most direct, effective, and efficient means possible." It then further explains that strategic attack can have effects on "critical leadership functions, infrastructure, and strategy, achieving results by affecting the psychological, cognitive, and behavioral aspects of warfare."[17] AFDP 3-70 also adds more possible effects, including causing "systemic shock."[18] Taken together, it is difficult to figure out how to conceptualize strategic attack.

AFDP 3-70 provides a chart of seven short examples of what it claims to be successful historical strategic attack, including two non-airpower examples. Yet of those seven, only one clearly constitutes strategic attack in seeking to avoid the defeat of an opponent's military. This example concerns Operation Allied Force, where NATO "strategic attack operations helped coerce Yugoslav leader Slobodan Milošević to submit to NATO demands (1999)." Yet its vague causal explanation undercuts the definition of strategic attack and renders it unhelpful for airpower professionals.

This ambiguity is repeated in the next listed incident. In seeking to affect "key government and military installations," the airstrikes conducted during the initial period of Operation Iraqi Freedom (2003) provide an example of both strategic and operational attack; however, the doctrine fails to distinguish between the two. And while the airstrikes "disrupt[ed] Iraqi command and control," doctrine does not clarify whether this effect was on political leadership, the military, or both. One might also point out that any strategic effect was ultimately limited because the airstrikes failed to bring peace quickly—the very intent of strategic attack.

The other examples are arguably misidentified as strategic rather than operational. Doctrine cites the Battle of Issus (333 BCE), where Alexander the Great led an attack against King Darius III, ending in his removal from the battlefield and the Persian army's retreat.[19] But the example only provides operational

16. AFDP 3-70, 3.
17. AFDP 3-70, 3.
18. AFDP 3-70, 2.
19. AFDP 3-70, 7.

rather than strategic effects—the army's retreat. Indeed, the campaign continued for years because Alexander did not fulfill his political objectives at Issus.[20]

The same holds true for the second listed example, best described as an operational attack because it affected Germany's military capability. During World War II, "Allied bomber crews and commando teams destroyed the German heavy-water program—derailing Nazi nuclear reactor plans and Hitler's hope for an atomic bomb with it."[21] Air Force doctrine claims that this purported strategic attack prevented the Germans from developing the bomb; however, as tempting as it may be to read this attack's effect retrospectively because it targeted an atomic weapon, it is ultimately unhelpful to impose such an understanding of the possible revolution caused by nuclear weapons into the thinking of the time.[22] A better example of strategic attack would be the Hiroshima and Nagasaki bombings that compelled Japanese leaders to surrender.

Another example from World War II—the Allied destruction of Japanese merchant ships in the Pacific that "consciously avoided engagement with Japanese naval forces while denying Japan crucial war-sustaining resources"—has some elements of strategic attack in how US submarines avoided Japanese ships. Yet attacks on "merchant shipping" aimed at "denying Japan crucial war-sustaining resources" sought above all to have operational effects by undermining Japan's warfighting capability.[23]

This mislabeling occurs with the remaining two examples: the coalition strikes "on a Libyan regime convoy, leading directly to Muamar Gaddafi's capture and fulfillment of U.N. Security Council Resolution 1973 (2011), preventing further attacks against civilians by Gaddafi's forces"; and the 2020 US airstrike that killed Iranian Quds leader General Qasem Soleimani. The former takes a highly short-term view, ignoring the extent to which Gaddafi's death by opposing rebels may have protected some civilians initially but precipitated a larger civil war that had catastrophic implications for many others.[24] By only temporarily securing peace and concluding operations before Libya determined whether it could be successfully governed, this example cannot be considered to have met political objectives.[25] The latter case involving Soleimani is also not

20. Donathan Taylor, "Battle of Issus," EBSCO Research Starters, accessed 22 July 2025, https://www.ebsco.com/.

21. AFDP 3-70, 7.

22. Michael D. Gordin, *Five Days in August: How World War II Became a Nuclear War* (Princeton University Press, 2015).

23. AFDP 3-70, 7.

24. Kersten Knipp, "Libya's Unstable Decade After Moammar Gadhafi's Death," DW [*Deutsche Welle*], 20 October 2021, https://www.dw.com/; and Mohamed A. Daw et al., "Trends and Patterns of Deaths, Injuries and Intentional Disabilities Within the Libyan Armed Conflict: 2012–2017," *PloS One* 14, no. 5 (2019): e0216061.

25. Melissa Salyk-Virk, "The Conflicts in Libya from 2011-2020," in *Airstrikes, Proxy Warfare, and Civilian Casualties in Libya* (New America, last updated 2 June 2020), https://www.newamerica.org/.

strategic but operational, given that doctrine notes how it "disrupt[ed] Iranian military operations."[26] By AFDP 3-70's own definition of strategic attack, disruption does not meet the bar of "achiev[ing] strategic, war-winning effects."[27]

The Air Force's current doctrine consists of cherry-picked and problematic examples of strategic attack, leaving planners struggling to understand what it entails. A broader span of US airpower history helps to distinguish between operational and strategic attack in several key conflicts, identifying when each method has been most successful in contributing to political objectives.

The Historical Effectiveness of Strategic Attack

As the following historical case studies demonstrate, operational airpower has consistently and most effectively helped meet political objectives by defeating an opponent's military strategy. Strategic attack has also been successful at times.

World War I

From almost the beginning of World War I, multiple countries experimented with strategic attack, seeking various desired effects, with some more coherent than others. For example, Royal Air Force Secretary of State William Weir, desperate to try anything to end the war, expressed to his then-Chief of the Air Staff Hugh Trenchard that he hoped Trenchard "could start up a really big fire" in a German town, presumably to cause fear and panic among civilians.[28]

Historians agree that strategic attack failed for a range of reasons, including the bombers' significant lack of precision, thus failing to achieve its political objectives. Operational effect, however, proved to be a critical enabler of victory. Over time, Great Britain and France eroded German airpower advantages as they gained air superiority, helped defeat the Ludendorff Offensive, and refined air-ground operations to defeat Germany in the 100 Days Offensive.[29]

World War II—Europe

Airpower against Germany in World War II had far more significant operational than strategic effects, as can be seen clearly even in the Combined Bomber Offensive (CBO). From its beginning in 1943, the CBO focused on undermining German warfighting capability. It prioritized submarine construction yards, aircraft factories, transportation, oil, and other war-supporting factories.

This campaign also does not meet the intent of strategic attack as set forth by airpower advocates like Douhet. It did not end the war quickly and decisively by

26. AFDP 3-70, 7.

27. AFDP 3-70, 3.

28. John H. Morrow Jr., "The First World War, 1914–1919," in *A History of Air Warfare*, ed. John Andreas Olsen (Potomac Books, 2010), 23.

29. Morrow, "First World War," 24.

attacking political targets. As one scholar argues, the CBO did not even represent an independent air campaign. Army Air Force war plans noted that the CBO "resembled the British commitment to wearing Germany down prior to a land invasion."[30] In this way, the CBO sought to make the ground operation far easier.

The Allies' operational approach continued to dominate during 1944, most notably by securing air superiority for the Normandy invasion. In the process, Germany diverted 68 percent of its aircraft from the Eastern Front for homeland defense.[31] In an added irony, the Army Air Forces used its offensive weapon par excellence—the bomber—as bait to compel the German fighters up to the skies so American fighters could destroy them.[32]

The Army Air Forces estimated that by 1945, it had devoted only about 24 percent of its efforts to strategic attack. Of that 24 percent, however, almost 75 percent actually sought operational effects (table 1).[33]

Table 1. Army Air Forces target sets, 1944 to 1945, by percentage of total bomb tonnage, with potential strategic attack designated by an asterisk.[34]

Target Set	% of Total	Tons of Bombs Dropped
Marshalling yards	27%	195,610
Airfields	11.6%	82,691
Military installations	8.8%	62,908
Other specific industries*	7.5%	53,492
Aircraft factories	6.2%	44,437
Ground cooperation	5%	36,958
Ship yards, sub pens	4.8%	34,427
Railroads, roads, bridges	4.2%	30,557
Jettisoned and unknown*	3.6%	25,535

Obviously "city areas" comes closest to representing the vision of strategic bombardment theorists like Douhet, but the Army Air Forces targeted those areas only 6.6 percent of the time in terms of total bomb tonnage.[35] While it could be argued its practice of blind bombing resulted in unintended effects on the civilian populations of cities, the service intended to hit more opera-

30. Richard Overy, *The Bombers and the Bombed: Allied Air War over Europe, 1940–1945* (Penguin, 2013), 110.

31. Richard Overy, "The Air War in Europe, 1939–1945" in *History of Air Warfare*, 49.

32. Eugene Thomas Winn, *Liberator Bomber: The Correspondence of Lieutenant Eugene T. Winn of the 446th Bomb Group, 1942–1945* (Mercer University Press, 2004), 68.

33. Thomas Alexander Hughes, *Over Lord: General Pete Quesada and the Triumph of Tactical Air Power in World War II* (The Free Press, 1995), 16.

34. *Army Air Forces Statistical Digest World War II*, 2nd printing (Office of Statistical Control, December 1945), 240; http://www.91stbombgroup.com/.

35. *Statistical Digest*, 242.

tional targets that tragically happened to be located in urban areas.[36] The Army Air Forces devoted slightly more to other unspecified industrial targets.[37] The attritional nature of these attacks undercuts the label "strategic" as Airmen understood it.

Transportation and the means to enable transportation, such as oil, received the majority of the Army Air Forces' effort against Germany, constituting 42 percent of targeting between March and May 1944.[38] These strikes should be considered operational because they primarily intended to prevent Germany from using its railroads to send soldiers and materiel to the battlefield and its oil to fly airplanes and drive tanks. They also helped to paralyze the German ability to produce war materiel.[39] Importantly, the attack on transportation was highly inefficient; only by taking an expansive view would one consider this strategic—but even then—it would be a highly inefficient form of it. The Army Air Forces itself recognized that cutting rail lines in particular required a "continuous operation" because the lines could be quickly repaired.[40]

Even if operational attack dominated, the CBO did have elements of strategic attack. At the political level of war, the CBO opened another front to shore up a key alliance with the Soviet Union. Yet, it was the Battle of Berlin as the Allied armies threatened the German capital—not the CBO—that affected Hitler's decision-making when he took his own life. In short, strategic attack did not convince him to surrender.

Even if operational attack was more effective overall than strategic attack, it is still important to evaluate strategic attack not by the ambitious inter-war claims of the bomber barons but by what effects it had in wartime. One analysis, for example, concludes that in "Europe, strategic bombing did not prove the case of its most outspoken advocates."[41] The RAF and later the US Army Air Forces experienced almost a "near-catastrophic failure … to make good the prewar claims."[42] This analysis is correct on both counts, but that is beside the point. The CBO did not need to win a war by itself to necessarily be worth the investment. In this case, interwar airpower theory—and its hold on airpower scholarship—threatens to undercut how practitioners might apply strategic attack in future contests.

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36. Overy, *Bombers and the Bombed*.

37. *Statistical Digest*, 242.

38. "Big Tonnages Clog Movement of Enemy Troops, Supplies," *Impact!* (September 1944): 12.

39. Alfred C. Mierzejewski, *The Collapse of the German War Economy, 1944–1945: Allied Air Power and the German National Railway* (The University of North Carolina Press, 1988), 182.

40. Overy, *Bombers and the Bombed*, 350; and "Rail Lines Cut Off Across Italy," *Impact!* (May 1944).

41. Tami Davis Biddle, *Rhetoric and Reality in Air Warfare: The Evolution of British and American Ideas about Strategic Bombing, 1914–1945* (Princeton University Press, 2002), 292.

42. Biddle, *Rhetoric and Reality*, 301.

World War II—Japan

The war against Japan played out differently in important ways. While joint air-sea operational attack theoretically defeated the Japanese military, it took strategic attack to change Tokyo's decision-making.[43]

Beginning in the fall of 1943, the Army Air Forces launched its long-awaited campaign against the Japanese homeland from the Mariana Islands. Initially, the operation targeted aircraft production, thus seeking to have an effect on Japan's ability to defend itself as had occurred against Germany. Struggling to undertake precision attack, however, the Army Air Forces shifted to an incendiary campaign against Japan's cities. Airmen claimed that they sought to shut down the Japanese factories' support of the war effort. Arguably, such efforts also sought to have a psychological effect on Japanese civilians, although this was not stated outright.[44] The Army Air Forces, however, failed to achieve much effectiveness through either operational or strategic attack through the firebombing campaign. Aerial mining and submarines had already largely made it impossible for Japanese factories to secure the supplies they needed to produce much of anything.[45] The plight of Japanese civilians also did little to affect Japan's leadership. Although firebombing destroyed some military production by burning Japan's urban areas, it ultimately failed to drive political leaders to surrender.

By contrast, the dropping of the atomic bombs on Japan quickly and dramatically changed decision-making.[46] This was both the intended effect and the actual effect, making the "political" bombing of Hiroshima and Nagasaki one of history's most successful examples of strategic attack.[47] This effort resulted in the destruction of some previously untouched military facilities, but this was neither the desired effect nor the causal reason for Japanese surrender. As in most cases of successful strategic attack, external factors also helped, especially the possibility of the Soviet Union entering the war against Japan.

The Korean War

While some scholarship suggests that strategic bombing dogma greatly shaped how Airmen employed airpower in the Korean War, the reality is far different.[48] During the war, the US Air Force considered that it had flown 220,168 sorties for purposes of interdiction and armed reconnaissance; 92,603

43. Sadao Asada, "The Shock of the Atomic Bomb and Japan's Decision to Surrender: A Reconsideration," *Pacific Historical Review* 67, no. 4 (1998).

44. Ralph H. Nutter, *With the Possum and the Eagle: The Memoir of a Navigator's War over Germany and Japan* (University of North Texas Press, 2005), 237.

45. Nutter, *Possum and the Eagle*.

46. Asado, "Shock."

47. O'Brien, *War*, 475–6.

48. Conrad C. Crane, *American Airpower Strategy in Korea, 1950–1953* (University Press of Kansas, 2000).

for close air support; 73,887 for offensive counterair; 60,971 for reconnaissance; and 12,931 for defensive counterair. The Air Force counted only 994—or 0.2 percent—as strategic attack sorties. The Far East Air Force's (FEAF) initial objectives mirrored this reality, with its commander, General George Stratemeyer, considering his main priorities to be air superiority, support for the Army, and isolating the battlefield.[49]

FEAF had its greatest success early in the war as North Korea tried to dislodge its opponent from the Korean Peninsula. Operational airpower used around the Pusan Perimeter had enormous success in terms of close air support and interdiction, aided by the fact that the mechanized North Korean military was at the end of its supply lines and the road and rail network could not resupply fast enough. Judged by the original political objectives of US involvement, the United States ensured South Korean sovereignty, making operational airpower hugely important to the meeting of political objectives. It was only when General Douglas MacArthur, commander of UN forces in Korea, changed those objectives to far more ambitious ones—dragging China into the war—that airpower struggled to be decisive in affecting the ground situation.

Most of what constitutes strategic attack occurred during the beginning and end of the Korean War. Strategic Air Command envisioned shocking North Korean cities as it had in the Japanese firebombing campaign by "bringing the war to the people."[50] Psychological effects, however, did not influence North Korean, Chinese, or Soviet decision-making. Moreover, the limitations that the Joint Chiefs of Staff imposed on airpower to prevent the Cold War's expansion insured that the Air Force could not directly use strategic attack against the Soviet Union or China.[51] As such, operational airpower had the most opportunity to try to convince the communist powers that they could not fulfill their military strategy.

Some Western scholars incorrectly assert that the rise in strategic attack at the war's end, including targeting hydroelectric plants and dams, succeeded in influencing the truce talks.[52] While there is some indication that these attacks affected North Korean leadership, they did little to alter Soviet or Chinese thinking. Soviet leader Joseph Stalin particularly hoped to drag the war on as long as possible, given that the costs the war imposed on the United States were far higher than the ones he faced.

His death in March 1953, however, changed the political calculus, with incoming Soviet leadership adopting a new grand strategy in dealing with the West. China followed suit only 23 days after Stalin's death; after meeting with

49. Alan Stephens, "The Air War in Korea, 1950–1953," in *History of Air Warfare*, 89.

50. Pape, *Bombing*, 144–5.

51. Robert F. Futrell, *The United States Air Force in Korea* (Office of Air Force History, 1983), 480.

52. Ziaoming Zhang, *Red Wings over the Yalu: China, the Soviet Union, and the Air War in Korea* (Texas A&M University Press, 2002), 195.

the Soviets, China announced its readiness to restart peace proceedings.[53] Peace emerged on the Korean Peninsula not because of strategic attack but because of changed political circumstances.

The Gulf War

Like World War II, Desert Storm provides another example of operational airpower most effectively meeting political objectives. While some claim that strategic bombing had won the war and that war did not require defeating an enemy's fielded forces, they remain in the minority.[54]

This conflict also marked an evolution in thinking about strategic attack, as evident in the heated discussion between US Central Command's Air Component Commander General Chuck Horner and Colonel John Warden, then lead of the Air Force planning cell Checkmate, with Horner conflating "strategic" attack with nuclear attack.[55] Mutually assured destruction had made strategic attack unthinkable, and it took Airmen some time to revisit conventional strategic attack. Operation Desert Storm importantly brought this debate to the fore again.

Ultimately, though, operational attack had far more effect than strategic attack in Desert Storm, particularly in allowing for the efficient achievement of air superiority and then degrading the military effectiveness of Iraqi troops in the Kuwaiti theater of operations, thus paving the way for a relatively easy ground campaign.[56]

Operation Allied Force

Operation Allied Force showed the opposite to be true. Here, strategic attack worked in conjunction with diplomatic efforts, but operational airpower largely failed. Major factors that led Milošević to surrender included Russia's reversal of support, careful targeting of Milošević's cronies, and the NATO Alliance's stability.[57] By contrast, operational attack in targeting Serbian fielded forces yielded far less tangible benefit.[58]

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53. Zhang, *Red Wings*, 190.

54. John A Warden III, "Success In Modern War: A Response to Robert Pape's *Bombing to Win*," *Security Studies* 7, no. 2 (1997/98), https://doi.org/.

55. John Andreas Olsen, *John Warden and the Renaissance of American Air Power* (Potomac Books, 2007), 141.

56. Benjamin S. Lambeth, *Airpower in the War Against ISIS* (Naval Institute Press, 2020), 39; and James A. Winnefeld and Dana J. Johnson, *Air Power in the Gulf War: Evaluating the Claims* (RAND Corporation, 1994), https://www.rand.org/.

57. Benjamin Lambeth, *NATO's Air War for Kosovo: A Strategic and Operational Assessment* (RAND Corporation, 2001).

58. Tony Mason, "Operation Allied Force, 1999," in *History of Air Warfare*, 244.

Operation Inherent Resolve

With few chances to use strategic attack during the Global War on Terror, airpower advocates seized opportunities for what some—using a broad understanding of the term—considered to be strategic attack during Operation Inherent Resolve. Unsurprisingly, during the operation, the Army and the Air Force argued over how to best employ a high-value asset. The Air Force advocated for a far greater role for the so-called "strategic" fight while the Army insisted on support for the "close" fight, reinforcing the perception by some critics that the Air Force did not want to support the Army.[59]

Two competing accounts take different approaches to this concept. A 2021 RAND study reveals the tendency to take too encompassing a view of strategic attack while a separate analysis largely and correctly ignores the term. The RAND report blurs the line between what constitutes deep attack and strategic attack. For example, it describes how early on in the operation "the deep fight—attacks on strategic targets intended to directly degrade ISIS [Islamic State of Iraq and Syria] capabilities—and close fights unfolded separately."[60] This conflates the conflict's geography with its aims by defining it as strategic yet describing the desired effects as being exacted on vaguely-defined "capabilities."

Under the narrower definition of strategic attack offered here, these attacks do not merit being considered strategic attack if planners wanted above all to undermine ISIS' warfighting capability. Viewed this way, the Air Force appears far more eager to support the ground campaign's military objective to retake territory, albeit off the battlefield, than if it sought largely to employ airpower independently in strategic attack.[61]

Subsequently, Operation Tidal Wave II sought to attack ISIS' military strategy by undercutting the organization's financial ability to wage war, thus serving a military objective.[62] The United States also wanted to "undermine ISIS's self-assurance and fighting spirit through such attacks."[63] This objective is so vague as to make it difficult to consider whether "self-assurance" intends to create operational or strategic attack, but the overall intent of Tidal Wave II appeared to require more operational than strategic attack. Notably, though, if planners did intend to undertake strategic attack, then targeting devolved into striking more than six hundred trucks hauling oil.[64]

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59. Tom Temin, "Is the Air Force Abandoning Its Close Air Support Mission?," *Federal News Network*, 2 February 2023, https://federalnewsnetwork.com/.

60. Becca Wasser et al., *The Air War Against the Islamic State: The Role of Airpower in Operation Inherent Resolve* (RAND Corporation, 2021), 199.

61. Wasser et al., *Air War*, 256.

62. Wasser et al., *Air War*, 225; Lambeth, *Air War*.

63. Lambeth, *Air War*, 147.

64. Lambeth, *Air War*, 94; and Lisa Ferdinando, "OIR Spokesman: Coalition Cripples ISIL Oil Distribution," US Department of War (website), 18 November 2015, https://www.war.gov/.

Operation Point Blank, by contrast, had both operational and strategic elements because planners wanted to undermine ISIS' political ability to govern as well as its ability to recruit fighters.[65] Still, this primarily constituted operational attack. As Inherent Resolve spokesperson Colonel Steven Warren noted, the real goal was to "eat away at their ability to continue their operations."[66]

Unlike the RAND study, a separate analysis on Inherent Resolve barely mentions strategic attack, and correctly so. Instead, it suggests that the United States could have done "deeper interdiction" to provide "independent leverage against ISIS."[67] This use of *independent*, though, is problematic. Airpower conducts interdiction to isolate the battlefield; thus, it is by nature joint, not independent.

A more strategic campaign would have focused on undercutting ISIS' ability to govern.[68] Retired Lieutenant General David A. Deptula, for example, sought "concurrent and sustained strategic attacks against ISIS's most vital centers of gravity in Syria," although he did not identify what those might be.[69] Another more strategic campaign could have been waged in the information environment in "debunk[ing] the Daesh 'strong caliphate' narrative."[70] Some analysts, however, have debated whether this approach would have been more effective.[71]

Russia's War in Ukraine

Although small unmanned aerial systems, or drones, have received the lion's share of attention in analyses of the air portion of Russia's war in Ukraine, there are several simultaneous campaigns that highlight the primary importance of operational attack and the secondary importance of strategic attack, which is in keeping with most of the case studies surveyed here.

The most important air war is the traditional operational air superiority battle. Russia has used missiles, Shaheds, and other cheap platforms to force Ukraine to make difficult and expensive choices about what to defend. NATO's provision of Patriots, national advanced surface-to-air missile systems, and other air defense systems have critically kept Russia from achieving traditional air superiority over Ukraine as a whole. Ukraine's air defense has preserved Ukrainian sovereignty to date, turning the ground war into a war of attrition.

The interdiction campaign, by contrast, has not been as important as it had the potential to be. On the one hand, Russia's inability to do dynamic targeting

65. Wasser et al., *Air War*.

66. Wasser et al., *Air War*, 227.

67. Lambeth, *Air War*, 82.

68. David Deptula, as cited by Lambeth, *Air War*, 90.

69. David Deptula, "Foreword," in *Air War*, by Lambeth, ix.

70. Robert J. Elder Jr., "Air Force Strategy and Inherent Resolve," *Air & Space Forces Magazine*, 24 June 2016, https://www.airandspaceforces.com/.

71. Paul J. Hoffman, "The Islamic State on the Eve of OIR: From Insurgency to Proto-State," in *Operation Inherent Resolve*, ed. Jordan Hayworth (Air University Press, 2023), 16.

makes it difficult for it to interdict effectively. By contrast, Ukraine struggles to mass enough resources to have significant and enduring operational effect. It has used air-launched ground weapons like Army Tactical Missile Systems with their almost 200-mile range to push Russian command and control and logistics centers farther away from the frontlines.[72] This approach adds friction to Russian efforts, but it has yet to enable a breakthrough.

In terms of the long-range campaigns waged by both sides, it is not always clear what effects planners seek. At times Ukraine seemingly has sought a psychological effect on Russian citizens and decisionmakers in launching small attacks against Moscow, thereby constituting strategic attack. On the other hand, the majority of Ukraine's long-range campaign has been operational in seeking to destroy bombers and hurt oil and drone production.

Meanwhile, Russia wages strategic attacks against Ukrainian citizens in its horrific strikes against hospitals and other civilian targets. Its targeting of Ukraine's electricity infrastructure may also be considered strategic if Russian planners seek to affect enemy morale or political leaders' willingness to continue waging the war. Yet thus far, such attacks have not changed Ukrainian leaders' decision-making. On the other hand, if Russia seeks to force Ukraine to use up precious air defense, then such strikes are more operational. The Russian case highlights the tendency of air warfare to devolve into a game of trying a bit of everything at once when one has a sufficient inventory of aircraft, weapons, and more.

In short, neither side has been successful enough with operational attack to break through the stalemate and win on the battlefield. Meanwhile, strategic attack has yet to provide a shortcut to directly meet political objectives by winning off the battlefield.

So What? Strategic Attack for Airpower Practitioners

Paring down the concept of strategic attack has two primary benefits for airpower employment. First, and perhaps most importantly, it assuages concerns from joint and coalition partners that the Air Force understands their desire for the critical support airpower provides. In Operation Iraqi Freedom, simply labeling strategic attack as "strategic regime"—defined as neutralizing the "regime's ability to command forces/govern State"—helped ease interservice tensions.[73] In short, the Air Force's approach to jointness stands to improve significantly with a more focused understanding of strategic attack.

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72. Lolita C. Baldor and Tara Kopp, "Ukraine Uses Long-Range Missiles Secretly Provided by US to Hit Russian-Held Areas, Officials Say," *The Associated Press*, 24 April 2024, https://apnews.com/.

73. Not for attribution, lecture, Operation Iraqi Freedom, Air Command and Staff College, December 2023.

Second, recategorizing much of what has been considered strategic attack throughout airpower history as operational attack helps to confirm several points:

- Strategic attack remains controversial in the national security community, in part because expansive and competing definitions have resulted in the identification of much of historical targeting as strategic. Separating out the intended effects highlights that operational attack has generally but not always been more effective while providing a clearer perspective on the relative balance between operational and strategic approaches in past case studies.
- Some airpower advocates believe that Air Force officers censor themselves too much, failing to convince sister services of what the Air Force can do. Highlighting the dominance of operational attack in Air Force history provides a path forward for more outspoken officers who better understand the breadth of US airpower history and can explain that strategic attack has not dominated the service's historical record.[74]
- Airpower, in this context, has never won a war by itself and almost certainly never will, especially given its exponentially increasing dependence on space and cyber. Except in very rare cases, it is no longer accurate to describe airpower as being employed independently. Indeed, doing so only perpetuates the Air Force's reputation as a service with a preference for independent airpower.
- Cutting through the clutter surrounding the concept in scholarship and doctrine helps airpower advocates make tailored arguments about the use and effectiveness of strategic attack. Strategic attack is only strategic in that it seeks to bypass the operational level of war and have direct effects on the political level.

Currently, Air Force doctrine lumps operational attack into its strategic attack doctrine. To this, it also adds a multitude of other concepts that have a dizzying effect on the practitioner, especially given such doctrine's overly simplistic and problematic historical examples. By comparing and contrasting operational and strategic attack, the Air Force can clearly determine when and why each approach is likely to be successful.

Scholars and airpower practitioners alike have failed to agree on what constitutes strategic attack, and this ambiguity threatens future joint operations. A reconceptualization that clearly distinguishes between effects on the military at the operational level of war and on society writ large at the strategic or political level of war helps to bring a more precise understanding to an important tool.✪

74. Lambeth, *Air War*, 40.

The Lords of the New Church

Zealots, Prophets, Heretics, and the Future of Airpower

J. WILLIAM "BILL" DEMARCO

The US Air Force, born of visionary ambition to dominate the skies and reshape modern warfare, now finds itself constrained by the very institutions it once disrupted. Drawing an analogy between ecclesiastical orthodoxy and military bureaucracy, this article argues that the Air Force is at risk of enshrining ritual over readiness, doctrine over adaptability, and performance over authenticity. Despite high-profile innovation efforts, cultural inertia—fueled by gatekeeping structures, evaluative formalism, and legacy paradigms—impedes transformation. Through the lens of thinkers such as Max Weber and Clausewitz, this work analyzes efforts at innovation through programs such as AFWERX and individuals including Colonel John Boyd to explore how reformation—not revolution—is required for the renewal of the Air Force.

The US Air Force—indeed, the broader Joint force—is grappling with an accelerating mismatch between twenty-first-century operational complexity and twentieth-century institutional behavior. Despite investments in technology, innovation, and professional military education (PME), the Air Force continues to recruit prophets only to burn them at the stake. Cultural inertia, driven by bureaucratic risk aversion, doctrinal orthodoxy, and outdated talent structures, undermines the ability to adapt with speed and relevance. In a time when adversaries are rewriting the rules of power projection, America cannot afford to rely on legacy mindsets embedded in inherited institutions.

In 1929, the Air Corps Tactical School (ACTS) adopted the Latin motto, *Proficimus More Irretenti* ("We Make Progress Unhindered by Custom"), embodying a spirit of daring intellectual rebellion.[1] Its authors believed that airpower theory should not be tethered to tradition. They were not seeking comfort; they were seeking transformation.

Ironically, this motto has all but disappeared from visible use at Air University—a poignant metaphor for how the spirit of doctrinal innovation has been replaced

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1. *History of the Air Corps Tactical School, 1920–1940*, Air Force Historical Study No. D301 (US Government Printing Office [GPO], 1992), 27.

by a culture of procedural compliance. One of the earliest expressions of this *proficimus* spirit was the development of high-altitude precision daylight bombing doctrine at ACTS. Figures like Lieutenant General Harold George and Major General Haywood Hansell—drawing from Giulio Douhet's theories but adapting them to American industrial capacity and democratic norms—argued that airpower could strike an enemy's warmaking capability directly, bypassing prolonged ground warfare. Though controversial at the time, their ideas laid the intellectual foundation for strategic bombing in World War II, demonstrating what it truly meant to make progress unhindered by custom.

Yet there are moments in the life of an institution when reverence becomes ritual, and ritual becomes rot. The Air Force, like the great churches of history, was founded with a visionary mandate: to transcend the limits of land-bound warfare, to command the skies, and to deter or defeat adversaries through the asymmetric power of the air. But over time, even the most righteous institutions can begin to worship their own form. Airpower, once an animating doctrine of strategic imagination, risks becoming a liturgy—a closed canon of beliefs administered by a priesthood of program offices, doctrinal gatekeepers, and acquisition theologians.

This article frames the question of Air Force reform through a metaphor that is both subversive and faithful: the institutional church. It asks whether the Air Force, like the church of the late Middle Ages, has become so consumed by its own orthodoxy and ritual that it has lost sight of its reason for being. The goal is not to dismantle but to diagnose—to distinguish between performative innovation and prophetic reform, between liturgy and lived readiness.

Drawing on the perspectives of thinkers ranging from Carl von Clausewitz and Colonel John Boyd to Hans-Georg Gadamer and Søren Kierkegaard, and grounded in Air Force doctrine and strategic scholarship, this work argues that the Air Force must undergo what Gadamer would call a *hermeneutic turn*: a rediscovery of meaning through the act of interpretation.[2] Doctrine, like scripture, must not only be read but also reread, debated, embodied, and transformed.

The following sections explore this analogy through seven thematic movements: 1) institutional drift, 2) the rise of gatekeepers, 3) the tension between prophets and heretics, 4) the misuse of sacred texts, 5) the performance of strategy, 6) the liturgy of lethality, and 7) a final call to institutional repentance. Each section builds toward a vision not of revolution, but of reformation—a return to the deeper truths of airpower in a moment when the stakes demand nothing less.

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2. Hans-Georg Gadamer, *Truth and Method*, 2nd rev. ed., trans. Joel Weinsheimer and Donald G. Marshall (Continuum, 2004).

Founding Vision Versus Institutional Drift

Institutions, whether sacred or strategic, are often founded with a sense of purpose—aspirational, even transcendent. Churches are established to shepherd souls, preserve wisdom, and enact a divine mission. The Air Force emerged with a similarly compelling directive: to secure dominance in the air domain in defense of national interest. Its creation reflected a vision of transformational power—airpower as the decisive instrument of national will.

Over time, institutions risk becoming preoccupied with the preservation of form rather than the pursuit of function. The church, particularly during the late Middle Ages, gradually shifted from spiritual vitality to ritual maintenance, from theological inquiry to bureaucratic enforcement. The sale of indulgences, the centralization of ecclesiastical authority, and the persecution of dissenting voices such as fifteenth-century religious reformers Jan Hus or Girolamo Savonarola illustrate how doctrine became a mechanism of control rather than a conduit of truth.[3]

A parallel pattern has emerged within the Air Force. The founding ethos of imagination, agility, and strategic initiative has, in key areas, been subordinated to institutional self-preservation. In recent years, the Air Force has expressed the need for innovation through initiatives like *Accelerate Change or Lose* and AFWERX.[4] Yet these efforts often fall prey to what Thomas Kuhn might call *paradigm entrenchment*—where anomalies are acknowledged but never allowed to disrupt the prevailing model.[5] In many cases, efforts like Spark Cells or innovation incubators remain brokers of boutique change, not prophets of doctrinal transformation.

While designed to empower tactical-level innovation, many of the Spark Cells proliferating across Air Force bases are resourced "out of hide" and focus on hyperlocal solutions—like 3D-printing spare parts or developing mobile apps to schedule fitness tests.[6] These are not unimportant, but they rarely scale beyond the base and almost never challenge or transform strategic doctrine. In this way, Spark Cells often become ritualized innovation: visible, celebrated, and low-risk—but ultimately disconnected from the institution's most urgent adaptation needs.

Similarly, AFWERX began with the promise of unleashing Airman-led innovation at the tactical edge, co-founded by visionaries like Dr. Brian Maue to create agile pathways for warfighters.[7] Yet over time, its mission has become increasingly transactional—more focused on matching startups with acquisition oppor-

3. Diarmaid MacCulloch, *The Reformation: A History* (Viking, 2003).

4. Charles Q. Brown Jr., *Accelerate Change or Lose* (Headquarters US Air Force, August 2020).

5. Thomas S. Kuhn, *The Structure of Scientific Revolutions*, 3rd ed. (University of Chicago Press, 1996).

6. Lan Kim, "3D Printed Parts for the C-5M Deliver New Capabilities," US Air Force (USAF, website), 12 March 2023, https://www.af.mil/.

7. AFWERX Public Affairs, "AFWERX Named to Fast Company's 100 Best Workplaces for Innovators," USAF, 30 July 2020, https://www.af.mil/.

tunities than on challenging foundational doctrine or force design.[8] Its outputs are now measured more in media buzz and small-dollar Small Business Innovation Research awards than in strategic adaptation. In this, AFWERX exemplifies how reformist energy can be ritualized into process—how what begins as disruption can be absorbed into the very bureaucratic rhythms it set out to transcend.

Similarly, the promotion system rewards conformity to established career paths, privileging command tours and platform pedigree over unconventional thinkers in cyber, artificial intelligence, or autonomous systems.[9] As in the medieval church, where dissenting theologians were cast as heretics for challenging orthodoxy, today's doctrinal dissenters often find themselves marginalized in key decision-making forums. In both cases, the institutional immune system activates not to test the new but to defend the familiar.

Max Weber's theory of the "routinization of charisma" describes how revolutionary ideals, once institutionalized, solidify into bureaucratic mechanisms that dampen the very spirit that gave rise to the organization.[10] The prophet becomes the priest; the revolutionary becomes the administrator. Structures created to support mission success become the mission. In this light, the Air Force risks becoming a steward of its own mythology—one that venerates legacy platforms and Cold War paradigms even as adversaries exploit emerging technologies and novel domains.

The inertia of institutional drift is compounded by cognitive lag. Theories and operational concepts often outlive their utility, particularly when institutions remain reluctant to reinterpret doctrinal frameworks. Kuhn's concept of paradigm shifts is instructive here: dominant models persist until they can no longer accommodate growing anomalies—at which point crisis compels transformation. In the Air Force's case, anomalies abound: cyber and space-based threats, human-machine teaming, and algorithmic decision cycles all signal a strategic context that legacy airpower doctrine can no longer contain. Yet, like the pre-Reformation church clinging to scholastic orthodoxy, the institution tends to respond not with reformation but retrenchment.

A telling example is the Advanced Battle Management System (ABMS), envisioned as a radical overhaul of command and control (C2)—seamless, AI-enabled, and distributed across platforms. Originally intended to replace the aging Joint Surveillance Target Attack Radar System architecture, ABMS promised a shift toward

8. See, for example, Theresa Hitchens, "Air Force Boosts Funding Cap for Promising Startups," *Breaking Defense*, 7 October 2019, https://breakingdefense.com/.

9. See Kyle Rempfer, "Fighter Jock Culture May Be Holding Air Force Back, RAND Study Says," *Air Force Times*, 26 February 2019, https://www.airforcetimes.com/; and Jennifer-Leigh Oprihory, "USAF Wants Promotions to Be More Equitable, Brown Says," *Air & Space Forces Magazine*, 21 September 2020, https://www.airandspaceforces.com/.

10. Max Weber, *Economy and Society: An Outline of Interpretive Sociology*, ed. Guenther Roth and Claus Wittich (University of California Press, 1978).

edge-cloud networks and real-time sensor fusion.[11] But the initiative faltered under the weight of legacy acquisition procedures, unclear doctrinal anchoring, and platform-centric thinking. Though publicly championed, ABMS remained doctrinally peripheral—celebrated in speeches but unsupported in core planning documents.[12] It became a case study in anomaly denial: a transformative vision effectively quarantined from doctrinal reckoning.[13]

Reform does not begin with the rejection of tradition but with its reinterpretation. According to Gadamer's hermeneutics, understanding is always historically situated.[14] Foundational texts—whether scripture or doctrine—must be engaged anew in each generation. A hermeneutic turn involves discerning not just what a text meant, but what it means now, in light of new realities. For the Air Force, this implies that concepts like *dominance*, *decisive force*, or even *strategic deterrence* must be examined in the light of contemporary threats, technologies, and geopolitical dynamics.

The contrast is stark: Airpower, once a disruptive idea, now risks being domesticated by the very structures it once challenged. Reformation, in this context, is not a break with history but a return to its animating spirit. Institutional drift can be arrested—but only through intentional, interpretive renewal.

The Rise of Gatekeepers and Orthodoxy

All enduring institutions develop mechanisms to preserve their coherence: hierarchies, rituals, and authoritative doctrines. In the ecclesiastical world, these mechanisms manifest as councils, sacraments, and creeds. In military culture, they take the form of command structures, evaluative boards, and doctrinal custodians. Their purpose is to maintain integrity, continuity, and legitimacy.

Yet, as Weber cautioned in his theory of authority, the bureaucratic apparatus established to serve the mission may begin to serve itself.[15] Within the Air Force, this bureaucratic preservation often surfaces as rigid adherence to legacy concepts, even in the face of profound strategic disruption. Gatekeeping functions, originally intended to safeguard professional standards, may evolve into instruments of conformity. Doctrine becomes less a guide for thought and more a script to be recited. The evaluative architecture of the institution—promotions, awards, assignments—begins to reward compliance over insight, control over creativity.

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11. Valerie Insinna, "The Air Force Has a New Plan to Field the Advanced Battle Management System. Here's What You Need to Know," *Defense News*, 11 May 2021.

12. *Defense Acquisitions: Action Is Needed to Provide Clarity and Mitigate Risks of the Air Force's Planned Advanced Battle Management System*, GAO-20-389 (US Government Accountability Office [GAO], 16 April 2020), https://www.gao.gov/.

13. Kuhn, *Scientific Revolutions.*

14. Gadamer, *Truth and Method*.

15. Max Weber, *From Max Weber: Essays in Sociology*, ed. H. H. Gerth and C. Wright Mills (Oxford University Press, 1946).

Historically, this dynamic was evident in the institutional resistance to Boyd's observe, orient, decide, act (OODA) loop framework as "too disruptive," as it challenged hierarchical, platform-centric thinking.[16] Despite its eventual embrace by joint doctrine, Boyd's work was largely developed outside formal structures and met early resistance by doctrinal boards. Boyd himself was marginalized during his career. His prophetic contributions on energy-maneuverability theory and the OODA loop only gained traction after his departure from active service.[17]

Similarly, Billy Mitchell's early advocacy for strategic bombing and carrier-based aviation was dismissed as insubordination by senior leaders still entrenched in battleship-era thinking.[18] Mitchell was court-martialed in 1925 for his public criticisms of senior leadership's failure to understand the potential of airpower. Though vindicated by history, he was condemned by the institution.

Today, a similar gatekeeping logic can be seen in the marginalization of non-kinetic warfighting disciplines—particularly cyber, space, and AI. Officers pioneering these domains often find themselves lacking traditional markers of institutional credibility, such as command of a manned flying squadron. Consider the Air Force's initial reluctance to formally integrate ABMS into a doctrinal framework, despite its potential to redefine C2 across domains. In its review, the Government Accountability Office (GAO) warned that although ABMS had progressed technically, the Air Force had "yet to develop clear doctrinal and acquisition strategies," a gap GAO identified as a significant barrier to full operational integration.[19] Instead of enabling doctrinal innovation, program offices defaulted to legacy acquisition pathways, stalling momentum and sending a signal that novel concepts must conform to legacy structures to be accepted.

Michel Foucault's notion of disciplinary power and the "panopticon" helps explain this phenomenon. Once internalized, the gaze of institutional authority shapes behavior not through overt coercion but through self-regulation. This notion of institutional power warns that once a logic of internal control is normalized, even the most visionary organizations begin to regulate thought, behavior, and possibility itself.[20] Officers learn to anticipate expectations and align performance with visible norms, regardless of strategic efficacy. In such

16. See Robert Coram, *Boyd: The Fighter Pilot Who Changed the Art of War* (Little, Brown, 2002); and Ian T. Brown, *A New Conception of War: John Boyd, the U.S. Marines, and Maneuver Warfare* (Marine Corps University Press, 2018).

17. Grant Hammond, *The Mind of War: John Boyd and American Security* (Smithsonian Books, 2001).

18. John T. Correll, "Billy Mitchell and the Battleships," *Air & Space Forces Magazine*, 21 July 2021, https://www.airandspaceforces.com/.

19. *Battle Management: DOW and Air Force Continue to Define Joint Command and Control Efforts*, GAO-23105495 (GAO, January 2023), 12–13, https://www.gao.gov/.

20. Michel Foucault, *Discipline and Punish: The Birth of the Prison*, trans. Alan Sheridan (Vintage Books, 1995).

systems, innovation is often framed as disruption; critique is conflated with disloyalty. The institution thus protects its form at the expense of its future.

This dynamic is especially evident in the Air Force's use of doctrine. Official publications such as Air Force Doctrine Publication (AFDP) 1, *The Air Force*, are designed to serve as adaptive frameworks for thinking. Yet in practice, they can become tools of orthodoxy, invoked to shut down rather than stimulate debate. As one military strategist warns, doctrine must be "a point of departure for thought, not a substitute for it."[21]

This narrowing of intellectual space is reinforced by enduring status hierarchies within the service. The fighter pilot archetype—rooted in the heroic ethos of Cold War air superiority—continues to dominate leadership pipelines and cultural narratives. Meanwhile, acquisition innovators, cyber specialists, and AI researchers—those advancing the frontier of military capability—often remain institutionally peripheral.[22] The result is a cultural lag: emergent ideas surface but rarely gain traction within the promotion or doctrinal apparatus. Institutions preserve power less through overt repression than through the normalization of certain ways of knowing—subtly determining whose expertise is deemed credible.[23] Within this epistemic hierarchy, voices that challenge the dominant paradigm often find themselves excluded.

Historical examples of reformers treated as threats abound. Boyd and Mitchell are just two examples. The fate of reformers often follows a familiar pattern: they are first dismissed as heretics, then accepted as visionaries, and finally canonized as saints once their insights no longer pose a threat. Institutions resist anomalies until the weight of contradiction becomes unbearable.[24] But by then, the cost of inaction may be irreversible.

The role of doctrinal gatekeepers must therefore be reimagined. Their task is not to enforce intellectual closure but to create space for disciplined dissent—what Isaiah Berlin described as a *pluralism of values*: the belief that multiple, sometimes conflicting, principles can each hold legitimate claims to truth depending on context.[25] This does not entail relativism, but rather a recognition that institutional health requires conversation, not catechism.

Reform, then, begins with a redefinition of authority itself. It asks whether the purpose of command is to preserve hierarchy or to cultivate adaptability, and whether the role of doctrine is to restrict action or to expand understanding. The prophetic task is "to nurture, nourish, and evoke a consciousness and perception alternative to the consciousness and perception of the dominant

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21. Colin S. Gray, *Modern Strategy* (Oxford University Press, 1999), 390.

22. Rempfer, "Fighter Jock"; and S. Rebecca Zimmerman et al., *Movement and Maneuver: Culture and Competition for Influence Among U.S. Military Services* (RAND Corporation, 2019), https://www.rand.org/.

23. Foucault, *Discipline and Punish*.

24. Kuhn, *Scientific Revolutions*.

25. Isaiah Berlin, "The Pursuit of the Ideal," in *The Crooked Timber of Humanity: Chapters in the History of Ideas*, ed. Henry Hardy (Princeton University Press, 1990).

culture."[26] Without such prophetic space, the Air Force risks becoming an institution of ritual without renewal.

Zealots, Prophets, and Heretics

Every reformation movement—religious, intellectual, or institutional—relies on a cast of archetypes: zealots who ignite the flame of change, prophets who see with moral clarity, and heretics who challenge the prevailing orthodoxy. These roles are not always distinct, nor are they evenly recognized in their time. More often than not, those labeled heretics by their institutions are later venerated as visionaries by history. Like tectonic shifts, their impact may be imperceptible at first, but over time, they realign the doctrinal landscape.

In ecclesiastical terms, zealots are those who demand radical reorientation. They are often impatient with proceduralism and unwilling to compromise on urgency. Within the Air Force, these are the officers advocating for machine-speed decision-making, cognitive warfare capabilities, and the operational integration of AI. Their insistence on speed and disruption challenges the established pace of institutional change. Lieutenant General Christopher Weggeman, while serving as deputy commander of Air Combat Command, became a vocal champion of digital modernization and the "DAF Digital Trinity"—cloud computing, data, AI/machine learning. His persistent calls for a new operational rhythm—grounded in machine-speed C2 and software-defined warfare—embodied the zealot's urgency. Though not marginalized, Weggeman's message often strained against entrenched bureaucratic rhythms and the cultural inertia of platform-first thinking.[27]

Prophets, by contrast, speak from within the institution yet refuse to be seduced by its internal logic. They are capable of diagnosing not only procedural inefficiencies but also moral and philosophical drift. They resist the tyranny of single vision in favor of competing yet coexisting truths.[28] These are the instructors, strategists, and field commanders who resist cynical careerism and instead ask what the Air Force is for. Their role is not merely critical but redemptive. Prophets remind the institution of its original covenant, its telos, and its accountability to more than budget cycles and bureaucratic rankings.

Lieutenant General Clint Hinote—as deputy chief of staff for strategy, integration, and requirements—exemplified this prophetic role. He consistently challenged the service to think differently about deterrence, airpower, and Indo-Pacific operations, often warning that legacy approaches would not survive future conflict. Hinote was not oppositional but deeply loyal—a reformer

26. Walter Brueggemann, *The Prophetic Imagination* (Fortress Press, 1978), 3.

27. Air Force Life Cycle Management Center, "Exclusive Interview with Lt. Gen. Chris Weggeman," Air Combat Command, 1 July 2021, https://www.acc.af.mil/.

28. Berlin, "Pursuit."

working from within to realign the Air Force with its stated mission and emerging strategic environment.[29]

The heretic, exemplified in figures like Mitchell and Boyd, is often the prophet before vindication. Boyd was denied general officer rank and spent much of his career influencing doctrine from the margins rather than the center. As mentioned, though derided in his time, Boyd's concepts now form the backbone of Joint PME curricula and underpin modern maneuver warfare doctrine.[30] Mitchell's court-martial for insubordination was portrayed as a disciplinary necessity, yet today he is remembered as a prophetic architect of airpower—anticipating carrier warfare and strategic bombing long before either became accepted practice. His marginalization was not a failure of analysis but a failure of institutional imagination.[31] Mitchell's vision, once silenced, later returned at the core of the Air Force's strategic identity.

A more recent example is Dr. Will Roper, former assistant secretary of the Air Force for acquisition, technology, and logistics. Though not a uniformed officer, Roper had a tenure marked by efforts to transform how the service designs and fields capability. His push for digital engineering, Agile software development, and acquisition reform challenged deeply embedded cultural norms. Programs like the Digital Century Series and concepts such as the ABMS envisioned faster, more adaptive force design.[32] Yet Roper's vision often encountered resistance from legacy systems and cultural gatekeeping. His unorthodox methods and rapid experimentation ethos invited criticism, but they also forced the institution to confront its own inertia.[33]

The theological parallel is unmistakable: the early church often condemned dissenters as heretics, only to later embrace their ideas as orthodoxy. Origen of Alexandria (c. 185–c. 254) was anathematized after his death, yet his writings became foundational to Christian theology. Constantinople's patriarch Athanasius (1230–1310), repeatedly exiled for opposing the Arian heresy, was ultimately canonized as a doctor of the church. Joan of Arc (1412–1431) was burned for heresy but later declared a saint. Time and again, the institution first resisted—and then absorbed—the very voices that challenged its direction. Military institutions exhibit the same pattern, conflating critique with disloyalty, only to later rely on the foresight it once rejected. As mentioned above, in such a cycle, anomalies accu-

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

30. Thomas C. Greenwood and Frank G. Hoffman, "Evolving the OODA Loop for Strategy," *Marine Corps Gazette*, March 2025.

31. Correll, "Billy Mitchell."

32. Ben McNally, "It's Time to Build the Digital Century Series," *War on the Rocks*, 5 March 2025, https://warontherocks.com/.

33. Yasmin Tadjdeh and Stew Magnuson, "Web Exclusive: Air Force's Roper Wants to 'Fast Forward' Digital Engineering Revolution," National Defense, 23 September 2020, https://www.nationaldefensemagazine.org/.

mulate until the dominant model collapses, forcing the institution to embrace what it once dismissed as heresy.[34]

Reform in the Air Force will depend on how it treats its dissenters. Will it continue to mistake critique for rebellion? Or will it create space for prophetic critique before crisis demands it? Like any faith community, the service's vitality may hinge on its willingness to hear its prophets before canonizing them in hindsight.

Sacred Texts and Selective Readings

Religious institutions rely on sacred texts to transmit meaning across generations. The Bible, the Quran, and the Torah serve as repositories of divine revelation and tradition, but their power lies not merely in their preservation but also in their interpretation. In military institutions, particularly the Air Force, doctrinal documents function similarly. Publications such as AFDP-1, the *National Defense Strategy*, and a wide array of vision statements and operational concepts constitute the canon of professional military thought.

Across both religious and martial domains, however, the meaning of foundational texts often becomes frozen. Scripture and doctrine are invoked more often to legitimize the status quo than to provoke transformation. This is the danger of inauthentic understanding—a mode of reading that assumes the meaning of a text is fixed and self-evident, rather than something to be discovered anew through dialogue and reflection.[35]

Doctrine, like scripture, is prone to what Paul Ricoeur described as *second naiveté*: a return to meaning not through blind acceptance, but through a critical reengagement that preserves reverence without suspending reason.[36] In the absence of such interpretive maturity, institutions recite rather than rethink. They use texts to justify themselves rather than to transform themselves.

Within the Air Force, this dynamic is visible in the way doctrinal language is often used rhetorically in briefings, evaluations, and PME classrooms without encouraging genuine interrogation of its relevance. Too often in today's PME classrooms, Air Force doctrine is treated as fixed canon rather than a living, interpretive tradition. Students are asked to reference and perhaps memorize doctrine, not to interrogate it.[37] Contrast this with the Air Corps Tactical School of the 1930s, where officers debated competing visions of airpower—disagreements that would go on to shape the foundations of modern strategy. The loss of such interpretive freedom reflects Gadamer's warning: when institutions stop rereading their own texts in light of current realities, those texts cease to guide—they merely ossify.

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34. Kuhn, *Scientific Revolutions*.

35. Gadamer, *Truth and Method*.

36. Paul Ricoeur, *The Symbolism of Evil*, trans. Emerson Buchanan (Beacon Press, 1967).

37. See, for example, Celestino Perez Jr., "What Military Education Forgets: Strategy Is Performance," *War on the Rocks*, 12 September 2018, https://warontherocks.com/.

For instance, concepts like air superiority and strategic deterrence are ubiquitous in formal discourse—but rarely are students or officers asked to question how these terms must evolve in light of autonomous systems, contested space domains, gray or hybrid warfare. Instead, they are treated as doctrinal constants rather than strategic hypotheses.[38]

To be clear, there are promising exceptions. The Air Force's flagship journal has served as a venue for reflective doctrinal engagement. Articles questioning legacy assumptions—such as the utility of the air tasking cycle, redefining air superiority, or the future of fifth-generation fighter platforms—signal a growing appetite for interpretive debate.[39] But these discussions often remain compartmentalized, with limited influence on promotion boards, planning processes, or operational design. Strategic texts, instead of being interrogated, are too often reduced to talismanic slogans: full-spectrum dominance, global reach, information advantage. The phrases remain, while the contexts that gave them coherence shift.

Reform necessitates a hermeneutic turn—a willingness to read foundational texts not simply for what they said, but for what they demand now. Doctrine must be interpreted as a living tradition, one that requires ongoing dialogue between past insights and present realities. Understanding arises not from rigid application but from the fusion of horizons—the interplay between the historical text and the interpreter's contemporary situation.[40]

In practical terms, this means that concepts such as strategic effect, domain control, or C2 must be revisited in light of cyber proliferation, AI-augmented decision cycles, and adversary innovations. It also means PME institutions must teach interpretation, not just recitation—educating officers to engage with doctrinal texts as living arguments, not sacred artifacts.

Ultimately, the question is whether the Air Force will treat its doctrinal canon as a set of fixed commandments or as an invitation to strategic discernment. Just as the vitality of a religious community depends on its ability to reengage its sacred texts with honesty and imagination, so too does the vitality of a warfighting institution depend on its capacity for doctrinal renewal grounded in operational reality and interpretive courage.

Performance versus Authenticity

In both religious and military institutions, there exists a powerful temptation to conflate appearance with essence. A well-executed liturgy, a perfectly

38. Frank G. Hoffman, "Will War's Nature Change in the Seventh Military Revolution?," *Parameters* 47, no. 4 (Winter 2017–18).

39. See, for example, John D. Jogerst, "The Fifth Generation Fighter Pilot Force," *Air & Space Power Journal* 29, no. 2 (2015); Patrick Lyle, "The Rest of the C2 Iceberg," *Air & Space Power Journal* 28, no. 4 (July–August 2014); and Kelly A. Grieco and Maximilian K. Bremer, "Contesting the Air Littoral," *Æther: A Journal of Strategic Airpower & Spacepower* 3, no. 3 (2024), https://www.airuniversity.af.edu/.

40. Gadamer, *Truth and Method*.

choreographed formation, or an impeccably formatted briefing can all convey the impression of vitality. But performance is not proof of purpose, and ritual is not reality. The deeper risk, in both ecclesial and strategic contexts, is that institutions come to value the optics of success over the substance of readiness.

Kierkegaard, writing in the nineteenth century, warned that the gravest danger to authentic faith was not atheism, but habit: a Christianity so domesticated that it functioned as mere cultural convention.[41] He observed that once religious practice becomes performance—divorced from inward transformation—it ceases to challenge or convert. In the military, a similar condition arises when doctrinal compliance substitutes for critical engagement, and when ceremonial displays of readiness mask unresolved vulnerabilities.

The Air Force has developed a culture deeply rooted in evaluative formalism. Performance reports, promotion boards, and scripted exercises reward predictability and penalize deviation. Officers are trained to master the metrics, often at the expense of honest reflection. Exercises are structured to validate capabilities, not to expose fragility. Wargames often prioritize the demonstration of interoperability rather than the stress-testing of concepts and doctrine. As a result, readiness is often performed rather than interrogated.

This dynamic was evident during portions of the Iraq and Afghanistan campaigns, where tactical brilliance often masked a deeper strategic incoherence. The 2006 General David Petraeus-led counterinsurgency manual was widely hailed as a doctrinal innovation, yet even its most ardent supporters acknowledged that it was applied unevenly and often reduced to a checklist.[42] Confessional insights from post-2011 Afghanistan after-action reviews—particularly those surrounding the fall of Kunduz in 2015 or the 2021 collapse of Afghan national forces—point to repeated institutional failures to question embedded assumptions. Many reviews noted that metrics-driven assessments—for example, number of raids and force generation statistics—gave the illusion of progress while obscuring fragility.[43] These were rituals of reassurance, not rigorous interrogations of effectiveness.

This dynamic is captured by one scholar who argues that military education systems often prize alignment with doctrinal vocabulary while remaining impoverished in adaptive reasoning.[44] Strategic imagination is stifled by the expectation to produce the "right" answer rather than to explore possibilities. When strategy becomes a scripted exercise instead of a generative process, the result is

41. Søren Kierkegaard, *Attack upon Christendom*, trans. Walter Lowrie (Princeton University Press, 1968).

42. Field Manual 3-24 and Marine Corps Warfighting Publication 3-33.5, *Counterinsurgency* (Headquarters, Department of the Army, December 2006); and Joseph MacKay, "Field Manual 324 and the Iraq War," in *The Counterinsurgent Imagination: A New Intellectual History*, LSE International Studies (Cambridge University Press, 2023).

43. *Collapse of the Afghan National Defense and Security Forces: An Assessment of the Factors That Led to Its Demise*, SIGAR-22-35-AR (Special Inspector General for Afghanistan Reconstruction [SIGAR], 12 May 2022).

44. Perez, "Military Education."

what Kierkegaard might call a *crowd-driven untruth*: a communal commitment to appearances over substance.[45]

Authenticity, by contrast, demands vulnerability and moral courage. It asks leaders to admit uncertainty, to confront failure, and to interrogate their own complicity in institutional drift. Authenticity emerges when individuals operate from a place of congruence—where internal convictions align with external behavior.[46] For institutions, this means aligning mission statements with actual decision-making and doctrinal aspirations with operational culture.

Reform requires candor. After-action reviews must become confessional rather than performative. PME must prioritize reflection and argument over rote memorization. Leadership evaluations must reward intellectual risk and moral clarity—not just procedural compliance.

A purely performative military culture is not simply inefficient—it is brittle. Strategic competitors are unlikely to be deterred by rituals of dominance that conceal doctrinal stagnation. Only an institution willing to see itself clearly—and to act congruently—can claim authentic readiness.

Liturgies of Lethality

Warfare, like religion, has always carried its own ceremonial weight. From the martial processions of classical armies to the precise protocols of modern nuclear deterrence, the rituals of war are designed not only for functionality but also for symbolism. These liturgies convey authority, tradition, and continuity. But they also carry risk—particularly when the form begins to obscure the function.

In the Air Force, this performative impulse has evolved into what might be termed the liturgies of lethality: deeply choreographed demonstrations of power, doctrine, and technological prowess. These include scripted exercises, meticulously branded strategic frameworks, and an ever-growing corpus of institutional slogans. Together, they constitute a ceremonial rhythm that reassures internal audiences and projects confidence outward. Yet their very predictability signals a deeper malaise.

Institutions often substitute the performance of power for its authentic exercise.[47] Visibility becomes more important than adaptability; form supersedes substance. In such a system, the markers of readiness—uniformity, compliance, smooth execution—become more valued than their underlying reality. This creates a form of institutional pageantry that is self-reinforcing: strategic briefings are praised for their polish, wargames for their efficiency, doctrines for their alignment—not for their disruptive insight. Weber's analysis of bureaucratic rationality noted the tendency of complex systems to prioritize predictability

45. Søren Kierkegaard, *Two Ages: A Literary Review*, trans. Walter Lowrie (Princeton University Press, 1978).
46. Carl R. Rogers, *On Becoming a Person: A Therapist's View of Psychotherapy* (Houghton Mifflin, 1961).
47. Foucault, *Discipline and Punish*.

and control, even when those priorities conflict with the organization's foundational aims.[48] When applied to military doctrine, this produces a deeply professional but strategically inert force, capable of enacting familiar procedures but resistant to the improvisational demands of conflict.

Liturgies of lethality become most dangerous when they displace genuine strategic inquiry. Exercises designed to validate pre-existing concepts provide little space for surprise, failure, or dissent. Promotion systems that reward consensus over creativity cultivate risk aversion. The cumulative effect is a military posture that appears robust but is fragile beneath its ceremonial surface.

Yet there are signs that the liturgy is not entirely hollow. Recent Air Force and joint operations—such as the global strategic strike out of Whiteman Air Force Base during Operation Midnight Hammer—challenged scripted rehearsals and exposed real-world complexity. During the June 2025 strike on Iranian nuclear facilities, seven B-2 bombers flew an 18-hour mission with support from decoys, refueling tankers, F-35 escorts, surveillance platforms, and submarine-launched Tomahawks—more than 125 aircraft in total.[49]

Operation Absolute Resolve, the January 2026 US intervention in Venezuela, similarly demonstrated traditional warfighting mastery: US forces employed more than 150 aircraft from the Air Force, Navy, and Marine Corps, along with Delta Force and other special operations units, to overwhelm Venezuelan defenses and capture President Nicolás Maduro in Caracas.[50]

These operations were undeniably effective at achieving tactical aims, though their very success emerged not from doctrinal rigidity, but from adaptation, improvisation, and human judgment under real-world complexity. The illusion of seamless execution masked the friction behind the scenes—split-second decisions, shifting authorities, re-tasked assets, and digitally fused C2 workarounds. Rather than validating our assumptions, these moments served as reminders that strategic adaptation depends on our willingness to confront, rather than conceal, systemic vulnerability.

The question now is whether we can normalize that agility—*build it in, not bolt it on*. Future operations will unfold across compressed timelines, contested domains, and cognitive battlefields where information is both weapon and terrain. Success will depend less on doctrine-as-script and more on doctrine-as-orientation: a framework that empowers speed, mission command, and iterative adaptation. To remain ahead, the enterprise must institutionalize the capacity for deviation, reward heretical insight, and protect the creative tension that makes real innovation possible.

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48. Weber, *Economy and Society*.

49. Ashley Roque, "Operation Midnight Hammer: How the US Conducted Surprise Strikes," *Breaking Defense*, 22 June 2025, https://breakingdefense.com/.

50. Matthew Olay, "Trump Announces U.S. Military's Capture of Maduro," *Pentagon News*, 3 January 2026, https://www.war.gov/.

As Helmuth von Moltke observed, no plan survives contact with the enemy.[51] War remains the realm of uncertainty and friction; no amount of ceremonial invocation will eliminate that fog.[52] A liturgical approach to strategy is not merely ineffective; it is dangerous. Renewal requires not the abandonment of ritual, but its reorientation. Just as religious reformations have historically re-grounded liturgy in lived experience and theological reflection, military institutions must reconnect performance with purpose. Strategic rituals—whether doctrine writing, wargaming, or operational planning—must become spaces of experimentation and intellectual honesty. They must permit discomfort, ambiguity, and failure in order to cultivate strategic resilience.

Without such reform, the institution risks becoming a curator of its own mythology. It will continue to chant the mantras of airpower, recite the verses of innovation, and rehearse the gestures of deterrence—while adversaries, unconstrained by such rituals, act with agility and intent. In that gap between appearance and reality lies true vulnerability. Reform does not mean discarding the liturgy of warfighting. It means inhabiting it with authenticity.

A Final Benediction: Toward a New Reformation of Airpower

Reformation is not rebellion. It is not the dismantling of tradition, nor is it the substitution of one orthodoxy for another under the guise of progress. True reformation is more difficult than revolution, because it asks for discernment rather than defiance. It requires fidelity to a deeper calling, not merely dissatisfaction with the current form. In the case of the Air Force, the moment for such a reformation has arrived.

The institution stands today as both steward and symbol—guardian of national defense and projection of American airpower. But the rituals, slogans, and structures that once defined its strategic advantage now risk obscuring it. Rebranding has outpaced renewal; performance has eclipsed authenticity; and reverence for legacy has displaced the urgency of adaptation.

Yet the core mission remains vital. The vision of airpower as an agile, decisive, and asymmetric force capable of shaping the modern battlespace still resonates. That vision, however, must be retrieved from beneath layers of bureaucracy, doctrinal inertia, and performative metrics. Genuine understanding requires a fusion of horizons—a dialogical process through which inherited meaning is reinterpreted in light of the present.[53] The Air Force must not abandon its past but must enter into dialogue with it anew.

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51. Helmuth von Moltke, *Kriegsgechichtliche Einzelschriften* (E.S. Mittler, 1883).

52. Carl von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret (Princeton University Press, 1984).

53. Gadamer, *Truth and Method*.

This reformation must begin not with programs or platforms, but with people—those who still believe in the institution's potential. Reform will come from those willing to speak truth into ritualized systems; those who inhabit the institution with prophetic fidelity; those who, in Berlin's words, reject single visions in favor of plurality, tension, and truth.[54] These reformers are not antagonists but caretakers of the institution's soul.

To enable this, the Air Force must create spaces for dissent and imagination. PME must become a sanctuary for critical thought. Wargames must privilege discovery over validation. Leadership pathways must recognize courage not only in battle but also in conversation. And doctrine must once again become a living tradition—read, challenged, and revised in community, rather than recited in isolation.

Perhaps this can begin with structural changes: promotion boards can reward officers who publish dissenting views in scholarly journals, PME institutions can incorporate red-team critiques into core curricula, and wargames can be explicitly designed to expose failure, not avoid it. These moves, while modest, signal a shift from institutional theater to genuine intellectual readiness.

The stakes are not abstract. Strategic competitors are evolving with precision and intent. The bureaucratic reflex to script responses and control variables will not survive contact with the chaotic, fast-moving realities of twenty-first-century conflict. What is needed now is an Air Force willing to see itself clearly, question itself honestly, and reform itself meaningfully. What is needed is not a new church but a renewed one.

In the end, no matter how sophisticated the weapons or polished the doctrine, the future of airpower will be determined by an enduring question—not simply, "Are we ready?" but, "Do we still believe?"✪

54. Berlin, "Pursuit."

An Emergence of Space, Cyberspace, and Special Operations Forces Synthesis

Innovating through Cunning Domain Disruption

BEN ZWEIBELSON

The increasing complexity of twenty-first century conflict necessitates a formal integration of space, special operations forces (SOF), and cyber capabilities within DOW operations. While leveraging space and cyber domains for military advantage is not new, recent advancements and their intersection with SOF demand a reassessment of existing doctrine. Current joint and multidomain constructs remain terrestrially focused and thus ill-equipped to address the unique challenges of these rapidly evolving domains. Two competing models—nexus and triad—offer potential frameworks for space-special forces-cyberspace integration, emphasizing experimentation, improvisation, and innovation. This article explores these models, analyzing their potential and addressing the challenges of integrating the three capabilities into a cohesive and effective strategic vision.

In Sydney, Australia, a rogue actor using two 3D-printed automatic pistols opens fire in a crowded supermarket, killing and wounding multiple civilians. Captured by law enforcement, he admits that he was paid to do the job through an online, anonymous, and public task platform where he was wired money in advance and sent the software to print out the illegal weapons. He is the fourth individual paid online through cryptocurrency to perform these violent terror activities. Cybersecurity experts trace the blockchain transaction back to Somalia, where another individual is publicly posting requests for funding terror attacks against the Australian government and providing the finances and resources while spoofing their origins. The Australian Defence Force attempts to coordinate with American special operations forces and US Africa Command to find ways to target the financier, who uses multiple counter-cyber defenses and appears to be working with local warlords and potentially some Iranian-backed surrogate forces. The individual is also linked to similar actions in Tel Aviv, Toronto, and Stockholm. He also seems to be using commercial satellite provided internet service from remote locations in Somalia.

Dr. Ben Zweibelson, director of US Space Command's Strategic Innovation Group, is the author most recently of Bad War Stories *(Helion, 2026).*

The above fictitious vignette is drawn from multiple real-world incidents, demonstrating that these sorts of complex, multidomain, and global activities are becoming prolific and the preferred means of adversaries to thwart military and security instruments of state power. Traditionally, joint force doctrine and combatant command (CCMD) campaigning methodologies were originally designed for earlier and clearly defined, collaborative actions in largely adjacent domains and specific, isolatable geographies. Cyberspace, the space domain, and emerging advanced technology are distorting what used to be a flat series of surfaces with conflict—air, land, and sea—into a tangled Möbius strip or one-sided infinite loop, where military action now must be orchestrated and managed around the globe through space and cyberspace, obliterating earlier organizational boundaries and clarified authorities.[1]

The US military simply is chasing new threats in outdated ways, justifying these activities by citing obsolete doctrine and methodological practices that need significant revision and reform. Indeed, the nation may be entering a new security period where space, cyber, and special military capabilities require a novel and cunning framework to operate, violating earlier doctrinal norms and behaviors.

Special operations forces (SOF) and activities, and military forces utilizing the space domain and cyberspace, all contribute to the expansion in complexity, scale, and scope of conflict over the last two decades. While space and cyber activities reach back into the twentieth century—and SOF even earlier—the last 20 years have witnessed the metastasis of unique and game-changing developments. Although space and cyber domains require significant technological, informational, and resource investments to produce mature military effects within them, the intersection of space, SOF, and cyber (SSC) is not a recent phenomenon. The First Gulf War was the first example of space being used extensively by one combatant in a war while Russia's recent 2022 escalation of its war in Ukraine presents the first demonstration of cyberattacks on space assets as part of a military campaign.[2] The 2025 Israeli and American strategic strikes on Iran demonstrate a sophisticated combination of advanced technology, deception, intelligence gathering, and kinetic actions requiring space and cyber capabilities.

A New Theory for Solving New Problems

The opening scenario represents the tip of the iceberg for complex, multidomain, amorphous security challenges that will only increase in frequency and sophistication. In every possible area of friction or institutional ambiguity on authorities/policies/campaigning, adversaries will pressure the hinges and exploit the seams. Asymmetric advantages offered by emerging technologies, particularly

1. Ben Zweibelson, "Breaking the Newtonian Fetish: Conceptualizing War Differently for a Changing World," *Journal of Advanced Military Studies* 15, no. 1 (2024).

2. Eytan Tepper et al., "The Sixth Warfighting Domain?: Governing the Space-Cyber Nexus," *Georgia Law Review* 59, no. 1 (2024).

those in space and cyber configurations, appear to expand security challenges without offering significant confinement mitigation back to a single domain or geographically fixed location. This is both good and bad—the Department of War along with allies and partners can exploit new technological advantages while also repairing and patching previous vulnerabilities.

Adversaries can use many of the same new innovations, given that many are either dual-purpose or available commercially and publicly. While the tech is rapidly changing and disrupting the legacy world order, US military decision-making methodologies—including campaigning, existing joint force policy and organizational mandates, and collective, institutionalized best practices for warfighting—are increasingly serving as a reminder of how yesterday seems easier as tomorrow becomes more chaotic.

Collectively, the services may now realize that the ways in which the military currently constructs geographically bounded CCMD campaign planning and manages cross-domain and cross-CCMD coordination are outdated, if not possibly obsolete, except in special circumstances. This suggests that—given recent expansions in technology, exquisite military capabilities, complex operational effects, and the rapid growth of cyberspace and the space domain—the military needs to reform joint force campaigning methodologies. To do so, it must formally define some SSC configuration and integrate it across DOW security activities. This must be done through serious institutional debate, design thinking, prototyping, and then adapting to scale new concepts across the Department.

Such reform requires new thinking on global and celestial military integration that potentially exceeds existing institutionalized practices, theory, and doctrine. This declaration contradicts those that advocate SSC as merely joint operations—which until a decade ago, may have made sense. Yet the maturation of technology and human activity by, through, and in space and cyberspace using the unique authorities, skills, and cunning innovation of SOF requires the military profession to reconceptualize multidomain warfare. The joint concept that took hold in the twentieth century, primarily within a specific air-land-sea domain mindset, remains terrestrially oriented and cast within conventional, high-intensity state-on-state warfare.[3] The earlier order and stability of conventional conflict is giving way to new configurations of competition, organized violence, deception, and sensitive activities. These emerging configurations capitalize on cyberspace and the space domain where many of the terrestrial and physical domain qualities are transformed, inverted, or rendered irrelevant.

The SSC configuration continues to develop, requiring new understanding and novel terms, language, models, and methodologies to replace earlier constructs that appear limited or insufficient. Furthermore, the rapid and technological expansion in cyberspace and the space domain suggests the need for

3. Ben Zweibelson, *Reconceptualizing the Space Domain Beyond Historic Perspectives of Warfare*, Schriever Paper no. 1 (Air University Press, 2023).

certain reform of traditional concepts, doctrines, and practices. As of 2026, while there are significant tactical and technological examples that support such an assertion, there is little above these levels of organization and no clear strategic vision on what SSC should become doctrinally, in terms of new policy and authorities, and in long-term organizational transformation. The military profession is boldly executing SSC exquisite missions and operations that yield short-term, often significant localized or regional effects, but to date, its digital left hands are not synchronized with its space right hands at higher strategic and organizational levels necessary for long-term security goal realization.

Background

Nexus and Triad Models

Although the terms *nexus* or *triad* in the SSC context are not new, many across the DOW enterprise remain unaware or misinformed of their meaning, intended purpose, or relevance to broader security responsibilities and tasks. The two are competing, complementary, and at times overlapping terms that currently lack joint doctrinal coherence or consistency; however, the concepts are evolving and show promise in long-term organizational transformation for the War Department.

Nexus and triad are both models, not theories or methodologies—an important distinction. This illuminates a core tension in how the Department struggles with nexus, triad, and existing joint force campaign planning methods.[4] Theories swap out various models to better explain how they enable methodologies and processes to work in reality. Sometimes an insufficient model is jettisoned for a better one, while alternatively an inferior theory is retired while the effective model is passed onto the successor. For example, John Boyd's orient-observe-decide-act (OODA) loop, used in existing decision-making methodologies such as the Joint Planning Process and the Marine Corps' Planning Process, is a model stemming from theories on thermodynamics, cybernetics, evolutionary biology, and game theory as well as underutilized military theories such as those of Sun Tzu. In such methodologies, the OODA loop may be substituted for other models such as center of gravity.[5]

Debate across the military profession to foster greater collective understanding of how SSC presents novel and disruptive advantages in warfighting must be encouraged. Perhaps both the nexus and triad models are necessary in different contexts and applications. Alternatively, doctrinal reform may be like the parable of the blind men touching and describing the elephant, struggling with

4. Ben Zweibelson, *Beyond the Pale: Designing Military Decision-Making Anew* (Air University Press, 2023), https://www.airuniversity.af.edu/.

5. Zweibelson, *Beyond the Pale*.

terminology and logic. Or a new and needed SSC construct that might only be realized with these necessary experimental precursors may emerge. As with the OODA loop example, nexus and triad models may be temporary and disposable once the War Department gains a deeper understanding of this emerging global, multidomain battlespace. For now, they both challenge and disrupt the joint force doctrinal status quo.

Space and Cyberspace Domains

Space and cyberspace differ in physical and conceptual ways from the historically dominant terrestrial domains that underpin traditional, geographically designated—and hence, combatant command—configurations.[6] Space features celestial physics and requires an astrographic orientation involving significant technological and scientific considerations that break with terrestrial experiences and norms. Cyberspace is a virtual, human-created, and sustained environment that also lacks physical space. Yet cyber is entirely dependent upon physical domains to function, fusing information, speed, scale, and sociological constructs to bypass or otherwise disrupt traditional security activities unfolding in terrestrial domains.

Role of US Special Operations Command

US Special Operations Command (SOCOM) is the only DOW entity with the authorities and capabilities to conduct sensitive, clandestine, and covert activities through exquisite, high-risk, and special skill missions. SSC places space and cyberspace as primary military domains where these specialized military activities can be planned, executed, and assessed in ways that exceed earlier and legacy constructs for joint forces or multidomain warfare.

Nexus and triad do not automatically qualify for application just due to the presence of space, SOF, and cyber constructs in any military context. These models are applied to specific security contexts and conditions where a space-SOF-cyber synthesis of directed exquisite activities produces novel security outcomes that center on experimentation, improvisation, and innovation. They are integrated with overlapping resources, authorities, and capabilities of those included in either a triad or nexus modelled confederation of organizations.

One reason why both models exist could link back to earlier defense tensions initially addressed with the 1986 Goldwater-Nichols Act and formal attempts to improve the military instrument of US state power through interservice cooperation and a streamlined chain of command. Culturally, SOCOM leads the War Department in cognitive willingness to improvise, innovate, and experiment. This is part of its organizational bedrock and should not be interpreted as a snub to other military forces and organizations who also are creative and

6. Zweibelson, *Reconceptualizing.*

dynamic.[7] SOF improvises and perpetually seeks unorthodoxy because, without such flexibility, it would otherwise fail at even its routine and low-risk missions.

Cyber and space are newer and still relatively nascent areas of human exploration and familiarity. They are also the more under-governed and harder to secure domains, making fertile ground for innovators, heretics, and pirates alike.[8] The suggested overlaps between space and cyberspace for SOF-like unorthodoxy and covert or clandestine activities appear highly compatible, perhaps beyond traditional configurations of air-land-sea. Both space and cyberspace were nascent and technologically underdeveloped at that time for complex military operations. That a CCMD-centric and a service-centric SSC model exist suggests that similar institutional concerns that prompted Goldwater-Nichols may still linger.

One additional observation is the centrality and dominance of SOCOM in advocating these multidomain and interservice endeavors. Historically, despite SOCOM's small size in comparison with other CCMDs and services, the SOF organization habitually is at the lead of myriad innovative activities and routinely acts as the intellectual thought leader for the War Department while also placing SOF identity and purpose central to those efforts. US Cyber Command (CYBERCOM) and US Space Command (SPACECOM), along with the new Space Force, carry certain cultural issues where domain-specific warfighting ethos and mindset are less developed.[9] One assumption on why SOCOM often leads the War Department and in SSC contexts is that both cyber and space organizations may relate to the SOF community's deeper and historically established warfighting ethos.

Space-SOF-Cyber Nexus Defined

Nexus represents a combatant-command-centered effort by SOCOM, US Strategic Command (STRATCOM), SPACECOM, and CYBERCOM to conduct early and integrated planning and coordination within their domains/skills/responsibilities for the nation. While this article uses the acronym SSC, the STRATCOM additional 'S' is implied.

In 2025, SOCOM commander General Bryan P. Fenton stated that SOCOM was partnering with SPACECOM, CYBERCOM, and STRATCOM "to advance the convergence of SOF, space, and cyber effects" in a collaboration he charac-

7. S. Rebecca Zimmerman et al., *Movement and Maneuver: Culture and the Competition for Influence Among the U.S. Military Services* (RAND Corporation, 2019).

8. See Rodolphe Durand and Jean-Philippe Vergne, "No Territory, No Profit: The Pirate Organization and Capitalism in the Making," *M@n@gement* 15, no. 3 (2012).

9. Paula Thornhill and Charles Galbreath, *Should the Space Force Have a Warfighting-Centric Culture?* (Center for Space Police and Strategy, May 2024).

terized as a "critical nexus."[10] This partnership pursues such a convergence—defined as integration and synchronization—so that the CCMDs' capabilities are enhanced beyond any individual CCMD action done independent of the nexus construct to achieve multidomain, transregional effects whether in deterrence, crisis, or conflict. SOCOM thus seeks to expand beyond single-source, single-CCMD capabilities or activities, including historical trends featuring limited bilateral organizational coordination. The model represents an iterative, enduring, collaborative process where individual or isolated activities by a nexus member becomes the exception to the norm. Collaboration and tightly integrated, interdependent organizations synthesize their skills and resources to achieve what could not possibly be done by any one entity in exclusion.

In the nexus model, CCMDs communicate and synchronize from the strategic down to the tactical, integrated into campaign plans, other planning and design endeavors, targeting processes, and national security priorities. For SOCOM, the model manifests prior to most crises or conflicts, occurring in what the military defines as *phase 0* or the shaping period, where successful military activities can influence the strategic environment. Effective phase 0 actions are designed to prevent conflict, mitigate anticipated crises, or foster a favorable and unanticipated (by opponents) advantage for military conflict. It shifts the traditional air-land-sea geographic bounding of security activities to a new concentration of special operations, cyber, and space activities that are more agnostic of geographic boundaries, static or hierarchical frameworks, and legacy frameworks for slower, increasingly fragile security methods.

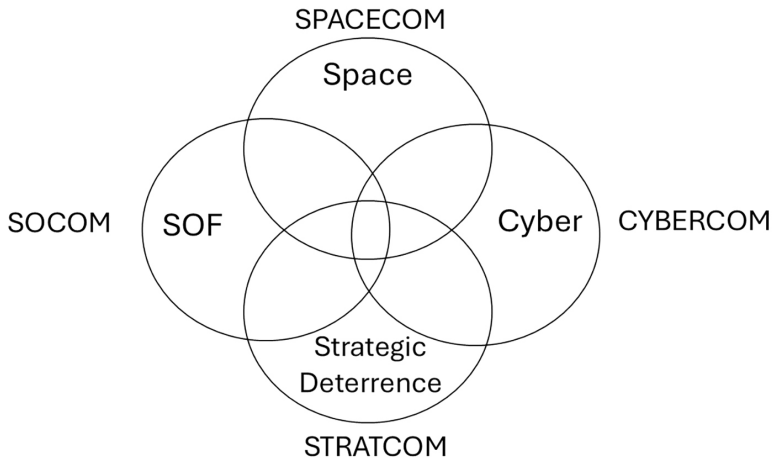

Figure 1. The Space-SOF-Cyber Nexus model

10. The Watch Staff, "Space Force Sets up Special Forces Component within SOCOM," *The Watch*, 5 June 2025, https://thewatch-journal.com/.

In SOCOM's current nexus model, strategic deterrence appears implied as ongoing and successful to permit continued irregular and unconventional warfare below the threshold of formal conflict. It uses four organizations arranged metaphorically into an overlapping Venn diagram, depicting a multidomain, joint endeavor designed to achieve layered strategic effects (fig. 1). Such effects are accomplished by synthesizing the nexus—the center of the Venn—to plan and conduct activities that create strategic and operational dilemmas for adversaries at the SSC intersection. In keeping with phase 0 shaping operations, these activities often remain below the traditional threshold of conflict, involving sensitive activities and other SOF mission sets through the space domain, cyberspace, and in coordination with strategic deterrence. Activities may materialize anywhere on the globe, yet despite a specific physical location for SOF power projection, they are enabled and enhanced by myriad complementary actions by, through, or within space and cyber organizations and their respective domains.

The nexus model thus causes inaction through systemic action, where SSC activities deny adversaries from achieving their own strategic goals and operational objectives. Successful SSC activities create new challenges or restrictions to an adversary's own national security interests. This enables phase 0 strategic goals where new conditions created by nexus activities establish favorable conditions for the United States, allies, and partners. Due to how SSC manifests in multidomain, irregular, and complex patterns that the nexus model facilitates, adversary initiatives are weakened. The non-traditional configurations that illustrate nexus action produce confusion, seed doubt, and weaken adversarial resolve where it matters most. SOCOM uses the nexus model to ensure US advantage in future conflict, in the event that deterrence fails and the War Department must act decisively and win.

SOCOM's nexus was introduced to address systemic and historic breakdowns between combatant commands and the complex strategic relationships between them, the services, and other agencies, helping to streamline planning processes across relevant CCMDs to generate superior and creative options for senior decision-makers. The nexus model intends to disrupt traditional DOW planning efforts through bypassing or marginalizing certain domain-specific, single-entity centrality, geographic exclusivity, or single-domain oversimplification.

Yet despite these ambitious and dynamic aspirations, SOCOM's nexus has several problems, including enterprise-wide understanding of what it is and how it works. For example, there is no shared agreement on priorities or weights of efforts for strategies and problem sets articulated by any of the four CCMDs. Currently, SOCOM's preference to work as the CCMD with supporting space and cyber organizations may be merely an initial stage in the SSC concept progression. Without some shared agreement between CCMDs on priorities, desired strategic effects, and resource allocation, efforts to operationalize this beyond localized, regional, or tactical activities remain limited. Much of the current progress emerges in a "bottom up" grassroots endeavor that again ac-

cumulates toward the tactical end of the spectrum. Yet, Congress and the military clearly provide a powerful "top-down" governance at the executive level for joint force integration and this proposed SSC adaptation. Any SSC formalization must include clear executive-level direction and guidance.

Nexus is maturing within a small community of SSC professionals. Outside this highly technical and exquisite bubble, the broader DOW community is underdeveloped and excluded from the nexus model's applications. While there appears a majority consensus on the nexus utility in tactical and technically specific applications, this agreement quickly loses steam when one examines DOW-wide, allied, and partnered campaign planning and strategic designs. This partly stems from the difficulty in developing SSC expertise, forming and sustaining a network of informed, enabled SSC professionals, and filling informational and training gaps across the enterprise. Although doctrine should occur last and is the least likely area for military innovation to be located, joint staff policy and direction on the nexus model would be a welcome first step in enabling complementary education, training, and professionalization across the DOW enterprise.

The Space-SOF-Cyber Triad

The triad, formulated in November 2021, is a convergence of the US Army Special Operations Command (USASOC), US Army Cyber Command (ARCYBER), and the US Army Space and Missile Defense Command (USASMDC).[11] While nexus is CCMD-centered, the triad model is represented as a triangle with the three military entities at each corner. Space is paired with SMDC, SOF with USASOC, and cyber with ARCYBER (fig. 2). The model emerged from a service-centric design, given its origins within USASOC—itself part of SOCOM—and is another instance of the SOF enterprise taking innovative leadership for the broader joint force.[12]

Triad's service-centric focus is the first obvious difference to the nexus model, with a second clear distinction in the lack of STRATCOM. Triad suggests that ongoing and successful phase 0 activities using SSC will not cause strategic disruption nor require additional involvement by strategic command representation, which implies certain Goldwater-Nichols ramifications in how services interact with other non-service defense organizations such as unified combatant commands. STRATCOM is a functional CCMD, meaning it has a specific mission set that is not tied to a defined geographic area of responsibility. It operationalizes this function within the military domains differently than

11. Brian Hamel, "Reframing the Special Operations Forces-Cyber-Space Triad: Special Operations' Contributions to Space Warfare" (thesis, US Army School of Advanced Military Studies, 2023); and Todd Lopez, "Parent Services Integration a Top Priority for Special Operations Components," US Department of War [DOW, website], 2 May 2022, https://www.war.gov/.

12. Hamel, "Reframing"; and also published in *Military Review*, Space & Missile Defense 2024, March 2024, https://www.armyupress.army.mil/.

SSC, although it has clear overlaps and explains how it is part of the nexus model with SOCOM.

Triad retains single-service focus with Army organizations arranged across the SSC continuum, where STRATCOM's exclusion may be due to this command-and-control difference in addition to the phase 0 assumed stabilization for SSC activities. USASOC advocates the triad model and uses it to consider how regionally aligned, multidomain task forces might conduct operational preparation of the environment using available human capital, equipment, organizations, and systems to achieve essential and asymmetric security goals.

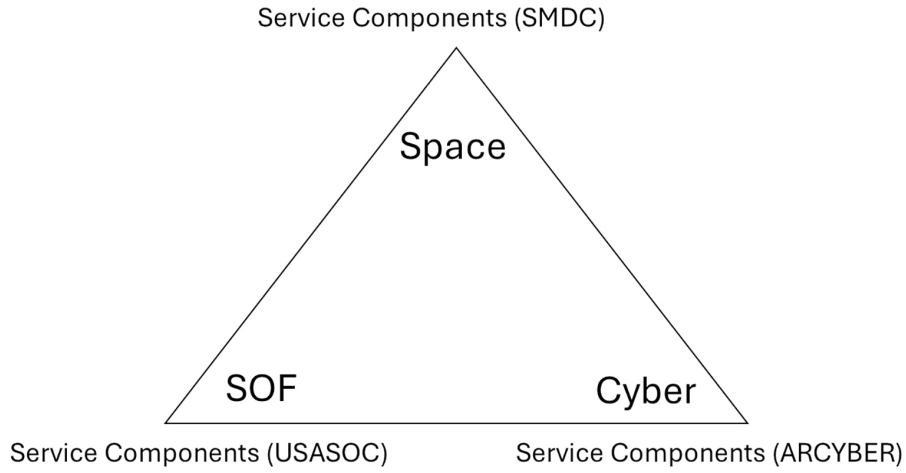

Figure 2. The Space-SOF-Cyber triad model

Triad as a model continues to develop, as does nexus. Currently, the triad value proposition is centered on the Army, where the SSC framework enhances the joint force by converging cyber, space, and SOF capabilities transregionally across CCMD boundaries. In the triad framework, multiple CCMDs can pursue a security threat using the triad regardless of the location, direction, or adaptation of the adversary targeted. Triad differs from traditional joint activities both in this global and astro-global (space) mitigation of set geographic boundaries between CCMDs and the emphasis on clandestine, covert activities that are central to SOF exquisite capabilities and authorities. Such sensitive activities—which routinely involve special access programs—prioritize space and cyber integration with enhanced communication, collaboration, specialized knowledge, and shared access. This frequently limits the number of personnel with the requisite skills, training, and access to participate in triad endeavors.

Triad and nexus are models generated by different parts of SOCOM under distinct organizing logics that appear to fall on either side of the service-combatant command tension. The rapid technological and experimental expansion of novel and dynamic cyber and space capabilities in the last two decades

present SOF with sophisticated and often unconventional abilities to pursue security challenges. Such SSC combinations are often ill-suited in traditional—historical, terrestrial-bounded, conventional-oriented—methodologies, doctrines, and models. It remains undetermined whether other CCMDs and the joint staff will fully embrace nexus and/or triad, or advance new methodology and respective doctrine reform to incorporate SSC into military decision-making frameworks formally.

Triad and Nexus Integration

Triad and nexus are regularly being integrated across the aforementioned CCMDs and participating services, although each appears to resonate in certain levels of DOW enterprise based on earlier assumptions about Goldwater-Nichols friction points. Currently, each CCMD enables liaison elements to integrate that CCMD's equities into other plans and operations, again with SOCOM enabling SOF activities that are dependent on unique space and cyber effects. Yet the nexus and triad models do not stipulate that SOCOM must be the supported CCMD in any SSC synthesis; CYBERCOM and SPACECOM could be the supported CCMD in SSC planning and operations. As these models are still nascent and experimental, future developments should yield examples of a cyber organization and a space organization acting as the supported CCMD for various security challenges that warrant a nexus or triad model incorporation.

Due to the limited personnel able to access special access programs and skilled in SOF capabilities, both SPACECOM and CYBERCOM require special operations integration and some pooling of their organic SOF-capable operators. These issues are centered on task organization matters and human capital management and are certainly solvable with sufficient senior leader decision and prioritization. The more challenging areas for the DOW enterprise involve further refinement, experimentation, and adaptation of nexus and/or triad into more mature and strategically nested constructs. Further down the road, new professional military education (PME), training, and doctrinal publication revision is needed to integrate these SSC concepts into formal military practice. This burden should be shared between the CCMDs. For example, new SSC education curriculums, exercises, wargames, and new doctrine should be collectively designed by SOCOM, CYBERCOM, and SPACECOM instead of emerging out of a single service.[13]

Within the above areas where SSC integration currently occurs, multiple existing issues persist across the War Department with respect to how various strategic and operational means are applied toward achieving security goals. Five major issues represent the immediate and organizationally significant

13. See, for example, US Space Command's "Space-SOF-Cyber Innovation Course," NSSI Public Center, 2025, https://nssi.spaceforce.mil/.

challenges for both nexus and triad. While no optimal solution may exist, the military community of practice must engage in discussion of these issues so that the SSC construct can be stress-tested further, addressed at the operational and strategic level beyond limited and largely tactical case studies, and subsequently integrated into allied, partner, and interagency security efforts.

Issue 1: Unfamiliarity and Disagreement on SSC Definitions

First, without any formal joint staff declaration concerning SSC concepts, each CCMD and service will continue to articulate their distinct version of nexus or triad, or opposition to both. Discussions on whether SSC is a separate and essential construct beyond traditional joint force activities and campaigning are healthy for the DOW enterprise and a part of how the military profession critically and creatively develops. That said, the War Department is a centralized hierarchical organization where clear decisions made at the top are necessary to transition certain experiments and prototypes into broader institutional acceptance and integration. Generating a white paper or draft concept memorandum at the joint staff level would be a valuable next step for further developing the SSC concept. Senior leadership is essential in nudging the DOW enterprise to balance what the organization wants and recognizes with what the organization needs that may not yet exist—the essence of all innovation and experimentation for security affairs.

Identifying and directing certain flag officers at each of the CCMDs and services central to SSC could help stress-test and validate the virtues of this new approach. This ideally includes the positioning of SSC senior leaders inside another CCMD, such as an SOF general officer being billeted within CYBERCOM or SPACECOM, along with reciprocal actions by the other organizations. These senior leaders would bring the necessary experience, knowledge, and SSC familiarity that is otherwise often absent. Between space, SOF, and cyber communities of practice, very few professionals are truly able to stand firmly in two of those constructs, with individuals able to profess expertise in all three even rarer. Extending into allies and partners, the problem is further exacerbated due to classification and information-sharing challenges coupled with cultural and political nuances.

At the joint force level, no nexus or triad concept sponsor exists. There is also no process for declaring command authority in a nexus or triad configuration between multiple organizations other than through existing and traditional formats or ad hoc arrangements. Lacking any joint staff-directed operational concept for SSC, various military communities appear to operate in a more tribal and organic arrangement. This leads to exceptional tactical and limited operational successes for SSC but little beyond. Further, without a joint-level operational concept or senior concept sponsor, various SSC groups continue to advocate their specific perspective over others and, at times, additional bureaucratic agendas disconnected or in conflict with other SSC perspectives. This is

best appreciated with Miles' Law, or "where you stand depends on where you sit."[14] Within these tribal spats, the SSC potential is hampered by generating fragmentary efforts, wasteful duplication, and broader institutional confusion. This spreads to allies, partners, interagency coordination, and defense industry/academia in how and why SSC concepts ought to be introduced, appreciated, and further developed.

Both triad and nexus advocate groups assert that their preferred SSC concept is superior or achieves different effects than the other. Triad proponents assert that nexus is a joint CCMD effort that focuses on operations, activities, and investments within an irregular warfare context that remains below the threshold of conflict—hence, a phase 0 endeavor. Certain nexus advocates posit that the triad model lends itself to any CCMD or constellation of CCMDs dependent on the nature of the emerging crisis or conflict. Yet the triad was designed and remains operationalized within a single service—the Army—with palpable SOF and SOCOM overlaps. The plasticity of SSC requires new rearrangements based on the changing location, composition, and strategic implications of the emerging threat; thus, any single-service domination of triad or nexus creates significant organizational blowback.

Another lingering complication is the tendency for traditional planning advocates to infiltrate any SSC endeavor with rigid doctrinal constructs and bureaucratic processes. Although this is less of a challenge in SOCOM due to its organizational culture and warfighting ethos, the firm grip of rigid, bureaucratic-styled planning logistics still permeates the SOF enterprise. In space and cyber organizations, those patterns of institutional conformity toward the legacy frame which does not include SSC as distinct or an emergent phenomenon are even stronger.

Issue 2: Global and Joint Command and Control for SSC in Current Configurations

The second key issue for SSC development is the ambiguous guidance in the Unified Command Plan (UCP). This executive branch security document establishes the missions, responsibilities, and geographic areas of responsibility for the US military instrument of state power. Although overarching and foundational, the UCP does not assign responsibility to any singular CCMD to plan and execute multidomain operations. It also does not clearly define transregional irregular warfare, nor does it provide any direct strategic guidance on how such complex security affairs must be orchestrated. Consequently, the joint force and, by extension, allies and partners do not seem to understand how to integrate transregional irregular warfare into broad campaign planning or areas where SSC concepts are most well suited.

14. Rufus Miles Jr., "The Origin and Meaning of Mile's Law," *Public Administration Review* 38, no. 5 (1978).

Certain units do this remarkably well, but collectively across the War Department, this is arguably the weakest area for CCMD campaign planning and wargame exercising. The myriad classification and information security requirements involving the sensitive activities that SOCOM is centrally oriented toward and that space and cyber organizations are aligned with complicate these tensions further.

In part, this issue centers on needed education for the military profession coupled with continued experimentation and prototyping of SSC concepts at operational and strategic levels. Expanded education and experimentation are key for diversifying the SSC community of practice into more directorates and agencies. The enduring challenges for classification and access to information are accentuated in the SSC construct due to the convergence of sensitive activities, SAP restrictions, and interorganizational barriers to information sharing.

Due to how triad and nexus models approach security challenges agnostically on matters of geography, boundaries, and integrated effects that often produce consequences outside any local or regional area of interest, SSC constructs increase new magnitudes of operational risk. Under traditional CCMD boundaries and geographic orientation, an organization can usually prevent one new planning endeavor from inadvertently threatening some other ongoing sensitive action or program running in that same controlled battlespace. SSC applications suggest a higher likelihood of the interorganizational "fratricide" of operations if only due to how existing security control measures are paired to a less nimble and adaptive arrangement.

The speed and global impact of SSC teams able to collaborate, communicate, and deconflict potential operational overlaps require greater DOW enterprise transparency and information sharing, particularly within the classification requirements and information management processes that still must protect such efforts. With the recent declaration by NATO partners of increased military spending efforts, future SSC endeavors will undoubtably expand in complexity, international participation, and SSC interdependency. The 2026 special operations raid to seize Venezuelan narco-dictator Maduro (and his wife) is an emerging high-visibility example of what most certainly contained SSC constructs. Access, resourcing, deception, and multidomain synthesis of multiple security entities, systems, and effects will become increasingly pluralized over single-domain, single-service, or regional bilateral confederation. This raises a deeper question of whether military combatant commands are organized effectively to even execute transregional irregular warfare or exercise SSC constructs to achieve robust strategic effects beyond limited tactical or localized ones.

Issue 3: Putting SSC Constructs into Next Generation Doctrine

All innovations begin outside of military doctrine and are usually in conflict with it. Once the organization experiments and finds novel success with some designed prototype—whether a thing, idea, or method—militaries begin

the necessary and laborious process of infusing it into existing doctrinal processes, models, and terminology. If SSC concepts continue to yield technical, tactical, and increased operational successes, the joint community will need to begin to compose next generation doctrine that incorporates some form of nexus and/or triad.

The DOW community remains hesitant to formally accept any concept as viable and valuable without it gaining some form of joint level endorsement, whether in memorandum, concept paper, new policy directive, or doctrinal reform. Currently, SSC concepts remain largely theoretical and experimental, advocated by certain senior military leaders but still manifesting through in-house and ad hoc processes. Beyond the DOW enterprise, new doctrinal concepts face certain resistance for scaling outward across partners, allies, and the international community if those developments are ill-defined. Fenton articulates this need to migrate from "NOFORN" to "YESFORN" in the immediate future.[15]

Nexus and triad may represent initial stepping stones for bigger and better SSC ideas, or they could be sufficiently robust for evaluation and doctrinal drafting efforts. Yet, in 2026, the SSC community of practice remains quite small and isolated, largely found in SOCOM, CYBERCOM, and SPACECOM circles where small cells of SSC savvy planners and designers work under the radar. This unintentionally lobotomizes the broader international community of practice by omitting most of their space, SOF, and cyber professionals from entering the conversation.

The generation of new doctrinal proposals and drafts will require certain transparency and collaboration across the DOW enterprise, into interagency arrangements and international military dialogues. Arguably, some NATO SSC configuration ought to be developed, along with myriad other partnering and teaming arrangements. While there is no global integrator at these international and alliance levels, for the War Department this integrator would be the chairman of the Joint Chiefs of Staff. His directive for some SSC concept deliverable could provide new opportunities to produce integrated campaigning between CCMDs on transregional irregular warfare where SSC concepts are powerful strategic amplifiers. Were the chairman to direct such formalized concept development, contributing authors would need to come from the space, SOF, and cyber communities of practice. Some form of SSC campaigning directives or joint guidance could initially stimulate this endeavor.

15. Sean Morrow and Don Rassler, "A View from the CT Foxhole: General Bryan Fenton, Commander, U.S. Special Operations Command," *CTC Sentinel* 17, no. 10 (2024), https://ctc.westpoint.edu/.

Issue 4: How to Scale to Produce SSC Expertise

Despite multiple organizational and policy efforts to increase joint collaboration and streamline military decision-making in multidomain, complex security contexts, a majority of military professionals continue to focus largely on one domain or within a single CCMD area. Traditional military training and education do not yet feature SSC concept development, with only rare individuals able to demonstrate proficiency in two or more of the SSC constructs.

Even when considering the small pool of SSC professionals able to operate across each area of expertise, the SSC community lacks any formal network for regular communication, collaboration, experimentation, exercise, or sharing of lessons learned. There is limited or no SSC cross-training available in SOCOM, CYBERCOM, and SPACECOM with the exception of certain pilot efforts such as SPACECOM's "Space, SOF, Cyber Innovation" course running quarterly since late 2024.[16] Several CCMD exercises such as Apollo Nexus and Shadow Nexus also represent initial attempts at broadening this community of practice and deepening network contacts. Frequently, SSC collaboration efforts appear primarily tactical and technical in nature, with the larger operational and strategic aspects glossed over or ignored. In many training center applications, SOF, space, and cyber are exercised in isolation to one another. A unit in training may also execute activities with little or no SSC configuration into either the triad or nexus models or alternative model formation.

Rapid scaling options for the War Department include directing SSC cohesive operationalization in training environments and through major exercises. Greater multidomain and CCMD integrated participation—and extending to allies and partners—in experimentation, exercises, simulations, table-top events, training, and planning conferences could become the necessary foundation for broader SSC concept development. The joint staff directorate for joint force development (J-7) should champion such experimentation, prototyping, and exercise alignment to promote SSC concept development across the DOW enterprise. Cross-domain specialists within each organization able to rapidly communicate, collaborate, experiment, and share resources while generating otherwise unimagined security options for senior leaders should be developed.

Each national training center and major PME programs should dedicate faculty and curriculum space to the SSC concepts, including development and additional experimentation. Classification barriers should be examined carefully, as many SSC constructs at the operational and strategic level do not carry the same level of restricted access and sensitive information. Care should be taken so that tactical and technical levels for SSC proficiency, such as targeting processes, detailed planning outputs, and special access content are safeguarded for the right participants. At other levels such as in major exercises, simula-

16. See "Space-SOF-Cyber Innovation Course."

tions, experiments, education, and some campaign planning endeavors, the lower classification needed should open the gates to greater DOW and international, interagency participation. Online, autonomous, and other scalable training and education efforts could also increase the familiarity of SSC concepts to the greater military community.

Issue 5: Integrated Campaigning and SSC Concept Inclusion

The joint staff is the primary organization within the centralized military hierarchy to create and publish SSC joint campaigning guidance in the form of an overarching document for all CCMDs. This enables each CCMD to operationalize the SSC concepts completely, whether a command is central to such endeavors or may only lend infrequent support. The initial document should remain conceptual or be labeled experimental, so that the War Department determines the feasibility on how to develop the concepts beyond the initial attempts reached in 2025 without joint staff direct involvement.

Irregular warfare is often best paired with low-intensity conflict, crisis conditions, and in otherwise peaceful periods of international competition or deterrence. SSC constructs like the nexus and triad models appear well adapted for transregional irregular warfare involving clandestine, covert, and other asymmetric activities that may be in friction with traditional joint campaigning through geographically fixed CCMD areas of responsibility. SSC actions may be the initial and exploiting forces to shape a security environment (phase 0) and set national security positions of advantage should conflict commence. SSC effects may boost deterrence options, marginalize adversarial options, or confuse and frustrate an opponent in such a way that the finishing force expected to conduct high intensity operations may not be pulled from the sheath. Exercises and wargames focusing on SSC activities that successfully prevent escalation into conflict—coupled to campaign planning branches and sequels—should be given their own focused attention and resources. International SSC efforts such as exercises also require enhanced exploration, experimentation, and validation.

With the space domain becoming increasingly crowded, areas such as low Earth orbit (LEO) take on new security requirements. In emerging strategic considerations such as a "master spoiling strategy"—where an aggressor intentionally creates a massive chain reaction of orbital debris in space and renders entire orbits unusable—the SSC construct is likely the ideal choice for DOW enterprise design and planning.[17] Russia's ambitions to put a nuclear satellite into orbit is one such concern. Integrated campaigning where terrestrial and celestial challenges blur the earlier security lines along with nation-state versus non-state actor activities will demand new joint staff policy proposals, direction, and guidance.

17. Bohumil Doboš and Jakub Pražák, "Master Spoiler: A Strategic Value of Kessler Syndrome," *Defence Studies* 22, no. 1 (2022).

Operationalize Space-SOF-Cyber for the Next Decade

While identifying a flag officer at respective combatant commands is one way to stimulate the space-special forces-cyber concept in each SSC organization, there is another necessary layer of decision-making authority needed. As mentioned, the Unified Command Plan does not assign responsibility to any singular CCMD for planning and executing multidomain operations, nor does it specifically address transregional warfare or how the command and control of such an effort would be implemented. Reforming the UCP to designate the SSC construct and empower a specified single CCMD for SSC activities is one possible solution. Formal rotation of flag officers through space, SOF, and cyber assignments is another enabling function that also might generate strategic options for appointing senior leadership over multiple CCMDs for such strategic endeavors.

Another imagined but plausible scenario suggests how a collaborative initiative may address a potential conflict in the multidomain, transregional reality of the near future:

In 2030, after gaining entry to a space tourism launch by hacking into the company's system, two terrorists quickly incapacitate the crew, commandeer the craft, and link to a Chilean ground station to override the flight software. An encrypted communication from inside Cuba demands a $500 million cryptocurrency ransom—or they will move the spacecraft's orbit into a collision course with the International Space Station. The chairman of the Joint Chiefs of Staff executes a new joint initiative, naming the SOCOM commander in charge of a rapid-response SSC task force. The commander directs a SOF team to intercept the craft in orbit. Using a specialized military spacecraft, the team accesses the ship's ventilation system externally to incapacitate the terrorists before breaching the hold. Cyber specialists neutralize the ground signal. SPACECOM maneuvers several satellites to observe the craft and provide real-time intelligence. SOUTHCOM is directed to support special activities in Cuba to identify a surprising alliance between Havana and the Sinaloa Cartel. Intelligence analysts later determine the cartel has been secretly gaining entry into key governmental nodes in Cuba through bribery and corruption.

The suggestions within this article point to policy, doctrinal, and organizational reforms needed so that future global, multidomain, and dynamic security challenges like this one are addressed quickly and decisively. Such a proposal will likely face significant resistance from regional battlespace owners and geographically situated CCMDs. Yet if existing joint campaigning is used, how might the above scenario be resolved?

The overarching DOW enterprise design was cast in an earlier geopolitical period where technological capabilities and the astro-global qualities of the space domain paired with a ubiquitous cyberspace domain were not yet relevant. The security challenges in the 1960s, 1990s, or even 2000s were certainly dynamic, complex, and difficult to navigate. Yet the complexities of today's

multidomain, highly technological, transregional reality are a new type of security shoggoth—a Lovecraftian shapeshifter—that cannot be defeated using the traditional weapons that slayed twentieth-century security shoggoths.

A new period of conflict, crisis, and competition extending into cyberspace and the space domain in novel and profound ways is at hand. Humanity is about to become a multiplanetary species—an evolutionary accomplishment with profound security consequences.[18] In the coming decades, advancements in quantum computing, AI and human teaming, human physiology, access to celestial bodies, new energy opportunities, and resources all represent deep change for life as currently understood.[19] Traditional modes of military conflict will extend into these future worlds, yet many security routines and practices will quickly fall to the wayside.

The world is progressing toward an astro-global or celestial living space, economy, and security environment.[20] Space, SOF, and cyber couched within strategic deterrence are increasingly central to the emergent challenges of this century. No nation can halt the progression toward highly accessible, low-cost space access, which in turn expands the entire multidomain battlespace from terrestrial to celestial for the War Department.[21] And without some SSC construct developed into its enterprise theory, model, and methodology, the United States may risk ceding future security advantage to adversaries able to outpace it.✪

18. James Moltz, *Crowded Orbits: Conflict and Cooperation in Space* (Columbia University Press, 2014), 8–9; and Joan Johnson-Freese, *Space Warfare in the 21st Century: Arming the Heavens* (Routledge, 2017), 32–33.

19. Namrata Goswami and Peter Garretson, *Scramble for the Skies: The Great Power Competition to Control the Resources of Outer Space* (Lexington Books, 2020).

20. Zweibelson, *Reconceptualizing*; and Richard Johnson, Special Publication (SP) LC-76–600068, *Space Settlements: A Design Study*, National Aeronautics and Space Agency (NASA) SP-413 (NASA, 1976), 155, https://ntrs.nasa.gov/.

21. Johnson-Freese, *Space Warfare*, 35.

The Many Restraints of Commercial Space

WENDY N. WHITMAN COBB

As space becomes increasingly vital to global security and economic systems, commercial space actors are emerging as potential restraints on conflict in the domain. This article explores how commercial space systems can reduce incentives for war through four interrelated mechanisms: military, economic, diplomatic, and informational. Commercial capabilities signal benign intent, complicate adversary targeting, and integrate space into the global economy, raising the costs of conflict. They also enable greater transparency and potential audience costs by informing the public and international actors. While commercial space may also fuel competition, its integration into state power creates disincentives for aggression. Taken together, these restraints offer a compelling if still uncertain case for commercial space as a stabilizing force.

There is no doubt that space has become an integral part of everyday lives. Although public knowledge of space and space-related issues—including the commercial space industry—remains nascent, political leaders around the world clearly understand just how much their respective countries as well as the world rely on space-based systems.[1] The rhetoric and actions of states in the way of increasing space defenses and even standing up space forces speak to this understanding. These actions, however, often signal that conflict is all but inevitable in outer space. Yet given the increasing global reliance on space and space-based systems, this risk may in fact be decreasing.

This article seeks to tease out the ways in which commercial space may help to ease tensions, despite increasing threats in the space domain. To be sure, how space and space-based systems—commercial and otherwise—have been used to both strategic and tactical effect in Russia's war in Ukraine may make this argument appear invalid on its face.[2] While not denying the ways in which commercial space may be used in the case of conflict, this article contends that commercial space companies and the services they offer provide military, economic, diplomatic, and informational restraints on open conflict in space.

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1. See, for example, Wendy N. Whitman Cobb, "Public Opinion of Commercial Space Exploration," *Astropolitics* 21, no. 2–3 (2023).

2. For example, see Andrew Radin et al., *Lessons from the War in Ukraine for Space* (RAND Corporation, 21 May 2025), https://www.rand.org/.

Moreover, the impact of this restraint stems not just from the fact that it spans different types of state power, but also that each category reinforces one another to create a significant disincentive for states to act more aggressively in space. To be clear, this is not to imply that the restraints across the four modes of state power are the only ones that exist or the only ones that matter with respect to restraint in the space domain. Rather, this article demonstrates there are multiple, reinforcing ways that commercial space increases the costs of conflict in space, discouraging states from engaging in potentially catastrophic actions as well as suggesting ways in which commercial space may be utilized more strategically.

Terminology

Before delving much further into the discussion, it is important to address some definitional concerns, namely the debate surrounding what is meant by *commercial space*.[3] This debate perhaps stems from the fact that private companies have been building and operating space systems for governments since almost the dawn of the space era, creating confusion about what differentiates this new phenomenon from typical patterns. Historically, governments told private industry what they needed, solicited bids, and then selected the best bid for the best price. The company then built the system and, depending on the contract, either handed it over to the government to operate or operated it on behalf of the government. New space companies and the modern commercial space industry work differently. These companies invest their own money into research, development, building, and operating space systems, not on behalf of the government. They then sell services to the government and others.

An additional hurdle to defining commercial space is that the term infers a market exists independent of any particular government or governments—as it stands currently, this is not the case in the United States. American commercial space companies are still heavily dependent on government contracts, so much so that were government contracts to disappear, most commercial space companies would not continue to exist.[4] This situation has led some to better describe this relationship as a public-private partnership rather than a true commercial situation.[5] Though this situation is improving, the fact that most commercial space companies cannot exist without government funding sources—whatever they may be—is an important characteristic to consider, particularly as some companies may come to be seen as de facto government

3. See Wendy N. Whitman Cobb and Derrick V. Frazier, *Space Policy for the Twenty-First Century* (University of Florida Press, 2024).

4. Svetla Ben-Itzhak, "Companies Are Commercializing Outer Space. Do Government Programs Still Matter?," *The Washington Post*, 11 January 2022, https://www.washingtonpost.com/.

5. Lindy Newlove-Eriksson and Johan Eriksson, "Governance Beyond the Global: Who Controls the Extraterrestrial?," *Globalizations* 10, no. 2 (2013).

actors. Given all of this, for the purposes of this article, commercial space is defined as companies that sell space-related services or products that have largely been developed and deployed without significant government assistance.

A final concept to be defined is *conflict*. An individual's first inclination when thinking about the term is likely to lean toward something physical and kinetic. Because of the distinct physics of outer space, kinetic conflict in space that creates debris is likely to be quite dangerous. Unlike within a domain like the sea, where disabled and/or destroyed vessels might sink or be easily removed, debris in space continues to move at high speeds and is uncontrolled, potentially threatening anything else in its path.

In a space-based conflict, although kinetic actions cannot be ruled out, nonkinetic actions are more likely. These do not create significant debris in space and include things like lasing, electromagnetic interference, or blinding, which may be either permanent or temporary. Even still, nonkinetic attacks that permanently disable satellites are still creating debris—albeit one large piece of debris rather than hundreds or thousands. To consider the consequences of a nonkinetic attack, one need look no further than Russia's plans to possibly detonate in low Earth orbit a nuclear-type weapon that would non-discriminately disable thousands of satellites via an electromagnetic pulse. Because of this, this article will consider both kinetic and nonkinetic conflicts.

Military

Because states are the only legitimate wielders of force, it is unlikely that commercial space companies will undertake specifically military actions, at least in the near future. Yet, even in a supporting role, commercial space systems are important forms of military restraint in two ways: signaling benign intent and deterrence by denial.

As one expert argues, transferring missions that have traditionally been performed by military actors such as communications and remote imaging, among others, can send a signal to potential adversaries that the United States has no hostile intentions in deploying such space capabilities. Rather, because an explicitly non-military actor is performing such duties, adversaries might see benign intent, thus mitigating any potential security dilemma that might develop. Though this analysis recognizes that not all military missions can or should be transferred—missile warning, for example—it argues that the greater use of commercial services more generally can help alleviate any growing tension in the space domain.[6]

While not explicitly saying so, this argument seems based on an assumption that commercial services might wholly replace military-only space systems. This

6. Brad Townsend, *Security and Stability in the New Space Age: The Orbital Security Dilemma* (Routledge, 2020).

is unlikely to happen in the near term, but what is already happening is the supplementation of military and government space capabilities with what the commercial industry can provide. New commercial communications systems like SpaceX's Starlink—and in the near term, Starshield, its satellite network for government and military use—have added to an already long history of government use of commercial communications satellites.[7] Commercial remote imaging satellites are increasingly providing pivotal images of Earth and—with the removal of regulations on non-Earth imaging in 2022—other satellites.[8]

Because of this and the US national security community's shift to larger numbers of smaller satellites, potential adversaries cannot cripple US capabilities by targeting only one or a few key satellites—instead, they must target a growing number with the increasing difficulties that doing so would present. As a result, an adversary may be deterred from making such an attempt in the first place as the growing number of commercial systems would deny them the benefit of successfully doing so.[9]

There is already evidence of a deterrence by denial mechanism creating very real effects. Russia's plans to deploy a nuclear antisatellite (ASAT) weapon in low Earth orbit can be viewed as a product of its frustration with Ukraine's continued use of Starlink for battlefield communication and even control of some systems such as unmanned aerial systems or drones.[10] Unable to cripple such systems via cyberattacks and unable or unwilling to attack them via kinetic or nonkinetic means in space, Russia might view a nuclear ASAT, while indiscriminate, as a solution to taking out a wide swath of what have turned out to be critical capabilities in the Ukrainian fight.

While commercial capabilities are unlikely to be used directly as offensive weapons in a space-based conflict, they provide critical military means of dampening the potential for conflict in the first place, not just by signaling a nonaggressive intention but by denying an adversary the benefit of a space-based fight short of extreme measures that might only make the situation worse.

Economic

Commercial space's power to disincentivize conflict in space is perhaps strongest through economic means. In a 2020 analysis, this author proposed a commercial space peace theory which builds on ideas stemming from interna-

7. Brett Tingley, "SpaceX Wins $70 Million Space Force Contract for Starshield Military Satellites," Space.com, 2 October 2023, https://www.space.com/.

8. Theresa Hitchens, "NOAA Eases Licensing Requirements on Commercial Remote Sensing," *Breaking Defense*, 9 August 2023, https://breakingdefense.com/.

9. Stephen J. Flanagan et al., *A Framework of Deterrence in Space Operations* (RAND Corporation, 31 August 2023), https://www.rand.org/.

10. Gabriel Honrada, "Is Russia Readying a Nuke to Blow Up Starlink?," *Asia Times*, 6 May 2024, https://asiatimes.com/.

tional relations theory, including the concept of economic interdependence and the power of commerce to reduce conflict terrestrially. While based on similar assumptions—including rational actors, the primacy of states as compared to individual or nonstate actors, and state leaders both in authoritarian and democratic states have a distinct interest in increasing a state's economic performance—this theory also operates at a global or systemic level. It considers the capacity for economic ties to reduce tensions across the global system as a whole rather than across pairs of states, unlike traditional theories. In brief, to the extent that space and space-based systems are intrinsic parts of the global economic system and that a country itself is tied into that economic system, the costs of conflict in space significantly outweigh any potential benefits.[11]

Conflict in space that affects such underlying economic systems cannot be restricted to a single state alone. By means of an admittedly simplistic example, consider an attack against the American global positioning system (GPS). While the state perpetrating the attack may only mean to affect the United States—perhaps to disrupt navigation and timing services in a theater of combat—because GPS is so intertwined in the global economic system, the effects of such an attack would not be restricted to the United States alone.[12] Not only do many other countries around the world utilize GPS, but consequences felt within the United States would ultimately spread to the rest of the world. While this might not be mutually assured destruction, it would most certainly be mutually assured disruption.

Since the time of that analysis, developments in space have only reinforced the ways in which commercial space is increasingly implicated in the global economy. Commercial remote imaging systems have found increasing use in fields as diverse as agricultural, archaeology, disaster prevention and mitigation, climate change monitoring, and business monitoring. Commercial systems such as Starlink promise even more economic impact through expanded communications but importantly through the widespread availability of low-latency internet connections in areas that may not have had the appropriate infrastructure to begin with. These impacts are over and above the ways in which the commercial space industry is gaining power and prominence in the size of the commercial space economy. While still relatively minor compared to other fields, in 2023, commercial space accounted for $240.9 billion of real gross impact in the United States, an impact that would be sorely missed were it to disappear entirely.[13]

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11. Wendy N. Whitman Cobb, *Privatizing Peace: How Commerce Reduces Conflict in Space* (Routledge, 2020).

12. Alan C. O'Connor and Michael P. Gallaher, "Economic Benefits of the Global Positioning System (GPS)," slide presentation, RTI International, 20 November 2019, https://space.commerce.gov/.

13. Patrick Georgi et al., "New and Revised Statistics for the US Space Economy, 2012-2023," Bureau of Economic Analysis, 31 March 2025.

This impact has not gone unnoticed by other states. A spiral arms race type dynamic has begun to emerge between the United States and China—not in terms of space arms themselves, but in the commercial space industries that have had such a large strategic impact in recent years.[14] While moving military space activities to the commercial sector might tamp down such an arms race, there is growing evidence that the commercial sector is merely becoming a thin veneer for military action. Instead of ameliorating tension, then, the operational shift of space activities from military to commercial sectors is just moving the arms race to a different theater, the commercial one. As such, both the United States and China, beyond recognizing the increasing importance of economic competition and even economic warfare, have taken explicit steps to protect, encourage, and expand their respective commercial space industries.

The argument that a spiral dynamic such as that involved in an arms race is currently building between the United States and China—and perhaps even other states—does not necessarily negate the argument that the economic power of space generally and commercial space specifically can reduce the potential for conflict. This is the case for several reasons. First and perhaps most significant, what matters most is how commercial space systems are used.

In the commercial space peace theory, what matters is the way in which space systems are integrated into the global economy; thus, commercial space systems contributing to the economic power of a state and the size of the global economy more generally can serve as a dampener to conflict.[15] On the other hand, the increased use of commercial space systems for military purposes may not send the benign message as theorized above.[16] That is, simply transferring some missions from a government-run to a commercial-run system does not signal that a country has no malignant ambition; many countries now realize that commercial space offers significant strategic advantages in terms of reduced cost, increased innovation, and better capability. While the message sent in transitioning to commercial systems perhaps may not be as clear as has been suggested, it certainly would complicate matters in a country's calculus.

A second reason to believe that commercial space can still temper tension is in the ways that it can complicate an adversary's planning considerations. Most commercial systems, even if used by a military, will have other uses—both domestic and foreign, civilian and military. Again, Starlink provides an apt example of this. While this dual use potential has always been recognized as presenting special complications in space, the increasing prevalence of commercial space systems make the problem much more difficult. In targeting a country, it may be difficult to know if and when it is even using a commercial system. The

14. Wendy N. Whitman Cobb, "A Commercial Space Security Dilemma? The Dynamics of Commercial Competition in Space," *Æther: A Journal of Strategic Airpower and Spacepower* 2, no. 4 (2024).

15. Whitman Cobb, *Privatizing Peace*.

16. Townsend, *Security and Stability*.

message sent, then, by using commercial systems, may not be beneficial in terms of sending an aggressive or peaceful signal but in increasing the number and kinds of signals an adversary must consider in determining whether to attack in space or not.

Finally, a shift to commercial space—even within a spiral dynamic—can bring economic benefits to a country. In other words, this kind of arms race might just be a better race to be in rather than one focused solely on weapons or other offensive capabilities. Innovation in space technologies provides a whole set of economic and technological benefits that can spread far beyond the realm of military space. These in turn increase the power of commercial space as well as its economic impact, further strengthening the ways in which commercial space may operate economically to reduce conflict.

Diplomatic

Over and above the military and economic means by which commercial space might decrease the potential for space conflict, there is an increasing list of measures that might be considered under the "soft power" sphere of diplomacy, law, and public opinion.

Perhaps the most significant to consider is environmental interdependence, which one scholar proposed as a reason that the United States and the Soviet Union seemingly restrained their aggressive behavior in space during the Cold War.[17] In brief, both sides recognized within a few years of the beginning of the space race that open, kinetic conflict in space would have dangerous effects in terms of debris and even radiation in the case of space-based nuclear detonations. As both states sought strategic advantage in the form of remote sensing and imaging, they made the calculation that they would refrain from kinetic, debris-causing actions. Although there were key "learning" and "unlearning" periods—times during which leaders in both countries came to understand the dangers only to forget them—this realization largely helped to contain open conflict in space in the very period where it might have been most expected.[18]

If such environmental interdependence existed in the Cold War, when not only the number of satellites was far less but also the uses of space were more minimal, it has only increased in the twenty-first century. Additionally, concerns about space debris are far more prevalent today, as incidents like kinetic ASAT testing, satellite collisions, and evidence of significant—and potentially dangerous—debris strikes are increasing the chances of a Kessler syndrome-like, slow-moving collisional cascade in near-Earth space.[19] These concerns have led to efforts at multiple levels to mitigate and remediate the danger of

17. James Clay Moltz, *The Politics of Space Security*, 3rd ed. (Stanford University Press, 2019).

18. Moltz, *Politics*.

19. Cameron J. Liang et al., *On the Increased Risk of Kessler Syndrome by Anti-Satellite Tests* (Institute for Defense Analyses, October 2023), https://www.ida.org/.

debris, including consultations at the United Nations, commercial-based solutions, and unilaterally imposed bans on the testing of kinetic, debris-causing ASATs by actors like the United States.[20]

It would indeed be a happy tale if environmental interdependence was all it took to restrain potentially hostile actions in the space domain. Unfortunately, evidence now indicates that this concern is not a significant restraint today and was likely not even so during the Cold War.

One scholar details that burgeoning Soviet interest in space for strategic purposes as well as the increasing use of space technology as a force projector in the 1970s and 1980s helped to stimulate and spur the Reagan administration's Strategic Defense Initiative, otherwise known as Star Wars—a program to develop a largely space-based defense system to prevent and destroy incoming ballistic missiles targeting the United States.[21] Although Reagan certainly had a number of reasons for pursuing the initiative, among them was growing concern that should conflict between the United States and the Soviet Union break out, Soviet space assets might need to be attacked in order to deny them any advantages. Environmental interdependence, then, hardly restrained Reagan from potentially engaging in kinetic conflict in space. That conflict in the domain did not break out, then, is perhaps not as attributable to environmental interdependence as to the failure of SDI and its attendant technology as well as to other political factors such as congressional limits on ASAT testing.

This picture of the 1980s is not all that dissimilar from the situation the United States and China now find themselves in. While both have made statements reaffirming their commitment to protect the space domain, both have also made it clear that they would not hesitate to attack space-based assets if necessary.[22] While it seems as if, at least initially, those attacks might be non-kinetic and/or temporary in effect, there is no reason to believe that should war break out on Earth, either country would hesitate to make moves to their advantage, particularly in a contest where at least one side sees their vital interests at stake. That is, what is perceived to be the largest constraint on space conflict—the danger of debris to other uses of space—may not be as significant as some may have hoped.

On the other hand, a May 2025 report from the China Aerospace Studies Institute (CASI) suggests that China may be deterred because of its increasing dependence on space. After examining 10 different factors which may influence

20. Vijay Iyer, "How Do You Clean Up 170 Million Pieces of Space Junk?," Federation of American Scientists, 24 May 2023, https://fas.org/; and Jason Rainbow, "Researchers Propose UN Goal to Curb Space Debris," *SpaceNews*, 9 January 2025, https://spacenews.com/.

21. Aaron Bateman, *Weapons in Space: Technology, Politics, and the Rise and Fall of the Strategic Defense Initiative* (MIT Press, 2024).

22. Howard Wang et al., *China's Growing Risk Tolerance in Space* (RAND Corporation, 24 June 2024), https://www.rand.org/; and Doug Cameron and Micah Maidenberg, "America Is Getting Ready for Space Warfare," *The Wall Street Journal*, 27 May 2024, https://www.wsj.com/.

China's behavior in the space domain, CASI concludes that only two factors are at play: the military balance and China's growing dependence on space "are likely to increase the US's ability to deter China successfully in the space domain."[23] Despite this finding, the report's authors provide no recommendations on how to further exacerbate that dependency, instead issuing recommendations having to do with the United States' posture in space. Understanding the potential to help the United States in the future, policymakers might also consider ways to enhance and increase China's dependence, thus engaging in the Cold War learning and unlearning process once again.

Finally, attacks on space systems—and commercial, privately-owned systems in particular—continue to fall in a sort of legal gray zone, offering a potential form of diplomatic restraint on space conflict. If they are actively being used by a state for a military purpose, they most likely can be targeted legitimately. Yet, the ambiguity of who is using commercial space systems and for what purposes might be something that a state actively emphasizes as a form of lawfare.[24] Consider the following: In the case of a conflict between the United States and China, China begins to actively and even effectively target a commercial system such as Maxar's constellation of remote imaging satellites. The United States might claim that it is not using Maxar's satellites either in that particular conflict or more generally and thus argue that any attack on Maxar would be unfounded and illegal. While it is unlikely that the Chinese government would agree with either characterization, the United States might be able to gain favor on the world stage by portraying China as a bad actor whose illegal actions in space have significant civilian and commercial consequences.

The success in an argument such as this one would almost certainly be predicated on the specific nature of the attack itself, including what systems were attacked, how, and to what effect, with the strongest likelihood of success coming with kinetic or permanent attacks on commercial satellites that have immediate, publicly recognizable, and somewhat significant consequences that the United States or another country could plausibly argue had no military role to play. Similarly, attacks on military satellites such as GPS or those that support communications, where the effects of the attack are also wide-ranging and public—for instance, harming the GPS system and the public's ability to use it or kinetic,

23. Kevin Pollpeter et al., *Deterring China's Use of Force in the Space Domain: A Proposed Scorecard for Weighing the Risks* (China Aerospace Studies Institute, 19 May 2025), https://www.airuniversity.af.edu/.

24. Jennifer A. Cannon, "Targeting Dual-Use Satellites: Lessons Learned from Terrestrial Warfare," *Air & Space Operations Review* 2, no. 2 (2023), https://www.airuniversity.af.edu/.

debris-creating attacks that in turn threaten non-military space systems—would also likely negatively affect global public opinion. The most significant costs might come if debris or other attacks were to threaten people in space.

Information

A final set of restraints comes from the information that commercial space systems provide which support activities in the diplomatic, military, and economic realms. This includes using imagery from commercial remote sensing satellites to publicize the bad deeds of others, combat misinformation, and shape public perceptions without giving away sensitive and classified sources and methods. The most prominent recent example of this is the United States' use of commercial remote imaging in the lead up to Russia's invasion of Ukraine, through which it attempted to "pre-but" Russia's denial of its troops massing on the Russo-Ukraine border.[25]

Uses of commercial satellite data like this are nothing new—*The Washington Post* reported in 1999 on the potential uses for commercial satellite images, including gathering information for government intelligence, public policy, and criminal investigations.[26] In 2010, in a program affectionately known as "Clooneysat," actor George Clooney used monitoring by commercial satellite to bring global attention to areas prone to war crimes in Africa.[27] Journalists have used commercial imaging to uncover Uyghur concentration camps and potential missile silos in China and the extent of the devastation experienced in both Ukraine and Gaza in the course of conflicts there.[28] Investigative organizations like Bellingcat have used commercial imagery in concert with other open source data to expose how Russia is illicitly moving grain out of Crimea and Sevastopol.[29]

Such uses of commercial satellite information alone may not be enough to affect a state's calculus about whether it should attack an asset in space. Yet, there is potential in the coming years for international and/or nongovernmental

25. Robin Dickey and Michael P. Gleason, "Space and War in Ukraine: Beyond the Satellites," *Æther: A Journal of Strategic Airpower and Spacepower* 3, no. 1 (2024), https://www.airuniversity.af.edu/.

26. D'Vera Cohn, "A Close-Up View from High Above," *The Washington Post*, 13 October 1999, https://www.washingtonpost.com/.

27. Nathaniel A. Raymond et al., "While We Watched: Assessing the Impact of the Satellite Sentinel Project," *Georgetown Journal of International Affairs* 7 (2013).

28. Doug Irving, "China's Disappeared Uyghurs: What Satellite Images Reveal," RAND Corporation, 29 April 2021, https://www.rand.org/; Kylie Atwood and Jennifer Hansler, "Satellite Images Appear to Show China Is Making Significant Progress Developing Missile Silos That Could Eventually Launch Nuclear Weapons," *CNN*, 2 November 2021, https://www.cnn.com/; Lauren Leffer, "Inside the Satellite Tech Revealing Gaza's Destruction," *Scientific American*, 1 December 2023, https://www.scientificamerican.com/; and Sylvain Barbot, "War in Ukraine at 2 years: Destruction Seen from Space—Via Radar," *The Conversation*, 23 February 2024, https://theconversation.com/.

29. Robert Simmon, "From Space to Story in Data Journalism," Global Investigative Journalism Network, 19 April 2024, https://gijn.org/stories/.

organizations (NGO) to use these same services to monitor and track actions in space, alerting states to bad behavior in orbit or the potential for it.The informational measures envisioned here are different from what is usually known as space situational awareness (SSA), although they are related. SSA involves the tracking of all things in space—such as satellites, systems, debris—but is separate from active space traffic management. Historically, much of this tracking has been done and made public by the US military, with the practice currently transitioning to the Department of Commerce. While tracking and monitoring actions in space is related to SSA, what is suggested here might be better termed space behavior monitoring and notification.

Since 2022, regulations that restricted US remote sensing operators from pointing their cameras at anywhere other than Earth were largely removed. How companies use their satellites and the types of imagery available are partially determined on a case-by-case basis under an operating license.[30] Of late, companies like Maxar are publicizing just what kinds of in-space images their satellites can gather, including one of the International Space Station taken from an amazing 276 kilometers away.[31] Other companies such as True Anomaly are developing inspector satellites that can rendezvous with objects in space and not just snap pictures, but monitor their behavior.[32] While True Anomaly's most interested customers include the US Space Force, it is also marketing its services to nongovernmental customers for the purposes of space security and sustainability.

From there, it is not hard to imagine that an NGO might be able to utilize these kinds of commercial imagery and data to monitor and track potentially bad actors in space. Increasing transparency along these lines—much like exposing concentration camps or war crimes—might not only make a potential bad actor think twice but also strengthen the legitimacy of such warnings given the source, an independent NGO rather than a state actor with specific geopolitical interests. This potential future use for commercial space systems leads to another informational restraint in terms of audience cost, the political cost imposed by a domestic audience on a leader who does not follow through on a publicly made threat. The cost can be in the form of decreased support for the leader or even the denial of reelection. Audience costs, according to this argument, are a kind of signal that increases credibility and demonstrates to the

30. Theresa Hitchens, "NOAA Eases Licensing Requirements on Commercial Remote Sensing," *Breaking Defense*, 9 August 2023, https://breakingdefense.com/.

31. Sandra Erwin, "Maxar Eyes Military Customers For Satellite Images Of Objects In Space," *SpaceNews*, 30 March 2023, https://spacenews.com/.

32. Mike Wall, "Private 'Jackal' Inspector Satellites to Get 1st In-Space Test This Year," Space.com, 6 April 2023, https://www.space.com/.

adversary the seriousness of the threat that is being made and helps to alleviate the incentives to be dishonest in international relations.[33]

Yet, in order for such costs to be imposed, audiences must know not just about the importance and value of the thing being threatened, but also that there is a threat from the adversary and that a threat has been made by their own leader.[34] For example, had then-President Barack Obama not threatened Syria by establishing a "red line" over the use of chemical weapons in 2014, he might have been able to negotiate or communicate that threat in private and avoided a domestic audience cost. One scholar calls this the "audience-cost dilemma," as presidents might have fewer restraints when negotiating privately but may reduce their credibility if the threats are not made public.[35]

Public opinion studies have shown that, in the United States and elsewhere, general knowledge about space and its prioritization as an issue is stunningly low. And with respect to commercial space, public knowledge is even lower.[36] If the public does not know about the ways in which space systems are threatened or does not understand how the loss of such systems may impact them, the potential of these costs to restrain space behavior may be limited. Though the public may not know much about the activities of the commercial space industry, their products can be used by governments in such a way as to provide a foundation for the imposition of audience costs. An additional, positive, effect of doing so may also be in helping to educate the public on those capabilities themselves.

Conclusion

This article has outlined the military, economic, diplomatic, and informational mechanisms through which commercial space may reduce the chances of conflict in space. Importantly, these mechanisms should not be considered individually but holistically. It is the rare circumstance where an actor is constrained by one factor alone. States must and will consider multiple factors when making the difficult decision about whether to go to war or not, either terrestrially or in space. Military, economic, diplomatic, and informational mechanisms ideally work cooperatively with each other to reduce the potential for conflict in space (fig. 1).

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33. James D. Fearon, "Domestic Political Audiences and the Escalation of International Disputes," *American Political Science Review* 88, no. 3 (1994).

34. Fearon, "Domestic Political Audiences."

35. Matthew A. Baum, "Going Private: Public Opinion, Presidential Rhetoric, and the Domestic Politics of Audience Costs in US Foreign Policy Crises," *Journal of Conflict Resolution* 48, no. 5 (2004).

36. Whitman Cobb, "Public Opinion."

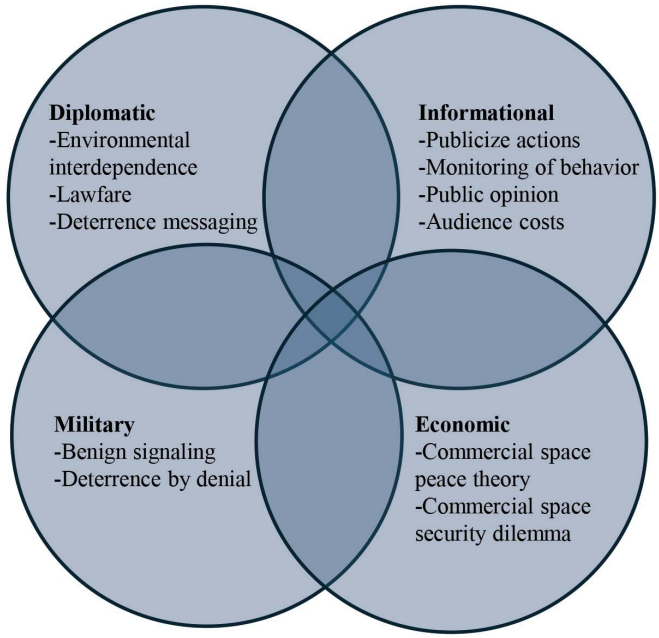

Figure 1. Commercial restraints on space conflict. Image created by author.

A fair question with respect to the use of commercial space might center on its impact on strategic stability in space. Traditionally, the understanding of strategic stability has been based on Thomas Schelling's work, which defines it as a situation in which neither side in a conflict has an incentive to initiate a nuclear first strike and neither side has an incentive to engage in an arms race.[37] As with most definitions that originated in the nuclear age, the application of Schelling's definition of strategic stability to the space domain presents complications, given that the space dilemma involves not just incentives to engage (or not) in a nuclear strike, but also incentives to engage (or not) in a general space-based attack.[38] Thus, as a recent RAND report notes, the definition of stability in space is still contested.[39] Further, the same report argues that the tendency toward first strike in space has not been validated yet and may not be validated at all.

It is clearly not in the scope of this article to do justice to this topic, but some recent reports have speculated on how commercial space might impact US-

37. See, for example, Thomas C. Schelling and Morton H. Halperin, *Strategy and Arms Control* (The Twentieth Century Fund, 1961).

38. See, for example, Krista Langeland and Derek Grossman, *Tailoring Deterrence for China in Space* (RAND Corporation, 27 July 2021), https://www.rand.org/.

39. Alexandra T. Evans et al., *Space Strategic Stability: Assessing US Concepts and Approaches* (RAND Corporation, 8 May 2024), 2, https://www.rand.org/.

China and US-Russia stability in space. The authors of the RAND report suggest that the proliferation of commercial systems, along with statements from both Russia and China regarding the potential targeting of commercial satellites, may increase the risk of escalation.[40]

On the other hand, it is not just the proliferation of commercial space capabilities that risks upending any sense of stability in the space domain—at least with Russia. Behaviors such as continuing Russian cyberattacks and US sanctions on Russia's space industry also present the potential for strategic instability.[41] This aligns with the holistic view presented here that takes into account many different factors in considering both deterrence in space and the potential for stability or instability.

Though all these restraints seem entirely plausible, writing about conflict in space—or even its potential—at this moment in time is admittedly difficult. The most stinging limitation is that there has been no open, kinetic conflict between states in the space domain, giving those who study it little actual evidence to work with. This is not unlike the dilemma that airpower writers in the interwar period found themselves in. With a modicum of air experience during World War II, airpower enthusiasts found themselves brimming with excitement over the new weapons of the war and all the ways in which it would change warfare. Theories like strategic bombing or the economic web theory certainly sounded plausible to them at the time; however, airpower did not turn out to be the miracle cure that would end World War II either early or through independent operations in the air.

While the restraints here are more than plausible, there is quite a lot that remains unknown at this point, either about what warfare in space will look like or what the global reaction will be. How will the use of space evolve in the next 10 years, let alone the next several decades? What kinds of technological breakthroughs might be made or what geopolitical terrestrial nightmares might ultimately fuel a space war? All these factors and more will influence both the course of space conflict, its reception, and the ultimate consequences. This uncertainty, perhaps, may even factor into a state's calculation. Given how little is known about the domain and its future possibilities, it may well be shortsighted to destroy what is just now beginning to be built. ✪

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40. Evans et al., *Space Strategic Stability*.

41. Andrey Baklitskiy, *Strategic Stability in Outer Space After Russia's Invasion of Ukraine* (Center for Naval Analyses, October 2023), https://www.cna.org/.

Nuclear Strategic Parity in a Tripolar World

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The tripolar nuclear system comprising Russia, China, and the United States presents significant challenges to American nuclear deterrence scholars and practitioners as they attempt to understand what it means for deterrence and both US policy and capability. This article examines these challenges and posits the nation's available options as it seeks to avoid expanding the nuclear arsenal while also maintaining stable deterrence. With the future of nuclear arms control uncertain, the United States should seek to pursue a dynamic strategy of nuclear parity with Russia and China.

Beginning in the 1960s, the United States and the Soviet Union sought to maintain a rough parity between their nations in the number of operationally deployed strategic nuclear weapons. While domestic politics played a role in shaping both American and Soviet—then later, Russian—nuclear strategy, leaders in both countries sought to maintain deterrence and promote strategic stability. Eventually, arms control agreements figured into achieving those same objectives.[1] The most recent agreement between Russia and the United States, the New Strategic Arms Reduction Treaty (New START), was signed in 2010 and was extended for an additional five years in 2021.[2] President Donald Trump allowed New START to expire in February 2026, ending the last remaining arms control treaty between the two nuclear superpowers.[3]

During his first term in office, President Trump was deeply skeptical of the agreement, but his loss in the 2020 election left the decision to extend the treaty up to the administration of President Joe Biden. While Biden renewed

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1. See Richard Dean Burns, *The Evolution of Arms Control: From Antiquity to the Nuclear Age* (Praeger Security International, 2009).

2. Treaty between the United States of America and the Russian Federation on Measures for the Further Reduction and Limitation of Strategic Offensive Arms, 8 April 2010, T.I.A.S. 11-205.

3. Steven Pifer, "New START's Final Year—What Next?," Stanford Center for International Security and Cooperation, 23 April 2025, https://cisac.fsi.stanford.edu/.

the treaty in 2021, both Russia's invasion of Ukraine in February 2022 and its subsequent threats to use nuclear weapons against NATO member-states were unprecedented, making it hard for an administration desirous of further arms reductions to pursue arms control.[4] It was also in 2022 that the United States began to see clearly that China was in the midst of a massive buildup of its nuclear forces.[5] The combination of Russian action and Chinese nuclear expansion made anything but nuclear modernization impossible.

On 21 February 2023, Russian President Vladimir Putin issued this statement on New START before the Federal Assembly: "I am compelled to announce today that Russia is suspending its participation."[6] Russia's foreign ministry reported it would for the time being continue to observe the treaty's agreed limits on the numbers of operationally deployed strategic nuclear weapons.[7] The United States would have to trust Russia to keep its word since verification—which stopped prior to the 2020 coronavirus outbreak—would remain off the table. With Russian nuclear modernization efforts largely complete, Putin has a modern nuclear arsenal of land-based, sea-based, and airborne nuclear systems with which he can coerce, deter, or fight the United States and NATO.[8] Even more important for Europe, Russia also fields a tactical nuclear force that is at least 10 times larger than the American and NATO force and has far more delivery options.

The United States, however, is 15 years into a nuclear modernization program that has yet to field a single new delivery system and is focused on strategic rather than tactical systems.[9] With the United States serving as the primary provider of conventional weapons to Ukraine's fight against Russia, it should come as no surprise that arms control, a primary concern of the United States, is of less concern to Putin.[10] This state of affairs left New START an untenable treaty. Vladimir Putin understood this point and the advantage he has.

With China in the midst of an ambitious nuclear modernization program that will see its nuclear arsenal reach or surpass that of the United States in the

4. Jan Eliasson and Dan Smith, "Joe Biden's Arms Control Ambitions Are Welcome—but Delivering on Them Will Not Be Easy," Stockholm International Peace Research Institute, 19 January 2021, https://www.sipri.org/.

5. See *Military and Security Developments Involving the People's Republic of China 2022* (Department of War [DOW], 2022).

6. Shannon Bugos, "Russia Suspends New START," *Arms Control Today*, March 2023, https://www.armscontrol.org/.

7. Rose Gottemoeller and Marshall L. Brown Jr., "Legal Aspects of Russia's New START Suspension Provide Opportunities for US Policy Makers," *Bulletin of the Atomic Scientist*, 2 March 2023, https://thebulletin.org/.

8. Mary Beth Nikitin, *Russia's Nuclear Weapons: Doctrine, Forces, and Modernization*, R45861 (Congressional Research Service [CRS], 2022).

9. Curtis McGiffin and Adam Lowther, *Dynamic Parity: A New Approach to American Nuclear Deterrence* (National Institute for Deterrence Studies, 2024), 3.

10. Aamer Madhani, "Ukraine Uses US Weapons to Strike Inside Russia, According to a Senator and a Western Official," AP [Associated Press], 5 June 2024, https://apnews.com/.

next decade, if estimates are correct, it is unsurprising that Chinese President Xi Jinping is uninterested in arms control.[11] Such an expansion of its nuclear arsenal at minimum will make China a nuclear peer of the United States and its superior in nonstrategic nuclear weapons.[12] China's absolute refusal to join any arms control agreements should give Trump and future presidents significant reason to question the wisdom of bilateral arms control agreements that leave the United States significantly weaker than China and Russia, adversaries engaged in a "no limits" partnership aspiring to topple the American-led international order.[13]

The reality is that American efforts to deter Russia and China are not looking promising. This challenge is made worse by the all-too-common belief that American conventional military power is a cover for an increasingly less credible nuclear arsenal. The decline in American deterrence credibility is also exacerbated by the tendency of American analysts to see the threat posed by Russia and China as separate and distinct, giving the United States the opportunity to pivot from one to the other with the same nuclear arsenal.[14] Rarely are these adversaries viewed as a collective threat that requires a larger force to counter both simultaneously.

With this background in mind, this article argues against the status quo, calling instead for the United States to pursue nuclear parity based on the collective capability of Russia and China. Unlike prevailing thought on nuclear tripolarity, or the "three-body problem," this assessment suggests arms control, alternative targeting strategies, and other efforts to maintain deterrence stability without expanding the American nuclear arsenal will not succeed and further contends that arms control is unlikely in the years ahead.[15] Instead, the United States must focus on how it can best field a credible nuclear deterrent force.

The Future of Deterrence

Before offering an independent view of American deterrence requirements, it is worth considering the most influential strategic assessment in recent years—that is, the final report of the Congressional Commission on the Strate-

11. *Military and Security Developments Involving the People's Republic of China 2023* (DOD, 2023), VIII.

12. Brad Roberts et al., *China's Emergence as a Second Nuclear Peer: Implications for US Nuclear Deterrence Strategy* (Center for Global Security Research, Lawrence Livermore National Laboratory, 2023).

13. Emily Wang Fujiyama and Huizhong Wu, "China and Russia Reaffirm Their Close Ties as Moscow Presses Its Offensive in Ukraine," AP, 16 May 2024, https://apnews.com/.

14. Daryl G. Kimball, "Does the United States Need More Nuclear Weapons?," *Arms Control Today*, July/August 2024, https://www.armscontrol.org/.

15. Eric S. Edelman, "America's Latest Problem: A Three-Way Nuclear Race," FP [*Foreign Policy*], 2 June 2025, https://foreignpolicy.com/; and see also James Timbie and James O. Ellis, *Technology, Complexity, Uncertainty, and Deterrence* (Johns Hopkins School of Advanced International Studies, 2023).

gic Posture of the United States.[16] This bipartisan commission's report is particularly meaningful because it was signed by every member of the commission—half of whom were Republican appointees and half Democrats. Given the well-known support for arms control and disarmament of some commission members, their willingness to sign a report that called for the possible expansion of the American nuclear arsenal was an indication for many within the nuclear enterprise that the strategic situation facing the United States may be worse than originally believed.[17]

The Strategic Posture Commission, as a creation of Congress, had no authority to impose its recommendations on the Biden administration. In many respects, its existence was the result of congressional dissatisfaction with the *2022 Nuclear Posture Review*. Released soon after Russia's invasion of Ukraine, the review acknowledged growing Chinese and Russian aggression but only reduced American nuclear capabilities.[18] It was only through shaping the power of persuasion and prestige that the recommendations of the commission could influence the Biden administration or, in 2025, the Trump administration.

In its final report, the commission noted that American deterrence strategy must change to address the 2027 to 2035 threat environment. The US-led international order and the values it upholds "are at risk from the Chinese and Russian authoritarian regimes." The possibility of military conflict with those major powers has grown and "carries the potential for nuclear war."[19] As the report states,

> Today the United States is on the cusp of having not one, but two nuclear peer adversaries, each with ambitions to change the international status quo, by force, if necessary, a situation which the United States did not anticipate and for which it is not prepared. While the risk of a major nuclear conflict remains low, the risk of a military conflict with either or both Russia and China, while not inevitable, has grown, and with it the risk of nuclear use, possibly against the US homeland.[20]

To meet this and other foreseeable national security challenges, the commission recommended an ambitious program of nuclear and conventional force modernization, a more resilient space architecture with offensive and defensive elements, an expansion of the United States' defense industrial base, improved nuclear infrastructure, and where appropriate, nuclear arms control and/or measures of nuclear risk reduction. Additionally, the United States should en-

16. Madelyn R. Creedon et al., *America's Strategic Posture: The Final Report of the Congressional Commission on the Strategic Posture of the United States* (Institute for Defense Analysis, 2023), https://www.ida.org/.

17. Al Mauroni, "The Strategic Posture Commission's Amazing Trip Back to the Future," *War on the Rocks*, 13 December 2023, https://warontherocks.com/.

18. Lloyd J. Austin III, *Nuclear Posture Review* (DOD, 2022).

19. Creedon et al., *Strategic Posture*, vii.

20. Creedon et al., *Strategic Posture*, v.

sure that it is on the cutting edge of emerging technologies related to security and defense. This includes data analytics, quantum computing, and artificial intelligence (AI).

Contained in the package of commission recommendations is completion of existing nuclear modernization programs, which include the United States' strategic nuclear triad of land-based intercontinental ballistic missiles (ICBM), submarine-launched ballistic missiles (SLBM), and airborne nuclear delivery systems. This modernization program tracks the consensus of the Obama, Trump, and Biden administrations; however, the commission recommended possible increases in the number of deployed weapons. This report stands in stark contrast to the *2022 Nuclear Posture Review*, which suggests the nation fields sufficient weapons to deter China and Russia.[21]

According to the Strategic Posture Commission, American nuclear strategy should be based on six fundamental tenets: 1) assured second strike, 2) flexible response to achieve national objectives, 3) tailored deterrence, 4) extended deterrence and assurance, 5) calculated ambiguity in declaratory policy, and 6) hedging against risk. Flexible response should provide a credible range of resilient response options to restore nuclear deterrence and promote conflict termination by "convincing an adversary's leadership it has seriously miscalculated, that further use of nuclear weapons will not achieve its objectives, and that it will incur costs that far exceed any benefits it can achieve should it escalate further."[22]

The precise numbers and kinds of weapons that the United States needs to offset the rise of China as a peer and the modernization of Russia's nuclear arsenal are not estimated in the report. Modernization costs of nuclear forces and infrastructure—including the nuclear command, control, and communications system; delivery systems; warheads; cyber and space supports; and improved air and missile defenses—are substantial. What is uncertain, however, is whether the United States must build to parity with both Russia and China to deter them effectively.

The commission leans in this direction without offering an explicit answer. Among scholars examining the implications of tripolarity, recommendations vary from maintaining the current size and composition of the American nuclear arsenal to building an arsenal of equivalent size and capability to that of Russia and China combined.[23] The current debate also includes discussions of nuclear targeting. Advocates of maintaining the current nuclear arsenal's size and capability suggest the United States may need to shift away from counter-

21. Austin, *Nuclear Posture Review*.

22. Austin, *Nuclear Posture Review*, 30.

23. See Kier Lieber and Daryl Press, *US Strategy and Force Posture for an Era of Nuclear Tripolarity* (The Atlantic Council, April 2023), https://www.atlanticcouncil.org/; and McGiffin and Lowther, *Dynamic Parity*.

force targeting toward some form of counter-value targeting, while advocates of parity suggest the United States maintain a counter-force targeting approach.[24]

The Congressional Budget Office's most recent cost estimate for the operations and maintenance of the existing force and fielding of new systems required to maintain current nuclear force is about $817 billion over the next decade.[25] At roughly $81 billion per year, this is less than 10 percent of the defense budget over that period.

Building a nuclear force that matches the combined capability of China and Russia will cost considerably more. Exactly how much is uncertain because no credible estimates exist. Cost, however, is a major concern for Congress and the president, who has called for cuts in nuclear spending.[26] For Trump, balancing the budget is a top priority. But as an analysis of federal spending suggests, it is entitlement, not defense spending, that consumes more than 80 percent of federal revenue.[27] Thus, if spending is a concern, fielding a nuclear force that deters great power war is important, as the Strategic Posture Commission clearly explained. And as former National Security Adviser Matt Pottinger said, "Deterrence is cheaper than war."[28]

During the nation's three-decade "procurement holiday" that followed the Cold War's end, Congress allowed the nuclear enterprise to atrophy in the naïve belief that federal spending, which did not decline after the war, was more effectively used on increased entitlement spending.[29] Now, the country finds itself in need of replacing everything from warheads to delivery systems to nuclear research facilities—and all at a time when China and Russia are building nuclear arsenals that are equal or superior to—in the case of Russia—the American nuclear arsenal.[30] America's declining relative position does not include the advantage China and Russia possess in advanced hypersonic weapons or other new technologies that may soon change the dynamics of nuclear deterrence and con-

24. See Keith B. Payne et al., *The Rejection of Intentional Population Targeting for 'Tripolar' Deterrence* (National Institute for Public Policy, 2023); and see also "PONI Live Debate: US Nuclear Targeting," Center for Strategic and International Studies (CSIS), transcript, 25 January 2024, https://csis-website-prod.s3.amazonaws.com/.

25. Phillip L. Swagel, *Projected Costs of U.S. Nuclear Forces, 2025 to 2034* (Congressional Budget Office, 2025), 3.

26. Gabe Whisnant and Jesus Mesa, "Trump Wants to 'Get Rid' of Nuclear Weapons," *Newsweek*, 6 March 2025, https://www.newsweek.com/.

27. Adam Lowther, "It's Time to Have a Guns Verses Butter Debate," *RealClearDefense*, 16 May 2025, https://www.realcleardefense.com/.

28. Micah McCartney, "Deter China Now Rather Than Fight It Later, Says Ex-Trump Adviser," *Newsweek*, 8 November 2023.

29. John F. Cogan, "Entitlements and the Budget," in *Blueprint for America*, ed. George P. Schultz (Stanford University Press, 2016).

30. See Anya Fink et al., *The Nuclear Programs of Russia, China, North Korea, and Iran* (Center for Naval Analyses, January 2024).

flict.[31] More importantly, American understanding or misunderstanding of Russian and Chinese nuclear strategy looms large in the background.[32]

The United States is now facing one superior nuclear-armed adversary in Russia and one soon-to-be peer in China. Addressing this challenge in a more effective way than the *2022 Nuclear Posture Review* was the very purpose of the Strategic Posture Commission's report. Although contending with the move from one to two nuclear peers may not seem like an impossible task, it does pose difficult questions for both nuclear planners and the president.[33]

Finding the Best Approach

If deterrence is about shaping an adversary's perception of risk, tripolarity increases complexity far more for the United States than it does for China or Russia.[34] America's adversaries, in pursuing nuclear arsenals that outmatch the United States', create added uncertainty for an American president by reducing the certainty that actions will meet with success. If prospect theory—the theory that human decision-making is fundamentally irrational because it overvalues perceived losses—is correct, this increased uncertainty is likely to enhance the president's perception that action will lead to a loss, rather than a gain. As one key analysis on crises between nuclear armed adversaries suggests, this leaves the president and the United States—rather than China or Russia—deterred from acting.[35]

In other words, the United States, rather than China and/or Russia, faces the greatest risk of failure in achieving its strategic objectives during a crisis involving a nuclear-armed peer adversary. It is a challenge that is too often overlooked by authors advancing maintenance of the status quo for the United States' nuclear arsenal.[36]

This problem is made worse by one of the more important second-order effects of the Russian invasion of Ukraine—the strengthening of the Sino-Russian

31. Patty-Jane Geller, *The US Must Strengthen Its Nuclear Forces to Deter Growing Nuclear Threats*, Backgrounder No. 3736 (The Heritage Foundation, 30 November 2022, https://www.heritage.org/.

32. See Fiona S. Cunningham and M. Taylor Fravel, "Assuring Assured Retaliation: China's Nuclear Posture and US-China Strategic Stability," *International Security* 40, no. 2 (Fall 2015).

33. Kim Tong-Hyung, "North Korean Leader Vows 'Offensive' Nuclear Expansion," AP, 10 April 2023, https://apnews.com/; and Yonah Jeremy Bob, "Iran Becoming Aggressive in Its Pursuit of Nuclear Weapons, IAEA Chief Warns," *Jerusalem Post*, 3 June 2024, https://www.jpost.com/.

34. Robert Litwak, "A Tripolar Nuclear World: Challenges to Strategic Stability," *The Washington Quarterly* 46, no. 4 (2023).

35. Jeffrey D. Berejikian and Florian Justwan, "Testing a Cognitive Theory of Deterrence," in *Behavioral Economics and Nuclear Weapons*, ed. Anne I. Harrington and Jeffrey W. Knopf (The University of Georgia Press, 2019); and see Matthew Kroenig, *The Logic of American Nuclear Strategy: Why Strategic Superiority Matters* (Oxford University Press, 2019).

36. Kimball, "More Nuclear Weapons?"; and Andrew F. Krepinevich Jr., "The New Nuclear Age: How China's Growing Nuclear Arsenal Threatens Deterrence," *Foreign Affairs* 101, no. 3 (May/June 2023).

relationship, which Putin described as having "no limits."[37] Russian reliance on China, North Korea, and Iran to provide needed military capability in Ukraine is driving previously unseen cooperation that includes the sharing of nuclear knowledge and possibly material.[38] If the bonds currently forming solidify and persist after Russia's war in Ukraine, the United States may find itself facing a relatively cohesive authoritarian axis that is set on toppling the American-led international order.[39] Thus, the risk of "losing" in any crisis between the United States and one or more axis members is understandably seen as a greater probability by an American president, leading adversaries to believe the United States will be deterred. Again, this is consistent with the core tenets of prospect theory's view on how humans address risk.

In countering the growing cooperation between Russia and China, it is also important to know how closely Russian and Chinese military-strategic planning is coordinated with respect to nuclear deterrence and employment.[40] Xi and Putin are making positive demonstrations of political affinity as the two states conduct joint military exercises.[41] This does not necessarily mean that Beijing and Moscow are transparent with respect to their nuclear forces and their actual war plans, either with the United States or each other.[42] Chinese and Russian leadership clearly share a mutual hostility to what they regard as American global hegemony, but the relationship between that and future cooperative force planning remains uncertain. Understanding whether the two states will work together in using their nuclear arsenals to coerce, deter, or defeat the United States is one of the most important questions to understand because the answer stands to have a significant impact on the nuclear force composition required by the United States to deter both adversaries.

Both China and Russia are placing greater importance on their nuclear forces because neither believes they can match American conventional forces.[43] Russia can match neither its quantity nor quality.[44] China can match its quantity but not quality. Thus, it is reasonable for both countries to rely on the coercive power of expanded nuclear arsenals in deterring American intervention in places like

37. Patricia M. Kim, "The Limits of the No-Limits Partnership," *Foreign Affairs* 102, no. 2 (March/April 2023).

38. Sulgiye Park, "Is Russia Helping China Expand Its Nuclear Weapons Program?" *The Equation*, Union of Concerned Scientists, 19 September 2024, https://blog.ucs.org/.

39. Bobo Lo, "The Ukraine Effect: Demise or Rebirth of the Global Order?," Lowy Institute, 11 May 2023, https://www.lowyinstitute.org/.

40. Mark Cozad et al., *Future Scenarios for Sino-Russian Military Cooperation* (RAND Corporation, 2024).

41. Richard Weitz, *Assessing Chinese-Russian Military Exercises: Past Progress and Future Trends* (CSIS, 2021).

42. See Max Seddon and Chris Cook, "Leaked Russian Military Files Reveal Criteria for Nuclear Strike: Doctrine for Tactical Nuclear Weapons Outlined in Training Scenarios for an Invasion by China," *Financial Times*, 28 February 2024, https://www.ft.com/.

43. Lydia Wachs, *The Role of Nuclear Weapons in Russia's Strategic Deterrence* (German Institute for International and Security Affairs, 2022).

44. Kristin Ven Bruusgaard, "Russian Nuclear Strategy and Conventional Inferiority," *Journal of Strategic Studies* 44, no. 1 (2020).

Ukraine or Taiwan, for example. If Russian use of nuclear threats against NATO is an indicator, there may be more to come from both Russia and China.

With such a pessimistic future a strong possibility, arms control is an enticing option. It is, however, unlikely, absent unexpected change. Russia cannot match American and NATO conventional power. China's massive conventional military modernization is untested. Thus, nuclear coercion and deterrence offer attractive alternatives.

A complete lack of interest in nuclear arms control is consistent with the People's Republic of China's (PRC) six-decade position avoiding any form of it.[45] In fact, arms control is inconsistent with long-held Chinese strategy, which emphasizes deception and surprise. For it to work, China must accept a degree of transparency never permitted by the Chinese Communist Party (CCP).[46] Given China's nuclear breakout since 2021 and plans to reach parity or superiority vis-à-vis the United States, there is little reason to believe nuclear arms control has a place in Sino-American relations.[47] Thus, it should come as no surprise that Xi responded to Trump's February 2025 call for the great powers to reduce their nuclear arms by suggesting the United States and Russia should lead the way.[48]

Once China completes its nuclear expansion, the CCP may offer greater transparency of both its nuclear forces and doctrine. Such transparency could serve Chinese interests. As one analysis notes, "For China, deterrence (威慑, *weishe*) is not simply the objective of forestalling an adversary's undesired action, as in Western thinking, but it also includes aspects of compellence, meaning that China often uses its military to coerce other countries to take actions Beijing desires." Such an approach "makes deterrence signaling an even more prominent part of Chinese aggression abroad."[49]

China and Russia deploy most of their strategic nuclear weapons on land-based ICBMs, unlike the United States, which relies more heavily on submarines and bombers. Both adversaries are improving their deployed SSBN and bomber forces, but they will remain primarily ICBM-based nuclear forces. The United States is expected to remain in the forefront of ballistic missile subma-

45. See Tong Zhao, *China's Approach to Arms Control Verification* (Sandia National Laboratories, 2022).

46. See also Mark B. Schneider, *Nuclear Weapons in Chinese Military Strategy* (National Institute for Public Policy, 2019); and Testimony on US Strategic Command and US Space Command in Review of the Defense Authorization Request for Fiscal Year 2022 and the Future Years Defense Program before the US Senate Committee on Armed Services (statement of Admiral Charles A. Richard, commander, US Strategic Command), 117th Cong. 1st session (2021), 20 April 2021, https://www.armed-services.senate.gov/.

47. Rajeswari Pillai Rajagopalan, "China's Nuclear Forces Continue to Expand," *The Diplomat*, 29 January 2024, https://thediplomat.com/.

48. Micah McCartney, "China Finally Agrees with Trump," *Newsweek*, 14 February 2025, https://www.newsweek.com/.

49. Nathan Beauchamp-Mustafaga et al., *Deciphering Chinese Deterrence Signaling in the New Era* (RAND Corporation, 2021), viii.

rine and strategic bomber-related technologies. Yet the exact composition of strategic nuclear forces is less relevant than the overall size of each country's nuclear force, which plays an important role in determining who will back down in a crisis.[50]

In a future crisis where the United States faces a peer or superior China and/or Russia, an American president may likely determine that the interests at stake are not worth the potential fight against these "friends of steel" and back down.[51] One analysis contends that "successful coercion requires discovering and threatening an adversary's pressure points."[52] In such a crisis, a peer or superior China and/or a superior Russia would possess the requisite credibility.[53]

At present, China and Russia field superior nonstrategic nuclear arsenals to the United States, which leaves both countries in a position to use these weapons as coercive tools for dissuading the United States from countering their regional ambitions.[54] Apart from the fighter-delivered nuclear gravity bombs in Europe, the United States relies on its operationally deployed strategic nuclear weapons for signaling and coercion. This creates a gap in capability that both Russia and China are likely to exploit by employing small numbers of low- or ultra-low-yield tactical nuclear weapons in an "escalate to win" strike, should the need arise.[55] For the United States, this is an undoubtedly undesirable position to be in. Nuclear inferiority at the tactical level—and soon, parity or inferiority at the strategic level—will leave the United States unable to maintain the current global order.

To exacerbate the challenge for the United States, forecasting the impact on deterrence of critical technologies like AI, quantum computing, nanotechnology, autonomous weapons systems, directed-energy weapons, and hypersonic weapons, among others, is difficult and makes a complex tripolar nuclear dynamic even more so. Whether they will influence decisions about nuclear force planning and "how much is enough" for deterrence are challenging to forecast.[56] American defense planners rely on wargames, exercises, and studies that maximize uncertainty to flesh out the range of possibilities for these technologies and how they shape deterrence, but none of these tools are predictive. They merely help expand the set of possibilities that deserve consideration.

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50. Kroenig, *American Nuclear Strategy*, 113.

51. Dmitry Antonov, " 'Friends of Steel': Xi and Putin Pledge to Stand Together Against US," *Reuters*, 8 May 2025, https://www.reuters.com/.

52. Daniel Byman and Matthew Waxman, *The Dynamics of Coercion* (Cambridge University Press, 2002), 30.

53. Darly G. Press, *Calculating Credibility: How Leaders Assess Military Threats* (Cornell University Press, 2005).

54. Wachs, *Nuclear Weapons*.

55. Peter Huessy, "Could Putin's 'Escalate to Win' Nuclear Threat Strategy Work?" Warrior Maven, 10 April 2023, https://warriormaven.com/.

56. See Michael J. Mazarr et al., *Disrupting Deterrence: Examining the Effects of Technologies on Strategic Deterrence in the 21st Century* (RAND Corporation, 2022).

Establishing benchmarks for a three nuclear superpower configuration is possible, even in the face of uncertainty. American, Chinese, and Russian strategic nuclear forces are likely to field weapons that are deployed on a variety of land-, sea-, and air-based platforms. There are inevitable asymmetries, with the most recent Defense Intelligence Agency analysis suggesting that both China and Russia are likely to field large numbers of nuclear-armed hypersonic glide weapons and a smaller number of fractional orbital bombardment systems.[57] Doubtless, the United States will continue plans to field Sentinel, the Columbia class SSBN, and the B21 bomber, but both Sentinel and Columbia are behind schedule, and all three are likely insufficient to prevent China and Russia from pursuing regional ambitions.

The China Question

Chinese strategic thinking is quite nuanced about the deterrence and defense uses for nuclear weapons.[58] Chinese leaders are certainly aware that they currently remain short of nuclear parity with Russia or the United States but are clearly closing that gap rapidly.[59] There is reason to believe that China's buildup is motivated by a desire to coerce the United States into sitting out a Chinese invasion of Taiwan, which is seen by an increasing number of experts as a growing probability.[60] China may prefer to see nuclear weapons as one option along a spectrum of choices for deterring or fighting war under exigent conditions, as a means of supporting conventional military operations, and as a tool of assertive diplomacy.[61]

China is also expanding its military modernization—conventional and nuclear—beyond weapons and platforms, into the development of superior command, control, and communications (C3) for military operations. The checklist of modernized systems includes C3; computing capability; intelligence, surveillance, and reconnaissance (terrestrial- and space-based); in addition to other information technologies for cyber war. Chinese military strategists conclude that the "informatization" of warfare under all conditions is a predicate to fu-

57. "Golden Dome for America: Current and Future Missile Threats to the U.S. Homeland," Defense Intelligence Agency, 13 May 2025, https://www.dia.mil/.

58. Lyle J. Morris and Rakesh Sood, *Understanding China's Perceptions and Strategy Toward Nuclear Weapons: A Case Study Approach* (Defense Threat Reduction Agency, 2024).

59. Mark B. Schneider, "China's Nuclear Weapons Buildup Is a Strategic Breakout," *The National Interest*, 7 December 2023, https://nationalinterest.org/.

60. Ashley J. Tellis and Tong Zhao, "What Are China's Nuclear Weapons For?," *Foreign Affairs*, 17 June 2024, https://www.foreignaffairs.com/.

61. David C. Logan and Phillip C. Saunders, *Discerning the Drivers of China's Nuclear Force Development: Models, Indicators, and Data* (National Defense University Press, 2023).

ture deterrence and defense operations.[62] Thus, a nuclear conflict may begin with the People's Liberation Army trying to make the United States unable to see, hear, and communicate, and unwilling to trust the information it possesses. Domains of warfare are blending to support whatever type of coercion, deterrence, or strike China desires.

Most importantly, nuclear weapons provide China a tool for deterring American military intervention in East Asia. The composite effect of China's present and presumably future modernization is to make its forces more agile and more effective in coercing the United States to avoid interference in a regional conflict (Taiwan), striking targets in the Chinese homeland with conventional or nuclear weapons, and preventing an American attempt to cut China off from the world.[63] The emphasis on agility and coercion reflects the tradition in Chinese military thinking since Sun Tzu that the acme of skill is to win without fighting. But, if war is unavoidable, striking the first and decisive blow is critical and consistent with China's "Active Defense" strategy, a strategy it has leveraged with particular emphasis since the 1990s.[64] Active defense proscribes against first use of conventional or nuclear weapons, so long as it is seen as a defensive act. Defeating the United States is just that because the United States is an existential threat to China.

This means that China must win the competition in the global competition in all domains, and by any means necessary. As one scholar points out, Xi believes that the world is at a political and technical pivot point, where world order will soon change.[65] For Xi and the People's Liberation Army, modern warfare is integrated across all domains and conventional and nuclear forces. This explains why China emphasizes space as a domain for future deterrence and warfighting. Not only is space the single greatest advantage for the United States, but it is also a key vulnerability for both conventional and nuclear forces. Thus, China is launching satellites with similar capabilities to those of the United States at a rapid pace, while also growing capabilities for rendezvous and proximity operations and other means of potential disruption or destruction of American integrated tactical warning and attack assessment satellites. According to General Stephen F. Whiting, US Space Command, China has tripled its numbers of intelligence, surveillance, and reconnaissance satellites since 2018, creating a

62. See Timothy L. Thomas, *Dragon Bytes: Chinese Information-War Theory and Practice* (Foreign Military Studies Office, 2004); and *Three Faces of the Cyber Dragon: Cyber Peace Activist, Spook, Attacker* (Foreign Military Studies Office, 2012).

63. Paul Bracken, *The Second Nuclear Age: Strategy, Danger, and the New World Politics* (Henry Holt, 2012), 206.

64. M. Taylor Fravel, *Active Defense: China's Military Strategy Since 1949* (Princeton University Press, 2019).

65. Rush Doshi, *The Long Game: China's Grand Strategy to Displace American Order* (Oxford University Press, 2021), 2.

"kill web over the Pacific Ocean to find, fix, track and, yes, target United States and allied military capabilities."[66]

Xi is very clearly rejecting former PRC leader Deng Xiaoping's maxim, "hide your strength and bide your time."[67] He is instead choosing a more assertive path that, by most accounts, seeks to restore China to its "rightful place" by the centenary of the CCP's victory in China's civil war (1945 to 1949). The willingness to go to war with the United States over Taiwan is less about "reunification" of a rebellious province—a questionable reading of Taiwan's history—than about destroying the last remaining remnants of resistance to the CCP. As one study of Taiwan's history clearly illustrates, Taiwan was not an integrated part of China or any of its dynasties but was most often seen as an island controlled by Europeans, pirates, or the Japanese.[68] For Xi, nuclear weapons are a key enabler in achieving that core interest. This is not because he wants a nuclear war, but because he believes American decisionmakers fear nuclear use more than they value interests in Asia.[69]

The Russia Question

Putin's motivations are not too dissimilar from those of Xi in that he is also looking to restore lost honor to a Russia that was weakened by the collapse of the Soviet Union but is now resurgent and looking to reassert its interests in Eastern Europe.[70] Too often Western leaders dismissed Putin's warnings about NATO's Eastern expansion as hyperbole.[71] Whether his fears are valid or not is less relevant than his perception. With Sweden and Finland joining NATO, Putin is likely to see this not as a defensive response to Russian aggression in Ukraine but as a further effort to constrain Russia and hold St. Petersburg and the northwest at risk.[72] From Putin's perspective, these are very logical concerns founded in NATO and American action. This paranoia is not alleviated

66. See Eric Lipton, "New Star Wars Plan: Pentagon Rushes to Counter Threats in Orbit," *The New York Times*, 17 May 2024, https://www.nytimes.com/; and see also Marissa Martin et al., *Chinese Military and Intelligence Rendezvous and Proximity Operations* (Secure World Foundation, 2021).

67. Diane Choyleva, "China's 'New Era' Changes the Game for Global Actors," Asia Society, 3 April 2024, https://asiasociety.org/.

68. See Jonathan Manthorpe, *Forbidden Nation: A History of Taiwan* (St. Martin's Press, 2009); and Fei-Ling Wang, "China Transforming the World Order," Adam Lowther, host, *NucleCast*, podcast, 18 April 2024, https://rss.com/.

69. Jonathan D. T. Ward, *China's Vision of Victory* (Atlas Publishing, 2019).

70. See Phillip Short, *Putin: His Life and Times* (Henry Holt, 2022).

71. Ronald Suny, "Ukraine War Follows Decades of Warnings That NATO Expansion into Eastern Europe Could Provoke Russia," *The Conversation*, 28 February 2022, https://theconversation.com/.

72. Jack Dutton, "What Vladimir Putin Has Said About Finland and Sweden Joining NATO," *Newsweek*, 16 May 2022, https://www.newsweek.com/; and Richard Holmes and Cahal Milmo, "Putin Sends Combat Troops and Spies to Finland's Border as NATO Tensions Grow," *The i Paper*, 18 May 2025, https://inews.co.uk/.

when American and Ukrainian intelligence personnel operate inside Russia (2015 to 2022)—according to media reports.[73] Such efforts only fuel Russian fears and a determination to prevent American interference with the Russian near abroad—its post-Soviet neighbors.[74]

Long before American airstrikes on Iran taught Putin that Russian air defenses cannot prevent the United States from striking deep behind enemy lines with stealth aircraft, Putin feared that very thing.[75] Describing these fears, one 2023 analysis also explains how Russia plans to employ low- and ultra-low-yield nuclear weapons to deter and defeat American fifth-generation airpower.[76] For Russia, the concern over NATO and airpower is much closer to home than it is for China.

While the United States has an almost eight-decade tradition of thinking about deterrence, Russia does not. It was only after 2000 that Russia, in a period of weakness, began to develop a theory and strategy of deterrence.[77] Surprisingly, the Soviet Union never developed such a strategy. Thus, modern Russian deterrence strategy is largely untested and on a less than firm foundation. Ample evidence from before and after its invasion of Ukraine suggests that Russia does have an "escalate to deescalate" nuclear strategy in which it will use nuclear weapons first for the sake of forcing an adversary to negotiate an early end to hostilities—particularly a stronger adversary.[78] In many respects, Russia finds itself in a similar position to that of the United States during the Eisenhower administration, looking to substitute an aggressive nuclear policy for conventional forces.

In the end, both Xi and Putin see American power as a threat to their own ability to achieve the aspirational goals they set for their respective countries. Both men understand that nuclear weapons are effective in deterring American conventional military action, and both believe that with peer or superior nuclear arsenals—particularly superior tactical nuclear arsenals—they can achieve their regional ambitions while coercing the United States into inaction or great restraint. On course to see its nuclear arsenal eclipsed by two nuclear-armed rivals within a decade, the United States is put in an undesirable strategic position. Again, evidence does not suggest China or Russia are developing nuclear arsenals capable of a disarming first strike against nuclear forces in the Ameri-

73. Patrick Reevell, "How the CIA and Ukrainian Intelligence Secretly Forged a Deep Partnership," *ABC News,* 17 January 2025, https://abcnews.go.com/.

74. Thomas de Waal, *The End of the Near Abroad* (Carnegie Europe, 2024).

75. Stefan Becket, "Pentagon Reveals New Details on Iran Strikes, Named Operation Midnight Hammer," *CBS News,* 24 June 2025, https://www.yahoo.com/.

76. Roy Boone et al., "Russia's Non-Strategic Nuclear Weapons and Western Air Supremacy," *Æther: A Journal of Strategic Airpower and Spacepower* 2, no. 1 (Spring 2023).

77. Dmitry Adamsky, *The Russian Way of Deterrence: Strategic Culture, Coercion, and War* (Stanford University Press, 2024), 22.

78. Mark B. Schneider, *The Leaked Russian Nuclear Documents and Russian First Use of Nuclear Weapons* (National Institute of Public Policy, 2024), 3–4.

can homeland; instead, they are most interested in strategic nuclear restraint accompanied by regional nuclear coercion through superior theater or tactical nuclear forces.[79]

Future Scenarios

According to one 2016 study, scenarios are a vision of what a future world might look like, their utility dependent on whether they are plausible and strategically relevant.[80] Scenarios are not designed to predict the future but to expand the range of possibilities and possible actions for those who employ them in tools such as table-top exercises or wargames. In some instances, scenarios, which can diverge from reality, can serve as thought experiments.

Two plausible scenarios are illustrative of the challenge facing the United States. While they do not offer a detailed description of Russian or Chinese nuclear doctrine, policy, or strategy nor give a full accounting of either's response on the one hand and the United States on the other, they are sufficiently plausible in highlighting what might occur if the US nuclear arsenal falls short. As two former senior officials of the Biden administration indicated in mid-2025, "Indeed, US defense planners must now consider the possibility that Beijing and Moscow may try to synchronize aggression against their neighbors to further limit the US ability to respond."[81]

Envision a near future in which Russia's war in Ukraine drags on for several more years before Ukrainian forces gain the upper hand and retake territory currently held by Russian forces and even begin to retake Crimea—a clear Russian red line that Putin repeatedly warns Ukraine and NATO they are crossing. Ukraine ignores Russian warnings, believing Putin will not cross the nuclear threshold. Russia then uses ultra-low-yield tactical nuclear weapons on key military targets in eastern Ukraine.

With the United States and the international community focused on Europe, Beijing sees an opportunity to seize Taiwan. This is the result of a speech given by Taiwan's president, Lai Ching-te, to the business community that Taiwan will not unify with China if the CCP remains in power. With China's nuclear expansion further along than American intelligence believes, China feels confident enough to launch an attack on Taiwan by using cyber and space forces that leave Taiwan deaf, blind, and unable to trust the information it receives. A naval blockade is also placed around Taiwan to prevent food, fuel, and commerce from reaching the island. The United States is made aware of China's far larger

79. Samuel Charap et al., *Mitigating Challenges to U.S.–Russia Strategic Stability* (RAND Corporation, 2022), vii.

80. Andrew F. Krepinevich and Jacob Cohn, *Rethinking Armageddon: Scenario Planning in the Second Nuclear Age* (Center for Strategic and Budgetary Assessments, 2016).

81. Vipin Narang and Pranay Vaddi, "How to Survive the New Nuclear Age," *Foreign Affairs* 104, no. 4 (2025).

than expected theater nuclear forces and its willingness to use nuclear weapons in the defense of "sovereign Chinese territory."

With Trump believing that neither Russia nor China will use nuclear weapons against the United States, he presses forward in defending both Ukraine and Taiwan. This leads to a coordinated nuclear strike on overseas American assets by both China and Russia. Ultra-low-yield tactical nuclear weapons strike both American naval forces steaming to defend Taiwan and American forces moving in and out of Ukraine near the Polish border. There are no direct strikes on the homeland. Trump is left to respond with advanced conventional capabilities, low-yield theater nuclear options (fighter-delivered B61-12s in Europe or submarine-delivered W76-2 SLBMs in Asia), or launch a strategic nuclear war. While American stealth aircraft and their precision-guided munitions are the preferred option, there is a fear that a conventional response will leave the United States appearing weak. And with the current nuclear arsenal, the president is in no position to climb the escalation ladder rung for rung with Xi and Putin.

Such a scenario is the preference of neither China nor Russia. China certainly desires to avoid any conflict with the United States. Russia would like to defeat Ukraine with conventional forces and limit its nuclear arsenal to coercion and deterrence of the United States and NATO. But given the very clearly stated core interests of China and Russia, neither is willing to compromise on achieving those interests. Both states believe there is an asymmetry of interest that benefits them.

American planners might argue that, however improbable a coordinated Chinese and Russian nuclear strike might be, the size of the American arsenal is sufficient to prevent them from employing nuclear weapons in a scenario like the one described above. This may be true, but if the worst were to happen, the United States would find itself in a very difficult position of its own making.

Should Russian predilections for violating arms control agreements hold true, and Russia—despite the intelligence community's best efforts—declare a dramatic expansion of its nuclear arsenal, post-New START, the American disadvantage would only grow.[82] It is also possible that intelligence on China's nuclear expansion is under-reporting the speed at which its arsenal is growing.[83] China is unlikely to reveal such a reality until it creates an advantage in a crisis.

Imagine a second scenario that takes place a decade from now in which simultaneous crises in Europe (Russian border dispute with Finland; threats to defend ethnic Russians in Estonia; or a new conflict with Ukraine) and Asia (China's attack on Taiwan with coordinated cyber and nonkinetic attacks on US

82. Mark B. Schneider, "Russian Violations of Its Arms Control Obligations," *Comparative Strategy* 31, no. 4 (2012).

83. US-China Economic and Security Review Commission, *2023 Report to Congress of the US-China Economic and Security Review Commission* (Government Printing Office, 2023).

and Allied capabilities in Asia) move from a limited conventional conflict in both regions to the use of ultra-low-yield or low-yield tactical nuclear weapons by China or Russia against regional targets. Much as in the previous scenario, such an escalation serves as a warning to the United States that it cannot rely on conventional capabilities to ultimately win against China and/or Russia. If the American nuclear modernization program remains unchanged, the United States will remain equally unable to climb the escalation ladder, rung for rung, with China and Russia.

Recommendations

To prevent the United States from finding itself in a situation like those described, maintaining the status quo nuclear modernization program is simply inadequate. A larger nuclear arsenal with a more diverse array of nuclear warheads and delivery systems is required. This article recommends adopting the strategy of *dynamic parity,* which one analysis describes as designed to accomplish four primary purposes:

1. Balance the American nuclear arsenal against the collective arsenals of China, North Korea, and Russia to prevent the United States from becoming inferior in nuclear capability.
2. Enhance extended deterrence by assuring Allies of American commitment to match adversary expansion with comparable capabilities.
3. Create a flexible framework for managing the growth or decline of operationally deployed nuclear weapons in the absence of arms control.
4. Inform American nuclear force configuration, size, and deployment.[84]

In short, dynamic parity argues for building a nuclear force of roughly equal size and capability to the collective nuclear forces of China, North Korea, and Russia. A critic of such an approach may argue that China and Russia will see collective parity as a move toward individual superiority, causing an arms race. Such an outcome is far less detrimental to American interests than nuclear inferiority.

Although the developers of dynamic parity do not discuss the topic, it is possible to mitigate the perception that the United States seeks superiority vis-à-vis Russia and China, individually, by communicating its strategy and, for example, deploying nuclear systems in theater that are tactical (low-yield and limited range) or—if fielded inside the United States—functionally limited by location and range to striking China or Russia but not both. Such an approach, backed by purposeful action, has the potential to achieve the desired result—stable deterrence.

There is a second component to dynamic parity. Absent trilateral arms control agreements, there is a need for dynamic sizing of American nuclear forces that expands the arsenal when adversary arsenals increase and contracts the United

84. McGiffin and Lowther, *Dynamic Parity*, i.

States' arsenal when China and Russia reduce their arsenals.[85] This approach requires the nation to maintain a nuclear enterprise that is capable of regularly replacing aging systems with cutting-edge systems in greater or lesser numbers.

In the short term, the developers of dynamic parity advocate uploading three warheads to each Minuteman III and placing American nuclear-capable bombers on alert.[86] This analysis disagrees with that recommendation for practical reasons. The United States is already struggling to field new systems on time and budget.[87] Shifting the Air Force's focus and funding from modernization to a temporary solution, like uploading and/or alerting bombers, is unlikely to solve any real problem. Over the short and long term, the lack of theater nuclear options is the challenge. Thus, expanding the number of dual-capable aircraft and nuclear weapons in Europe would prove far more useful to maintain strategic stability. Returning American nuclear weapons to South Korea would also send a clear signal to China. Placing nuclear forces in Europe and Asia on alert would signal American will and serve to mitigate American shortages of tactical nuclear weapons.

Neither the recommendations of the developers of dynamic parity nor of these authors represent a maximalist nuclear strategy. Instead, they attempt to balance deterrence credibility with cost. Whatever approach Trump and future presidents may choose, doing nothing is not an option. The president's "Golden Dome" missile defense shield may play an important role in moving the United States toward parity. But at the time of this writing, as a concept without clear substance, it remains difficult to incorporate into any strategy.[88]

Conclusion

The preceding analysis suggests that the United States is moving into a period where American nuclear inferiority vis-à-vis China and Russia is likely to destabilize strategic stability. The United States' current nuclear modernization program, absent any change, ensures the American nuclear arsenal falls behind that of Russia and China by 2035. American failure to field adequate theater nuclear systems to counterbalance the growing capabilities of China and Russia is particularly problematic and allows Xi and Putin to use nuclear weapons as coercive tools in regional crisis or conflict.

With New START expiring in 2026 and nuclear arms control nowhere on the horizon, nuclear parity is an increasingly important option for the United States if it seeks to prevent adversaries from viewing nuclear coercion as viable for pur-

85. McGiffin and Lowther, *Dynamic Parity*.

86. McGiffin and Lowther, *Dynamic Parity*, 12.

87. Xiaodong Liang, "U.S. Nuclear Modernization Programs," Arms Control Association, August 2024, https://www.armscontrol.org/.

88. "Golden Dome for America: Revolutionizing US Homeland Missile Defense," Lockheed Martin (website), 25 May 2025, https://www.lockheedmartin.com/.

suing core interests. US adversaries may see current American nuclear restraint as a weakness rather than a demonstration that the nation seeks peaceful coexistence. In countries where authoritarianism has deep cultural roots, American efforts to promote peace have the opposite effect. As former Secretary of Defense Donald Rumsfeld once noted, "Weakness is provocative."[89] For the United States, appearing weak is growing increasingly dangerous. ✪

89. Jim Rutenberg, "In Farewell, Rumsfeld Warns Weakness Is 'Provocative,' " *The New York Times*, 16 December 2006, https://www.nytimes.com/.

Back to the Future

Conventional-Nuclear Integration and Regional Deterrence

JAMES J. WIRTZ
JEFFREY A. LARSEN

This article explores the US revival of conventional-nuclear integration (CNI) to bolster regional deterrence amid intensifying great power rivalry, particularly with Russia and China. Proponents argue that CNI enhances deterrence and reassurance by combining nuclear and conventional capabilities into a unified strategy. Yet critics raise concerns about entanglement, where overlapping systems could trigger miscalculation or accidental escalation. While CNI aims at strategic cohesion and signaling strength, entanglement warns of operational risks. Ultimately, both perspectives are vital for understanding evolving deterrence needs in a complex, multipolar security landscape.

The United States provides security guarantees to nearly 40 allied countries, including extended deterrence pledges that involve nuclear assurances. Although these extended deterrence commitments faded into the political background following the collapse of the Soviet Union and the Warsaw Pact, conventional and nuclear deterrence are again increasing in military importance and political salience.

The United States' peer and non-peer adversaries are attempting to acquire or are integrating increasingly advanced nuclear capabilities or new nuclear doctrines into their defense establishments and operational planning for future conflicts. This is creating an issue for defense planners, because the US tactical and theater nuclear capability that emerged in the 1950s with the Eisenhower administration's "New Look" defense policy—which aimed to balance military needs with fiscal limits by emphasizing nuclear deterrence strategies—was eliminated in the immediate aftermath of the Cold War. Nuclear weapons have been largely removed from US conventional theater forces. This reality requires the United States to consider possible adversary nuclear use during a conventional conflict and to invest in integrated conventional and nuclear capabilities for US theater forces to better deter and defeat such threats.

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There is a growing movement to reintroduce nuclear capabilities in theater forces and regional deterrent postures.[1] As an April 2025 analysis notes, "France is making noise about expanding a nuclear umbrella to other European nations. Poland and South Korea are publicly calling for Washington to deploy US nuclear weapons on their soil, and Sweden has announced its willingness to host US nuclear weapons in wartime."[2] American interest in combining conventional and nuclear forces, which is often described by the terms *conventional-nuclear integration* (CNI) or *entanglement*, is replacing a preoccupation with special operations that characterized the Pentagon's approach to the Global War on Terrorism. American planners are slowly recognizing that a focus on tactics and weapons acquisition to win the next engagement is not the same as devising a strategy and force posture to deter the next war.[3]

CNI is important because plausible scenarios for nuclear conflict can arise out of a conventional war that escalates into a theater nuclear conflict. Russian nuclear doctrine, for instance, advances the concept of "escalate to de-escalate," which suggests that nuclear weapons can be used to reverse a losing conventional battle or to terminate a successful conventional engagement on favorable terms.[4] Multiple studies and wargames in an Asia context also have suggested that "most of the plausible scenarios for the initiation of nuclear war begin with the escalation of an extended deterrence crisis that started at the conventional level."[5]

But not everyone is highlighting how CNI will bolster America's predominately conventional theater deterrent posture. One expert has warned about the threat of conventional-nuclear entanglement as a source of deliberate or inadvertent escalation during a theater conflict: "Entangled nuclear-conventional crises are set to be more difficult to navigate than the nuclear crises of the US-Soviet Cold War."[6] While the terms CNI and entanglement both characterize the same strategic circumstances, they come to rest on opposing assessments of the risks and benefits of reintroducing nuclear weapons into US forces that are currently

1. James J. Wirtz and Jeffrey A. Larsen, "Who Does Deterrence? The Politics and Strategy of Integrated Deterrence," *RUSI [Royal United Services Institute] Journal* 168, no. 6 (2023).

2. Henry Sokolski and Thomas D. Grant, "How to Leverage US Nukes Overseas," *Breaking Defense*, 17 April 2025, https://breakingdefense.com/.

3. James J. Wirtz, "Deterrence 2027: Keeping the Threat at Bay," CIMSEC [Center for International Maritime Security], 18 November 2024, https://cimsec.org/.

4. Anya L. Fink, *Russia's Nuclear Weapons: Doctrine, Forces, and Modernization*, R45861 (Congressional Research Service, 21 April 2022), https://www.congress.gov/; and Bruno Tertrais, "Russia's Nuclear Policy: Worrying for the Wrong Reasons," *Survival* 60, no. 2 (2018).

5. Benjamin Zala, *Nuclear-Conventional Entanglement in Northeast Asia: The Case for Crisis Management Interoperability* (Asia-Pacific Leadership Network, July 2024), 5; and see, for example, Markus Garlauskas et al., *A Rising Nuclear Double-Threat in East Asia: Insights from our Guardian Tiger I and II Tabletop Exercises* (Atlantic Council, 15 May 2025), https://www.atlanticcouncil.org/; and Jon B. Wolfsthal and Toby Dalton, "Addressing the Growing Risks of Nuclear Use in East Asia," *Journal for Peace and Nuclear Disarmament* 8, no. 1 (2025), https://doi.org/.

6. Zala, *Nuclear-Conventional Entanglement*, 9.

armed only with conventional weapons. And whichever term one chooses to use, they both suggest that theater nuclear capabilities are returning to US extended deterrent guarantees. The US Navy, for instance, is working to deploy a Submarine Launched Cruise Missile-Nuclear (SLCM-N) by the mid-2030s.[7]

This article describes how the terms CNI and entanglement capture two separate concepts which highlight different facets of the effort to equip theater forces with nuclear weapons to bolster deterrence. In exploring the reintegration of nuclear weapons into theater deterrent forces as an emerging issue for defense planners, this article identifies the ways in which the two terms address different aspects of the reintroduction of tactical and theater nuclear weapons into conventional units, pointing to the increasing salience of theater nuclear deterrence.

The Pendulum Swings: Theater Nuclear Deterrence is Returning

An unmistakable shift in the American nuclear force posture occurred in September 1991 when President George H. W. Bush announced the Presidential Nuclear Initiatives. In a unilateral step, he removed all tactical ground-based nuclear weapons from US units and all tactical nuclear weapons from surface ships, attack submarines, and naval aircraft.[8] One conventional system, the Tomahawk Land Attack Missile, was retained, and its nuclear warheads were kept in warm storage until they were fully retired by President Obama's *2010 Nuclear Posture Review*.[9] This process did more than just eliminate the risks and costs of a class of weapons that were rendered obsolete by the end of the Cold War. The Presidential Nuclear Initiatives began a process whereby dual-use, nuclear-conventional systems were largely removed from conventional units as nuclear forces were centralized under the command and control of the newly created US Strategic Command in Omaha, Nebraska. The Cold War nuclearization of the US military was reversed—all nuclear weapons were now treated as a strategic asset, reserved to deter existential threats.[10]

With the rise of great power competition, however, the global nuclear balance, nuclear deterrence, and the status of US nuclear forces became a matter of political concern in Washington and allied capitals. Concerns about deterrence were driven by Russia's annexation of Crimea in 2014 and its 2022 in-

7. John Grady, "Sea Launched Cruise Nuclear Missile to Deliver in 2034, Says Admiral," *USNI News*, 8 May 2025, https://news.usni.org/.

8. Matthew Fuhrmann and Bryan R. Early, "Following START: Risk Acceptance and the 1991–1992 Presidential Nuclear Initiatives," *Foreign Policy Analysis* 4, no. 1 (January 2008); and Susan Koch, *The Presidential Nuclear Initiatives of 1991–92*, Case Study Series 5 (Center for the Study of Weapons of Mass Destruction, National Defense University, September 2012).

9. Robert Gates, *2010 NPR* (DOD, 2010).

10. Lawrence Freeman and Jeffrey Michaels, *The Evolution of Nuclear Strategy*, 4th ed. (Palgrave Macmillan, 2019).

vasion of Ukraine, which was accompanied by a barrage of Russian nuclear threats against NATO countries. Evidence of a sustained Chinese nuclear buildup only heightened fears about a shifting nuclear balance. If current trends involving quantitative and qualitative changes in competitors' nuclear arsenals continued, it appeared that the United States would find itself in last place in a twenty-first-century nuclear arms race.[11]

The rising integration of tactical and theater nuclear capabilities into competitors' force structures and doctrine suggested that the US nuclear arsenal was becoming increasingly out-of-date and ill-suited to the emerging threat. US central strategic systems—which are traditionally referred to as the strategic triad of long-range bombers, intercontinental ballistic missiles, and submarine-launched ballistic missiles—carried nuclear warheads that had yields too large for tactical employment on the battlefield. Moreover, because they would have to be launched at transcontinental distances to hold targets at risk, central systems would probably have to overfly other nuclear-armed states, which could prove to be highly provocative.

Furthermore, the asymmetric balance in theater nuclear capabilities between the United States and its peer competitors is becoming important for observers who are concerned that the United States lacks a nuclear weapon or delivery system that it would be willing to use in a theater engagement. In other words, the United States might be self-deterred from executing an extended deterrent threat following an adversary's use of a low-yield nuclear weapon on the battlefield.

On paper at least, CNI and the parallel requirement for US regional combatant commands to work together has existed for nearly 20 years following the publication of the DOD's *Deterrence Operations: Joint Operating Concept* mission: to "deny benefits and impose costs, plus encourage adversary restraint."[12] The *2018 Nuclear Posture Review* also recognized the necessity of dealing with this challenge, requiring "the integration of nuclear and non-nuclear military planning."[13] This built on the *2014 Quadrennial Defense Review,* which stated that US nuclear forces will ensure "potential nuclear-armed adversaries that they cannot escalate their way out of failed conventional aggression."[14] Nevertheless, there is now interest in paying more than lip service to CNI; with the pending deployment of SLCM-N on US attack submarines, the Pentagon now has an opportunity to reintegrate nuclear weapons into theater nuclear planning and deterrent postures.

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11. Hans M. Kristensen et al., "Chinese Nuclear Forces, 2024: A 'Significant Expansion,' " Federation of American Scientists, 16 January 2024, https://fas.org/; and *Nuclear Challenges: The Growing Capabilities of Strategic Competitors and Regional Rivals* (Defense Intelligence Agency, 2024), https://www.dia.mil/.

12. US Strategic Command, Director, Plans and Policy, *Deterrence Operations: Joint Operating Concept*, ver. 2.0 (Department of Defense [DOD], December 2006), 6, https://apps.dtic.mil/.

13. Jim Mattis, *2018 Nuclear Posture Review* [*NPR*] (DOD, 2018), VIII.

14. Chuck Hagel, *Quadrennial Defense Review 2014* (DOD, March 2014), 13.

Scholars have taken note of an adverse theater nuclear balance. A 2021 *Strategic Studies Quarterly* analysis stated that policymakers must turn to history to understand theater nuclear deterrence, arguing that "present efforts to address the challenge posed by conventional-nuclear integration (CNI) can be informed by the Cold War."[15] This is a valid observation. A review of past efforts can provide a starting point for the effort to reconstitute US theater nuclear capabilities 30 years after they were removed from fielded forces. Nevertheless, today's international security environment is more complex than the bipolar setting of the Cold War. Today the United States faces two nuclear peer powers in Russia and China, as well as at least one or two smaller adversarial nuclear-armed states in North Korea and, possibly, Iran.

In addition to dealing with more than one nuclear-armed opponent, US commanders must account for adversaries' plans to leverage nuclear risk to gain an advantage in a future regional conflict.[16] A growing number of observers have suggested that this creates a need to rebuild US theater nuclear forces.[17] The possibility that a regional conventional conflict might escalate to the point where one side thinks nuclear weapons should be used on the battlefield demands that the United States have similar capabilities to complicate an adversary's calculations. This does not mean that the United States needs a one-for-one, in-kind response to an opponent's theater capabilities, rather that it needs some kind of theater system that can hold regional targets at risk with a low-yield nuclear weapon.[18]

Analysts who agree with this assessment point out that conventional-nuclear integration is just one name for the intersection of conventional and nuclear forces that strengthens overall deterrence. They contrast the nuclear policies taken by the United States—which, in the aftermath of the Cold War, has attempted to maintain a clear firebreak between conventional and nuclear weapons use—with the approach taken by Russia and China, which are both enhancing their theater, dual-capable missile programs.[19] From about 1989 to post-2014, this

15. Justin Anderson and James R. McCue, "Deterring, Countering, and Defeating Conventional-Nuclear Integration," *Strategic Studies Quarterly* 15, no. 1 (2021): 28.

16. Anderson and McCue, "Deterring," 30.

17. Greg Weaver, *The Imperative of Augmenting US Theater Nuclear Forces* (Scowcroft Center for Strategy and Security, The Atlantic Council, 11 April 2025); Brandon M. Patterson, "The Navy Needs a Low Yield Nuclear Weapon," *Proceedings* 148, no. 12 (2022), https://www.usni.org/; Robert Peters and Eli Glickman, *Forward Deployment of Non-Strategic Nuclear Weapons Is Needed to Deter Adversary Aggression*, Issue Brief no. 5375 (The Heritage Foundation, 2025), https://www.heritage.org/; and Eric S. Edelman and Franklin C. Miller, *Joint Prepared Statement and Opening Remarks Before the United States Senate Committee on Armed Services, United States Nuclear Strategy and Policy, September 20, 2022, No. 538*, National Institute for Public Policy, 10 November 2022, https://nipp.org/.

18. The authors thank an anonymous reviewer for raising the issue of symmetry in theater nuclear systems.

19. Doreen Horschig and Nicholas Adamopoulos, "Conventional-Nuclear Integration to Strengthen Deterrence," CSIS [Center for Strategic & International Studies], 4 October 2023, https://www.csis.org/.

asymmetry in force posture and doctrine was not strategically salient; however, that time has now passed.

Characterizing the New Nuclear Setting

Today the United States faces an emergent strategic setting that for decades was widely considered to be consigned to the ash heap of history. Nuclear weapons lacked much political or strategic relevance as nuclear arsenals shrank and modest nuclear force modernization was the order of the day—that is, when funds were expended to extend the life of aging weapons and associated delivery systems.[20] When the threat of theater nuclear war receded in the 1990s, no one suggested that retiring tactical or theater nuclear weapons was a bad idea, or that the world would be a safer place if nuclear weapons continued to be deployed with conventional units.[21] The fact that Russia tended to hang on to its tactical nuclear forces despite the elimination of many US systems was largely attributed to a desire to retain some sort of defensive capability given the sharp decline in the size and quality of Moscow's conventional forces. There was a time during the unipolar moment and its long demise when global security challenges did not appear to require nuclear weapons by any major power.[22] Unfortunately, those days are gone. Instead, two terms are currently being used to characterize the reintroduction of non-strategic nuclear weapons into existing forces and planning: conventional-nuclear integration and entanglement.

Conventional-Nuclear Integration

Conventional-nuclear integration has been defined as "the deliberate, calculated decision by a state actor to combine conventional and nuclear-capable forces to realize strategic, theater, and/or tactical military objectives that it assesses cannot be achieved through the use of conventional forces alone."[23] Such thinking carries over across the entire range of required activities necessary to implement a decision to once again procure tactical nuclear weapons. This includes research and development, acquisition of fissile materials, weapon design and testing, deployment in the field, creation of doctrine, training of forces, and so on. From a US perspective, it is a significant decision that assumes the possibility of nuclear escalation by one or both sides in a regional conflict.

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20. James J. Wirtz, "Nuclear Policy at a Crossroads," in Muthia Alagappa, ed., *The Long Shadow: Nuclear Weapons and Security in 21st Century Asia* (Stanford University Press, 2008).

21. Richard K. Betts, *Nuclear Blackmail and Nuclear Balance* (Brookings Institution, 1987).

22. Timothy D. Miller and Jeffrey A. Larsen, "Cash for Kilotons: Dealing with Russian Tactical Nuclear Weapons," *Naval War College Review* 57, no. 2 (2004); and Hans M. Kristensen and Robert S. Norris, "Russian Nuclear Forces, 2015," *Bulletin of the Atomic Scientists* 71, no. 3 (2015).

23. Anderson and McCue, "Deterring," 31.

Conventional-nuclear integration does not imply that the conventionalization of nuclear weapons is underway—that is, that nuclear weapons will be integrated into arsenals to be used as the situation arises, just as conventional weapons are currently employed.[24] Neither is CNI about placing nuclear warheads on precision-guided delivery systems so that they can be readily employed alongside conventional munitions for purposes of preemption or routine battlefield use. Instead, CNI requires the development of a regional deterrent strategy that explains the role theater or tactical nuclear weapons will play in deterring both conventional and nuclear conflict. CNI is not about warfighting; it is about theater deterrence, especially deterring the opponent from employing nuclear weapons in the first place. It reflects the need to focus on deterrence—including nuclear deterrence—in regional defense strategy.

Beyond a straightforward decision to use nuclear weapons to defeat a conventionally armed opposing force, an adversary may wish to pursue several possible courses of action during a regional conflict. These different operations and strategies provide opponents with various rationales for pursuing a deterrent strategy incorporating CNI:

- To guarantee at least a draw in a conflict (and thus preserve their regime)
- To discourage allied participation and/or US intervention
- To provide fidelity for (theater) brinkmanship
- To complicate rules of engagement and targeting
- To enhance the lethality of standoff strike options[25]

How can the United States respond to such thinking by an adversary in a regional confrontation? The ability and willingness of an adversary to escalate a conventional conflict to nuclear levels will certainly affect US cost-benefit calculations about the use of force, especially a conflict that might trigger the use of central strategic nuclear forces. Regional nuclear asymmetry also will have an immediate impact on allied views of the desirability of American support in case of war. According to the *Strategic Studies Quarterly* analysis mentioned above, "adversaries and allies must believe the United States has both the political will and military capacity to directly counter, deter, and if necessary, defeat an integrated force fielding conventional and nuclear-capable assets in a regional fight far from US shores."[26] CNI provides assurances to allies that opponents cannot exploit a regional nuclear asymmetry to their advantage, which from the allied perspective reduces the likelihood that nuclear weapons will be used against them if they side with the United States in a regional conflict.

24. Robert Jervis, *The Meaning of the Nuclear Revolution* (Cornell University Press, 1990).
25. Anderson and McCue, "Deterring."
26. Anderson and McCue, "Deterring," 40.

CNI, often by other names and without fanfare, appears to have been at least partly incorporated into US defense planning. For instance, the *2022 Nuclear Posture Review*, while generally calling for less reliance on nuclear weapons in US national security strategy, nevertheless stated that one of its goals was to "adopt an integrated deterrence approach that works to leverage nuclear and non-nuclear capabilities to tailor deterrence under specific circumstances."[27] The US nuclear posture "is intended to complicate an adversary's entire decision calculus, including whether to instigate a crisis, initiate armed conflict, conduct strategic attacks using non-nuclear capabilities, or escalate to the use of nuclear weapons on any scale."[28] That is the essence of CNI. While not using the term conventional-nuclear integration in these phrases, such discussions have couched the term in the language of the Biden administration's *integrated deterrence* concept—which implied the entanglement of nearly everything, preferably in ways that benefited US security. The Trump administration has not disavowed this organizing construct and may wish to carry it forward, even if under a new name.[29] CNI is an extrapolation of that policy.

In terms of integrated deterrence, the *2022 Nuclear Posture Review* clearly states that an important factor is "better synchronizing nuclear and non-nuclear planning, exercises, and operations." It further notes that the War Department's aim is "to strengthen deterrence and raise the nuclear threshold for our adversaries in regional conflict by undermining adversary confidence in strategies for limited war that rely on the threat of nuclear escalation."[30] While the blanket term integrated deterrence has been overtaken by events, CNI might be an emergent, albeit if more constrained, manifestation of the need to coordinate and bolster today's deterrent posture in both Europe and Asia.

CNI represents more than just a shift in US nuclear procurement and deployment policy. It is intended to transform an aspirational or rhetorical goal into a new regional nuclear capability, reversing the decision to separate conventional forces from the central strategic deterrent that was intended to deter existential threats to the United States and its allies. CNI also reflects a new emphasis on deterrence in US defense policy, produced by great power competition and the ongoing great power war (by proxy) in Ukraine, a focus that was lost amidst the endless series of military actions taken in support of the Global War on Terrorism and US engagements in Iraq and Afghanistan.

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27. Lloyd J. Austin III, *2022 Nuclear Posture Review (NPR)* (DOD, 2022), 3.

28. Austin, *2022 NPR* (DOD, 2022), 9.

29. James Wirtz and Jeffrey Larsen, "Wanted: A Strategy to Integrate Deterrence," *Defense & Security Analysis* 40, no. 3 (2024); and see also Larsen and Wirtz, "Obstacles to Integrating Deterrence," *Joint Force Quarterly* 117, no. 2 (2025), .

30. Austin, *2022 NPR*, 10.

Entanglement

Entanglement—a term credited to a 2001 publication delineating the ways in which a US-Russian conflict might escalate—is used to describe how a nation's nuclear and conventional forces and strategies can become intertwined, especially in unanticipated and unintended ways that can lead to inadvertent escalation.[31] Entanglement is usually invoked to capture the dark side of CNI: "If an attack designed to degrade an adversary's conventional forces also compromises their nuclear forces in some way, this can incentivize the early use of nuclear weapons by creating a 'use or lose them' situation (whether real or perceived)."[32] This is a growing concern because technological breakthroughs in remote sensing, missile accuracy, space-based capabilities, and autonomous weapons systems have in some estimates made nuclear forces more vulnerable to attack and less survivable in a second-strike mode.[33] Some analysts have suggested that entanglement itself might deter attacks on dual-use systems out of a reluctance to risk escalation by damaging an opponent's nuclear infrastructure or forces.

One widely read Carnegie Endowment for International Peace analysis of the notion of entanglement focuses on the potential for escalation if an adversary were to attack US conventional command-and-control nodes. The discussion notes that the United States has specifically threatened to retaliate with nuclear weapons if its increasingly dual-use nuclear command, control, and communications (NC3) system comes under attack.[34] Others have also identified this issue while describing the general risks inherent in the turn toward dual-capable platforms, delivery systems, and associated systems.[35] As dual-use systems become increasingly common—as evidenced in the proliferation of satellites, ground stations, weapons systems, and commercial transmission pathways—it will become harder to differentiate between an attack meant to provide an advantage in a conventional conflict with one that could equally be seen as a prelude to a nuclear strike.[36]

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31. John Steinbruner, *Principles of Global Security* (Bloomsbury Publishing, 2001), as cited in James M. Acton, "Why is Nuclear Entanglement so Dangerous?," 55, Carnegie Endowment for International Peace, 23 January 2019, https://carnegieendowment.org/.

32. Zala, *Nuclear-Conventional Entanglement*, 5–6.

33. Zala, *Nuclear-Conventional Entanglement*, 5; and see also Kier Lieber and Daryl Press, *The Myth of the Nuclear Revolution: Power and Politics in the Atomic Age* (Cornell University Press, 2020).

34. Acton, "Nuclear Entanglement."

35. James Wirtz and Jeffrey Larsen, eds., *Nuclear Command, Control, and Communications: A Primer on US Systems and Challenges* (Georgetown University Press, 2022).

36. Don Snyder and Alexis A. Blanc, *Unraveling Entanglement: Policy Implications of Using Non-Dedicated Systems for Nuclear Command and Control* (RAND Corporation, 2022), https://www.rand.org/; and John E. Hyten, "Space Symposium Media Roundtable," transcript, US Strategic Command, 9 April 2019, https://www.stratcom.mil/.

The Carnegie report highlights the need for cooperative efforts to reduce the dangers created by dual-use NC3 systems: "In a conflict, states might act with greater restraint if such leaders were aware of the risks that their intentions could be misinterpreted if, for example, they ordered non-nuclear attacks on dual-use command-and-control systems."[37] A separate analysis also emphasizes the need for cooperative measures and reciprocal restraint by both sides in a conflict to avoid misunderstanding or miscalculation, labeling the set of recommendations as "crisis management interoperability."[38] Given the expiration or termination of existing arms control agreements, however, as well as what appears to be an almost universal disinterest in engaging in arms control, there appears to be little chance that negotiations related to entanglement will begin in the foreseeable future.

The concept of entanglement closely resembles that of *inadvertent escalation* explored in a 1992 study on conventional military operations and nuclear forces.[39] It notes that CNI also created risks of unwanted or unintended nuclear escalation during the Cold War. NATO's plan to undertake precision strikes against Soviet command-and-control systems could have produced inadvertent escalation if Soviet loss of situational awareness had been interpreted by Moscow as a harbinger of nuclear attack. Actions that can produce inadvertent escalation also could prompt rather deliberate escalation if various NC3 and delivery systems are designed not to "fail safe" but to "fail deadly." That is, systems could be employed automatically if deteriorating conditions fell within pre-set parameters. For example, weapons that require a continuous "do not fire" signal could be launched if that signal is lost during a crisis or war. Analysts still fear that the Soviet/Russian "Dead Hand" early-warning and command-and-control system has a "fail deadly" setting—a posture that is extraordinarily dangerous because it would automatically authorize a nuclear strike if certain parameters were met.[40]

Other operational and tactical phenomena might also fall in the basket of issues characterized as entanglement. During the 1990s, for example, one nuclear security expert wrote extensively about the potential for inadvertent escalation produced by a "ratcheting effect" occurring between opposing dual-use, nuclear-conventional command, control, and early warning systems. In other words, a change in party A's alert posture could prompt party B to place their forces on higher alert, which could lead to an additional increase in the alert posture of party A, and so on. This ratcheting effect could cause some unex-

37. Acton, "Nuclear Entanglement."

38. Zala, *Nuclear-Conventional Entanglement*.

39. Barry Posen, *Inadvertent Escalation: Conventional War and Nuclear Risks* (Cornell University Press, 1992).

40. Bruce Blair, "Russia's Doomsday Machine," *The New York Times*, 8 October 1993, A5; and see also David Hoffman, *The Dead Hand: The Untold Story of the Cold War Arms Race and Its Dangerous Legacy* (Anchor Books, 2010).

pected incident during peacetime, crisis, or war to entangle nuclear and conventional forces in unexpected ways.[41]

Similarly, analysis on "normal accidents"—unanticipated human-machine interactions affecting tightly coupled high energy systems—suggests another possible pathway to entangle conventional and nuclear forces at the worst possible times in the worst possible ways. This work highlights an especially pernicious pathway to entanglement. Safety and surety programs add complexity and uncertainty to operations, increasing the potential ways that operators might lose control of increasingly complex systems.[42]

Analysis

Although it is hard to say how long it will take the United States to reintegrate theater nuclear weapons into its conventional force posture, both terms—CNI and entanglement—capture key elements of the reintroduction of noncentral nuclear weapons into regional deterrent strategies. Both terms are useful, yet both are somewhat misleading because they highlight certain facets of the emergent strategic setting at the expense of others.

CNI directs attention toward the mechanics of reintroducing nuclear weapons into forces that are currently equipped only with conventional weapons. In other words, it highlights procurement, basing, command and control, and operational issues that arise when theater nuclear weapons are reintroduced to the force. At the same time, it downplays the impacts theater nuclear forces will have on US strategy and foreign and defense policy. CNI is a manifestation of the shifting US focus away from warfighting—the precise use of force to achieve circumspect military and political goals—to a deterrence posture that deliberately increases the risk of nuclear war to bolster what to date has been a conventional regional deterrent posture.

CNI might be thought of as shorthand for the growing reliance on nuclear weapons to strengthen deterrence, especially the effort to reduce the chance that opponents will use theater nuclear weapons first in a crisis or war. The most important element of CNI is in fact integration—that is, using nuclear weapons to bolster a deterrent posture that largely remains focused on conventional weapons.

The term entanglement addresses a more negative component of CNI, identifying specific connections between conventional and nuclear weapons that can act as a pathway to nuclear escalation, especially unwanted escalation, if certain conditions occur during a crisis or conventional war. While a good deal of the literature on entanglement focuses on dual-use C3 systems and sensors,

41. Bruce Blair, *The Logic of Accidental Nuclear War* (Brookings Institution, 1993).

42. Scott D. Sagan, *The Limits of Safety: Organizations, Accidents, and Nuclear Weapons* (Princeton University Press, 1993).

there are hundreds of escalation pathways that could form, especially as theater nuclear weapons are distributed widely across units currently armed only with conventional weapons.

Entanglement was a well-known phenomenon during the Cold War that was sometimes manipulated to influence the risk of nuclear escalation in the event of deterrence failure. Because the threat of deliberate nuclear escalation might not appear credible to potential opponents, points of entanglement created the risk that nuclear weapons might be used during a conflict due to misperception, miscalculation, or rational calculations of local commanders that defied national priorities. CNI does blur the lines between conventional and nuclear warfare, and entanglement captures how those capabilities overlap in practice, regardless of the efforts made to create a firebreak when it comes to nuclear escalation. Entanglement is the reason the United States withdrew its nuclear weapons from dual-use units as the Cold War ended and centralized virtually all nuclear weapons under the control of US Strategic Command.

Entanglement will always exist if nuclear weapons remain part of an arsenal. Nevertheless, steps can be made to reduce the pathways that constitute entanglement by removing them in terms of deployment, doctrine, operations, and one's deterrent strategy. This is exactly what occurred at the end of the Cold War. As the threat posed by a collapsing Soviet Union receded, the US government began to remove dual-use systems and the risks they posed from theater forces because the diminishing threat of hostilities no longer justified the risks created by CNI. Those who focus on entanglement as a source of nuclear risk when it comes to CNI are correct, but that risk is also the rationale for integrating nuclear weapons into theater deterrent postures.

A return to the robust theater nuclear capabilities deployed during the Cold War is, unfortunately, once again necessary. As nuclear weapons are redeployed, entanglement will inevitably increase.

Conclusion

A consensus is growing between Congress and the executive branch about the requirement for conventional-nuclear integration in the US military. Both the United States and NATO have emphasized this concept in recent documents. The US *2022 National Security Strategy* and *Nuclear Posture Review* highlighted the increasing requirement for CNI. The 2023 Washington Declaration between the United States and South Korea reiterated this requirement for their joint forces on the Korean Peninsula. NATO's *2022 Strategic Concept* and the 2023 *Vilnius Summit Communiqué* both emphasized the need for greater coherence between the Alliance's conventional and nuclear deterrent forces. NATO's 2023 communiqué also called for integration as a core concept in the Alliance's new regional strategies, and the 2024 NATO Summit in Washington reiterated the previous commitments. During the 2024 summit, the United States also agreed to deploy land-based conventional missiles to northeastern Europe as a deterrent

against Russian adventurism. The weapons to be deployed by 2026 include the Tomahawk, SM-6, and developmental hypersonic weapons.[43] These weapons could presumably be converted to dual-use missions as well, if the decision was made to do so.

CNI and entanglement are concepts of increasing relevance to future force posture, doctrine, and strategy. Both are useful, but both tend to conventionalize nuclear weapons, treating them as simply a more powerful munition, not as weapons intended to deter conflict in the first place. CNI tends to misdirect attention from the need to develop a coherent theater deterrent strategy. Nuclear weapons are not meant for warfighting but would serve as the basis of what Thomas Schelling might refer to as "a threat that leaves something to chance."[44] Entanglement identifies the potential pathways that can leave the threat of nuclear escalation to chance, without acknowledging the fact that the potential for escalation is what bolsters regional deterrence.

All this suggests that using nuclear weapons to create an effective deterrent is not for the faint of heart. Entanglement highlights how CNI is not just about redeploying weapons that appeared obsolete and gratuitously dangerous just a few short years ago. CNI is about deliberately raising the risk of nuclear war to bolster what is currently a largely conventional approach to deterrence.

Welcome back to the future. ✪

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43. "Joint Statement from United States and Germany on Long-Range Fires Deployment in Germany," news release, The White House, 10 July 2024, https://bidenwhitehouse.archives.gov/.

44. Thomas C. Schelling, *The Threat That Leaves Something to Chance,* RAND historical document HD-A1631 (RAND Corporation, 10 August 1959), https://www.rand.org/.

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